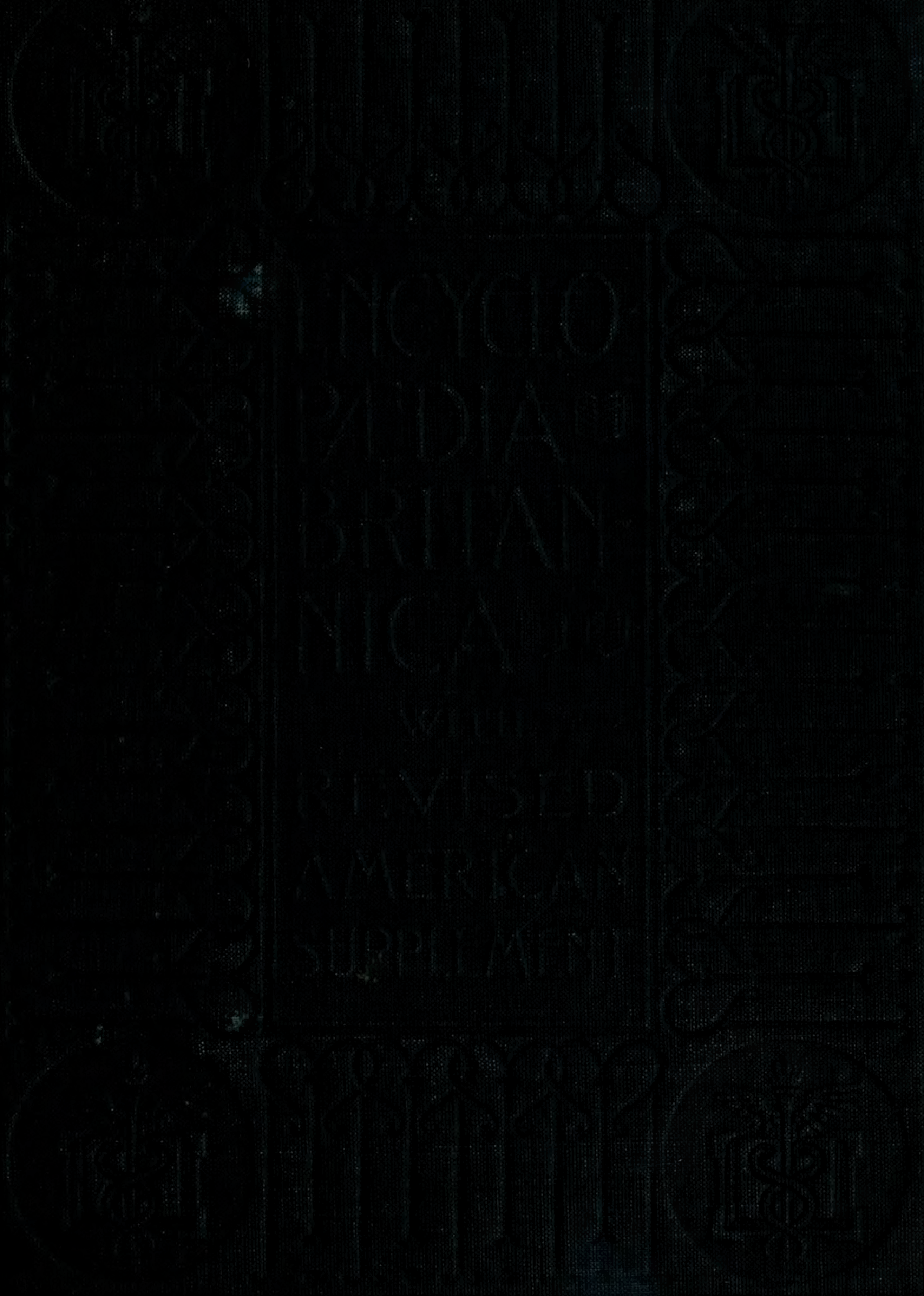

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ENCYCLOPÆDIA BRITANNICA.

PRUDENTIUS, AURELIUS CLEMENS, a Christian verse-writer, apparently a native of Spain, who flourished during the latter half of the 4th century and in the beginning of the 5th. According to the meagre and vague autobiographical notices given by himself in the preface to his poems he was born in the year 348, and, after receiving a liberal education, practised at the bar and subsequently held judicial office in two important cities. At the time of the publication of his poems in 405 he held from the emperor a high military appointment at court. Of his subsequent history nothing is known.

His extant works, besides the preface already referred to and an epilogue, are the following :—(1) *Cathemerinon Liber*, a series of twelve hymns (καθημερινῶν ὑμνῶν) in various metres to be repeated or sung at particular periods of the day or seasons of the year ; (2) *Apotheosis*, a poem of 1085 hexameter verses on the divinity of Christ ; (3) *Hamartigenia* (967 hexameter verses) on the origin of evil and sin ; (4) *Psychomachia*, or the conflict between virtue and vice for the soul (915 hexameter verses) ; (5) *Contra Symmachum*, two books, of 658 and 1131 hexameter verses respectively, directed against the petition of Symmachus to the emperor for the restoration of the altar and statue of Victory which Gratian had cast down ; (6) *Peristephanon Liber*, fourteen poems in various metres, in honour of certain saints who had won the crown of martyrdom (hence the name, περὶ στεφάνων),—these, which are often vigorous and graphic, are generally considered to show Prudentius at his best ; (7) *Diptychon* or *Dittochæon*, a series of forty-nine hexameter tetrastichs on various events and characters mentioned in Scripture. The *editio princeps* appeared at Deventer in 1472 ; among modern editions may be named those of Faustus Arevalus (2 vols., Rome, 1788-89), Obbarius (Tübingen, 1845), and Dressel (Leipsic, 1860)

PRUD'HON, PIERRE (1758-1823), French painter, born at Cluny on the 4th of April 1758, was the third son of a mason. The monks of the abbey undertook his education. The paintings which decorated the monastery excited his emulation, and by the aid of Moreau, bishop of Mâcon, he was placed with Devosges, director of the art school at Dijon. In 1778 Prud'hon went to Paris armed with a letter to Wille, the celebrated engraver, and three years later he obtained the triennial prize of the states of Burgundy, which enabled him to go to Rome, where he became intimate with Canova. He returned to Paris in 1787, and led for some time a precarious existence, painting portraits and making designs for booksellers. The illustrations which he executed for the *Daphnis and Chloe* published by Didot brought him into notice, and his reputation was extended by the success of his decorations in the Hôtel de Landry (now Rothschild), his ceiling painting of Truth and Wisdom for Versailles (Louvre), and of Diana and Jupiter for the Gallery of Antiquities in the Louvre. In 1808 he exhibited Crime pursued by Vengeance and Justice (Louvre, engraved by Royer), which had been commissioned for the assize courts, and Psyche carried off by Zephyrs (engraved by Massard). These two remarkable compositions brought Prud'hon the Legion of Honour; his merit was widely recognized ; he received innumerable orders, and in 1816 entered the Institute. Easy as to fortune, and consoled for the misery of his marriage by the devoted care of his excellent and charming pupil, Mademoiselle Mayer, Prud'hon's situation seemed enviable; but Mademoiselle Mayer's tragical suicide on 26th May 1821 brought ruin to his home, and two years later (16th February 1823) Prud'hon followed her to the grave. The classic revival which set in towards the close of the 18th century, and of which Louis David was the academic chief, found in Prud'hon an interpreter whose gifts of grace and naiveté tempered by seriousness atoned by the personal charm which they imparted to all he did for the want of severity and correctness in his execution. Mademoiselle Mayer (1778-1821) was his ablest pupil. Her Abandoned Mother and Happy Mother are in the Louvre.

Voiart, *Notice historique de la vie et œuvres de P. Prud'hon* ; *Arch. de l'art français* ; Qu. de Quincy, *Discours prononcé sur la tombe de Prud'hon, Fev. 1823* ; Eugène Delacroix, *Rev. des Deux Mondes*, 1846 ; Charles Blanc, *Hist. des peintres français*.

PRUSSIA (Ger., *Preussen* ; Lat., *Borussia*), a kingdom of northern Europe and by far the most important member of the German empire, occupies almost the whole of northern Germany, between 5° 52′ and 22° 53′ E. long. and 49° 7′ and 55° 53′ N. lat. It now forms a tolerably compact mass of territory, with its longest axis from south-west to north-east ; but within the limits just indicated lie the "enclaves" Oldenburg, Mecklenburg, Brunswick, and other small German states, while beyond them it possesses Hohenzollern, in the south of Würtemberg, and other "exclaves" of minor importance. On the N. Prussia is bounded by the North Sea, Denmark, and the Baltic ; on the E. by Russia and Poland ; on the S. by Austrian Silesia, Moravia, Bohemia, Saxony, the Thuringian states, Bavaria, Hesse-Darmstadt, the Rhenish Palatinate, and Lorraine ; and on the W. by Luxemburg, Belgium, and the Netherlands. With the exception of the sea on the north and the mountain-barrier on the south-east, the frontiers are political rather than geographical, a fact that has always been characteristic of Prussia's limits and that has had considerable influence in determining its history. The Prussian monarchy, with an area of 134,490 square miles, comprises nearly two-thirds of the entire extent of the German empire. Its kernel is the Mark of Brandenburg, round which the rest of the state has been built up gradually, not without costly and exhausting wars. The territory ruled over by the first Hohenzollern elector (1415-40) did not exceed 11,400 square miles, an area that had been quadrupled before the death of the first king in 1713. Frederick the Great left behind him a realm of 75,000 square miles, and the following two monarchs, by their Polish and Westphalian acquisitions, brought it to a size not far short of its present extent (122,000 square miles in 1803). After the disastrous war of 1806 Prussia shrank to something smaller than the kingdom of Frederick the Great (61,000 square miles), and the readjustment of Europe in 1815 still left it short by 14,000 square miles of its extent in 1803. Fully one-fifth of its present area is due to the war of 1866, which added Hanover, Hesse-Cassel, Hesse-Nassau, Schleswig-Holstein, and the city of Frankfort-on-the-Main to the Prussian dominions.

HISTORY.

The claims which Prussian history makes upon our attention are based neither upon venerable antiquity nor upon uniformity of origin. The territorial and political development of the country has taken place wholly within the last thousand years; and the materials out of which it has been built up—marquisates and duchies, ecclesiastical principalities and free imperial cities—are of the most heterogeneous description. The history of Prussia acquires its primary significance from the fact that this state was the instrument by which the political regeneration of Germany was ultimately effected from within, and the unity and coherence of the narrative are best observed when we consider it as a record of the training that fitted the country for this task. This rôle was forced upon Prussia rather by the exigencies of its geographical position than by its title to be racially the most representative German state. The people who have established the power of Germany cannot rank in purity of Teutonic blood with the inhabitants of the central, western, and southern parts of the empire. The conquest of the Slavonic regions that form so great a part of modern Prussia did not occur without a considerable intermingling of race, and Prussia may perhaps be added to the list of great nations that seem to owe their pre-eminence to the happy blending of their composite parts. It is perhaps also worthy of remark that this state, like its great rival, was developed from a marchland of the German empire,—Prussia arising from the North Mark erected against the Wends, and Austria from the East Mark erected against the Hungarians.

In tracing the early development of Prussia three main currents have to be noticed, even in a short sketch like the present, which do not completely unite until the beginning of the 17th century; indeed many writers begin the history of modern Prussia with the accession of the Great Elector in 1640. We have (1) the history of the Mark of Brandenburg, the true political kernel of the modern state; (2) the history of the district of Preussen or Prussia, which gave name and regal title to the monarchy; and (3) the history of the family of Hohenzollern, from which sprang the line of vigorous rulers who practically determined the fortunes of the country.

Mark of Brandenburg.—Whether Teutons or Slavs were the earlier inhabitants of the district extending from the Elbe on the west to the Oder and the Vistula on the east is a question mainly of antiquarian interest and one upon which authorities are not wholly agreed. In the opening centuries of the Christian era we find it occupied by Slavonic tribes, whose boundaries reach even to the west of the Elbe, and the conquest and absorption of these by the growing German power form the subject of the early history of Brandenburg. Hand in hand with the territorial extension of the Germans went the spread of Christianity, which, indeed, often preceded the arms of the conquering race. The Slavs to the east of the Elbe were left unmolested down to the foundation of the German monarchy, established by the successors of Charlemagne about the middle of the 9th century Then ensued the period of formation of the German "marks" or marches, which served at once as bulwarks against the encroachments of external enemies and as nuclei of further conquest. The North Mark of Saxony, corresponding roughly to the northern part of the present province of Saxony, to the west of the Elbe, was established by the emperor Henry I. about the year 930, and formed the beginning of the Prussian state. The same energetic monarch extended his career of conquest considerably to the east of the Elbe, obtaining more or less firm possession of Priegnitz, Ruppin, and the district round the sources of the Havel, and even carried his arms to the banks of the Oder. His son Otho I. (936-973) followed in his father's footsteps and founded the bishoprics of Havelberg and Brandenburg, the latter taking its name from the important Wendish fortress of Brannibor Towards the end of the 10th century, however, the Wendish flood again swept over the whole territory to the east of the Elbe, and the Germans were confined to the original limits of the North Mark. Christianity was rooted out and the bishop of Brandenburg reduced to an *episcopus in partibus.* The history of the next century and a half is simply a record of a series of desultory struggles between the margraves of the North Mark and the encompassing Wends, in which the Germans did no more than hold their own on the left bank of the Elbe.

Estab-
lishmen
of the
North
Mark.

Albert
the Be

Things begin to grow a little clearer in 1134, when the emperor Lothair rewarded the services of Albert the Bear, a member of the house of Anhalt and one of the most powerful princes of the empire, by investing him with the North Mark. Albert seems to have been a man of great vigour and considerable administrative talent, and by a mixture of hard fighting and skilful policy he extended his power over the long-lost territories of Priegnitz, Ruppin, the Havelland, and the Zauche. He also shifted the centre of power to the marshy district last-mentioned and changed his title to margrave of Brandenburg. The North Mark henceforth began to be known as the Altmark, or Old Mark, while the territory round Brandenburg was for a short time called the New Mark, but more permanently the Mittelmark, or Middle Mark. The soil of Albert's new possessions was for the most part poor and unpromising, but he peopled it with industrious colonists from Holland and elsewhere, and began that system of painstaking husbandry and drainage which has gradually converted the sandy plains and marshes of Brandenburg into agricultural land of comparative fertility. The clergy were among his most able assistants in reclaiming waste land and spreading cultivation, and through them Christianity was firmly established among the conquered and Germanized Slavs. Albert's descendants, generally known as the Ascanian line from the Latinized form of the name of their ancestral castle of Aschersleben, ruled in Brandenburg for nearly two hundred years; but none of them seem to have been on a par with him in energy or ability. On the whole, however, they were able to continue in the course marked out by him, and, in spite of the pernicious practice of dividing the territory among the various scions of the reigning house, the Mark grew steadily in size and importance. Before the end of the 12th century the margrave was created arch-chamberlain of the German empire, an office that eventually brought in its train the privilege of belonging to the electoral college. Berlin became a fortified post of the margraves in 1240 and soon began to take the place of Brandenburg as the political centre of the margraviate. Under Waldemar, who succeeded in 1309, the scattered possessions of the house were again gathered into one hand. His sway extended over the Altmark; Priegnitz, or the Vormark; the Middle Mark, now extending to the Oder; the lands of Krossen and Sternberg beyond the Oder; the Ukermark, to the north; Upper and Lower Lusatia; and part of Pomerania, with a feudal superiority over the rest. No other German prince of the time had a more extensive territory or one less exposed to imperial interference.

avarian ar- raves.

uxem- urg ar- raves.

With Waldemar's death in 1319 the Ascanian line became extinct and a period of anarchy began, which lasted for a century and brought the once flourishing country to the verge of annihilation. Its neighbours took advantage of its masterless condition to help themselves to the outlying portions of its territory, and its resources were further wasted by intestine conflicts. In 1320 the emperor Louis the Bavarian took possession of the Mark as a lapsed fief, and conferred it upon his son Louis, at that time a mere child. But this connexion with the imperial house proved more of a curse than of a blessing: the younger Louis turned out a very incompetent ruler, and Brandenburg became involved in the evils brought upon the Bavarian house by its conflict with the pope. To crown all, a pretender to the name of Waldemar appeared, whose claims to Brandenburg were supported by the new emperor, Charles IV.; and in 1351 Louis, wearied of his profitless sovereignty, resigned the margraviate to his brothers, Louis the Roman and Otho. The first of these died in 1365, and Otho soon became embroiled with Charles IV. But he was no match for the astute emperor, who invaded the Mark, and finally compelled the margrave to resign his territory for a sum of ready money and the promise of an annuity. The ambition of Charles was directed towards the establishment of a great east German monarchy, embracing Bohemia, Moravia, Silesia, Lusatia, and Brandenburg, and he had the sagacity to recognize the commercial importance of the last-named as offering an outlet by the Baltic Sea. Charles, however, died in 1378, and with him perished his far-reaching plans. He was succeeded in the electorate of Brandenburg—for as such it had been formally recognized in the Golden Bull of 1356—by his second son Sigismund. This prince was too greatly hampered by his other schemes to bestow much attention on Brandenburg, and in 1388 his pecuniary embarrassments were so great that he gave the electorate in pawn to his cousin Jobst or Jodocus of Moravia. The unfortunate country seemed now to have reached the lowest point consistent with its further independent existence. Jobst looked upon it merely as a source of income and made little or no attempt at government. Internal order completely disappeared, and the nobles made war on each other or plundered the more peaceful citizens without let or hindrance. Powerful neighbours again took the opportunity of appropriating such parts of Brandenburg as lay most convenient to their own borders, and the final dissolution of the electorate seemed imminent. Jobst died in 1411; and Sigismund, who succeeded to the imperial throne mainly through the help of Frederick VI., burgrave of Nuremberg, conferred the electorate of Brandenburg on this stout supporter, partly in gratitude for services rendered and partly as a mortgage for money advanced. Sigismund also may possibly have recognized in Frederick the fitting ruler to checkmate any attempt on the part of the Polish-Lithuanian power, which had just overthrown the Teutonic Order (see p. 6), to push forward the Slavonic settlements to their old frontier on the Elbe. At first Frederick was merely appointed administrator of Brandenburg; but in 1415 he was declared the actual feudal superior of the land, and two years later formally installed as elector.

The Brandenburg to which Frederick succeeded was considerably smaller than it had been in the best days of the Ascanians, consisting merely of the Altmark, Priegnitz, the Mittelmark, part of the Ukermark, and the territory of Sternberg. Including his family possessions of Ansbach and Baireuth, he ruled over a territory of about 11,400 square miles in extent. The internal condition of Brandenburg had declined as much as its territorial extension had decreased. The central power had become weakened and the whole inner organization relaxed, while the electorate had also lost most of the advantages that once favourably distinguished it from other imperial fiefs. Under the first margraves the official side of their position had been prominent, and it was not forgotten that technically they were little more than the representatives of the emperor. In the 13th century this feeling began to disappear, and Brandenburg enjoyed an independent importance and carried out an independent policy in a way not paralleled in any other German mark. The emperor was still, of course, the suzerain of the country, but his relations with it had so little influence on the course of its development that they may be practically ignored. Within the Mark the power of the margraves was at first almost unlimited. This arose in part from the fact that few great nobles had followed Albert the Bear in his crusade against the Wends, and that consequently there were few large feudal manors or lordships with their crowds of dependent vassals. The great bulk of the knights, the towns, and the rural communes held their lands and derived their rights directly from the margraves, who thus stood in more or less immediate contact with all classes of their subjects. The towns and villages were generally laid out by contractors (*locatores*), not necessarily of noble birth, who were installed as hereditary chief magistrates of the community and received numerous encouragements to reclaim waste lands. This mode of colonization was especially favourable to the peasantry, who seem in Brandenburg to have retained the disposal of their persons and property at a time when villainage or serfdom was the ordinary state of their class in feudal Europe. The dues paid by these contractors in return for their concessions formed the principal revenue of the margraves. As the expenses of the latter increased, chiefly in consequence of the calls of war, lavish donations to the clergy, and the attempt to maintain court establishments for all the members of the reigning house, they were frequently driven to pawn these dues for sums of ready money. This gave the knights or barons an opportunity to buy out the village magistrates and replace them with creatures of their own; and the axe was laid at the root of the freedom of the peasants when Louis the Bavarian formally recognized the patrimonial or manorial jurisdiction of the noblesse. Henceforth the power of the nobles steadily increased at the expense of the peasants, who were gradually reduced to a state of feudal servitude. Instead of communicating directly with the margrave through his burgraves and vogts (bailiffs), the village communities came to be represented solely by the knights who had obtained feudal possession of their lands. Many of the towns followed in their wake. Others were enabled to maintain their independence, and also made use of the pecuniary needs of the margraves, until many of them practically became municipal republics. Their strength, however, was perhaps more usefully shown in their ability to resist the barons, which saved industry and commerce from extinction at a time of unbridled lawlessness, when the central power could do nothing for their aid. In the pecuniary embarrassments of the margraves also originated the power of the Stände, or estates, consisting of the noblesse, the clergy, and the towns. The first recorded instance of a diet co-operating with the ruler occurs in 1170, and in 1280 we find the margraves solemnly binding themselves not to raise a "bede" or special voluntary contribution (like the English "benevolence") without the consent of their estates. By 1355 the estates had secured the appointment of a permanent councillor, without whose concurrence the decrees of the margraves were invalid. In the century that followed the extinction of the Ascanians liberty degenerated into licence, and the land was given over to an almost total anarchy. Only the most powerful towns were able to maintain their independence, and many of them and of the clergy paid regular black-mail to the nearest nobles. Thus rotten within, it is no wonder that the electorate completely lost its independent political importance.

The Hohenzollerns.

The Hohenzollerns.—The new ruler who had to face this state of affairs was a member of an old Swabian family, which took its name of Hohenzollern from the ancestral castle in the Swabian Alb. Recent investigation has traced back the line to Hunfrid, duke of Rhætia and Istria at the beginning of the 9th century, a member of the widely-spread family of the Burkardingians, while it finds the actual progenitors of the Swabian branch of the family in two Alemannian dukes of the 10th century. At a later period the Hohenzollerns were conspicuous for their loyal services to the Hohenstauffen emperors, under whom they acquired extensive possessions in Franconia and Moravia, and also the office of burgrave of Nuremberg (1191). They were ultimately recognized as among the most powerful princes of the empire, and, though they never attained to the electoral dignity, they frequently exercised considerable influence in the transference of the imperial crown. Rudolf of Hapsburg owed his succession in 1273 to the exertions of one Hohenzollern burgrave, and Louis the Bavarian owed the victory of Mühldorf (1322) to another. The two sons of the first burgrave, Conrad and Frederick, divided their inheritance between them, the former retaining the Franconian estates and the dignity of burgrave, the latter the ancestral possessions in Swabia. From the first of these descended the rulers of Prussia, while the other line also still exists in the person of the mediatized prince of Hohenzollern-Sigmaringen.

Elector Frederick I.

Frederick (1415-1440), who as elector of Brandenburg assumed the style of Frederick I., showed himself equal to the troublesome task before him, and would have been still more successful had his interests been limited to the electorate. By a prudent mixture of lenity and firmness, which did not shrink from actual fighting, he controlled the lawlessness of the Quitzows and other robber barons, restored a fair degree of internal order, and made his subjects feel that the central power was a fact that could not be ignored. While thus regulating the affairs of Brandenburg, Frederick was also a conspicuous figure in imperial politics, especially in the Hussite wars. His candidature for the imperial throne in 1438 may be regarded as the first occasion on which the houses of Hohenzollern and Hapsburg came into competition Frederick was succeeded in Brandenburg by his son Frederick II. (1440-1470), and in his Franconian possessions by his son Albert. The former followed in his father's footsteps by taking energetic measures to consolidate his power and restore the electorate to its former extent. His chief struggle was with the large towns, which had cordially welcomed the Hohenzollerns as champions against the freebooting barons, but were unwilling to allow any intervention in their own affairs. Frederick subdued the resistance of Berlin, among other towns, and by a somewhat unwarrantable stretch of his prerogative erected a royal castle within its walls. He also regained possession of the Neumark, which had been given in pledge to the Teutonic Order in 1402, and would have added Lusatia and Pomerania to his domains if the emperor had not placed obstacles in his way. A long-standing feud with the archbishop of Magdeburg was also finally settled in this reign. Under his brother and successor Albert (1470-1486), surnamed "Achilles" from his chivalrous valour and military talent, the Franconian lands were again united with Brandenburg. Albert allowed his devotion to the emperor to interfere to some extent with his own interests, but he carried on successful wars with Mecklenburg and Pomerania, and effectually resisted the attempts of the Teutonic knights to repossess themselves of the Neumark. His name is best remembered by the Dispositio Achillea, a family ordinance providing for the future separation of Brandenburg and Ansbach-Baireuth, and establishing the custom of primogeniture in each. According to Hallam, this was the first instance of the legal establishment of primogeniture, and, when we consider the effect it had in keeping the Brandenburg possessions together, while those of Saxony (for instance) were frittered away among younger sons and their descendants, we shall not fail to discern its importance in determining Prussia's future.

John (Cicero).

With the accession of John (1486-1499), surnamed "Cicero" on account of his eloquence or of his knowledge of Latin, begins a short period in which the rulers of Brandenburg take little share in imperial politics. At home John found his hands full in repressing the disorders that had arisen through Albert's long absence from the electorate, and he acted with such vigour and address that he succeeded in obtaining from the towns an important excise on beer, frequently refused to his father. The old claim to feudal supremacy over Pomerania, dating from the days of the Ascanians, was compromised in 1493 for an assurance of eventual succession on the extinction of the Pomeranian dukes.

Joachim I. (Nestor).

The next elector, Joachim I. (1499-1535), acquired the surname of "Nestor" from his encouragement of learning, which he showed *inter alia* by the foundation of a university at Frankfort-on-the-Oder. He also effected an important internal reform by the introduction of Roman law, looking upon this as an easier way of securing uniformity of procedure than by a codification of the heterogeneous common law of his dominions. The inconvenience arising from the fact that the supreme court followed the sovereign from place to place was now removed in Brandenburg, as a short time before in England, by the establishment of a fixed and central court of final jurisdiction (*Kammergericht*). This court had its seat at Berlin, which had recently become the capital and residence of the electors. In curbing the lawlessness of the nobles, who were yet far from being perfectly disciplined, Joachim showed as strong a hand as his predecessors. He adhered strenuously to his Roman Catholic belief in spite of the fact that Protestantism had been embraced by his own family and by most of his subjects, and he regarded with abhorrence the attitude of the Protestant princes towards the emperor. In violation of the family law, Joachim I. bequeathed the Neumark to his younger son, John, and thus Joachim II. (1535-1571) succeeded to only a part of the paternal possessions. John seems to have been the more vigorous and decided of the two brothers, and led the way in announcing his transition to the Protestant faith, followed by Joachim in 1539. John also joined the Schmalkald League, but was induced to retire from it by his brother, who succeeded in conjoining an adoption of the Reformation in his own dominions with a careful avoidance of conflict with the emperor and Roman Catholic party. The church ordinance which he framed for Brandenburg was drawn up in such a way that the head of the state became likewise the head of the state church, and henceforth he regarded himself, like Henry VIII. of England, as standing towards his own country in the place of the pope. The public introduction of the new faith was accomplished without difficulty, and the clergy witnessed the secularization of their property with much equanimity. The funds thus acquired by Joachim, a prince of magnificent ideas and of lavish expenditure, were of great service to him; but part of them he devoted to the encouragement of science and art. A compact of mutual right of eventual inheritance made in 1537 with the duke of Liegnitz and Brieg was of great ultimate importance as affording Frederick II. a pretext for his claims to Silesia. A still more useful arrangement of a similar kind was carried out by Joachim in 1569, when he secured the right of succession to the duchy of Prussia.

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Between the accession of the Hohenzollern dynasty and the period at which we have now arrived the area of Brandenburg had been increased to nearly 15,000 square miles, and its material prosperity had grown in at least an equal ratio. It was still, however, far from being a compact or united state, nor had it as yet any pretension to an independent part on the European stage. Perhaps the most marked internal change was the increase in the power of the estates, resulting in great measure from the financial needs of the electors. Their gradual progress towards complete recognition as a co-ordinate branch of government may be said to have culminated in the formal declaration of Joachim II., that he would never undertake any action of importance affecting the welfare of his subjects without first consulting the estates. Yet alongside of this growth of the estates there were other causes at work paving the way for the future absolutism of the rulers. Thus the new ecclesiastical constitution brought the elector, as head of the church, into immediate relation with all classes of the people, and the abolition of the distinction between mediate and immediate subjects in the religious sphere prepared the way for a similar position in secular matters. So too the introduction of Roman law accustomed the mind to dwell on the central authority and administration, and its very terminology promoted the conception of the elector as a "royal" ruler. A more important cause, however, than either of these was the gradual decline of the power of the towns, with the accompanying revival of that of the nobles. The practical independence and comparative wealth of the towns had been followed by intestine feuds, in which the patricians were arrayed against the guilds, and these not only weakened the towns directly, but also gave the electors frequent pretexts to interfere and curtail their privileges. At the end of the reign of Joachim II. the elector and the diet, the noblesse and the municipalities, were still in a state of comparative and promising equilibrium. But it was evident that the power of the diet was now almost wholly confined to its command of the purse, and that an elector who could make himself independent of its subsidies would be in a position to defy its claims; while it was equally evident that the growing weakness of the towns was incapacitating them for any effectual resistance to an ambitious prince, who might utilize the congenial support of the noblesse as a stepping-stone to arbitrary power. The short-sighted and selfish neglect of general questions now making way among the separate sections of the diet, and their increasing tendency to appear at those sittings only in which their own peculiar interests were under discussion, also helped to free the hands of the electors. The condition of the peasantry had been steadily deteriorating, and their personal rights were already seriously encroached upon.

Under Joachim's son, John George (1571-1598), who permanently reunited the Neumark with Brandenburg, the tendencies just noticed received emphatic expression. All vacant official positions were filled with members of the noblesse, who also received the right of exacting compulsory service from the peasants and other similar privileges. The elector, who acquired the name of "Oekonom" or steward from his admirable financial management, soon reduced the large debt left by his father, and, leaning on the support he had earned from the barons, was able to act with great independence towards the other elements of the diet. During his undisturbed reign the material prosperity of Brandenburg advanced considerably, and the population was increased by numerous Protestant refugees from France and Holland. Joachim Frederick (1598-1608) had the good sense and resolution to oppose the testament of his father, which had assigned the Neumark to his younger brother, and in the Gera Bond executed a solemn ratification of the Dispositio Achillea. Ansbach and Baireuth were formally relinquished to the younger line, and have never since, except from 1791 to 1806, formed part of the Prussian dominions. This reign is memorable for the establishment of a state council (*Staatsrath*), which served in some degree as a ministerial cabinet, and may be characterized as the nucleus of the bureaucracy of modern Prussia.

John Sigismund.

John Sigismund (1608-1619) does not seem to have been a man of marked personal character, but his reign is of great importance in the history of Brandenburg on account of the extensive territorial enlargement that fell to its lot. The contingency which had been contemplated in the treaty with Prussia in 1569 was realized on the death of Duke Albert in 1618; and John Sigismund, whose title was strengthened by his marriage with the late duke's daughter, inherited the duchy. His marriage also brought him a claim to the duchies of Cleves and Jülich and other lands near the Rhine, but this title was disputed by the count palatine of Neuburg. The count was a Roman Catholic, and his contest with the elector soon became a mere incident in the great conflict that now broke out between the two religions. The disputed territories were occupied by Spanish and Dutch troops, and neither claimant derived much advantage from them till after the Thirty Years' War. For a time, however, the outlying possessions of John Sigismund touched on both sides the limits of modern Prussia. In 1613 the elector, either from pure conviction or from a desire to conciliate the Reformed diet of Cleves, announced his adoption of the Reformed (Calvinistic) type of Protestantism, an action that gave great offence in his older dominions. He made, however, no attempt to induce his subjects to follow his example, and may be said to have inaugurated the policy of religious toleration that has since been characteristic of Prussian rulers. During his reign his territories were more than doubled in extent, covering at his death an area of 31,000 square miles; but the elector of Brandenburg could not yet claim to rank above those of Bavaria and Saxony.

Duchy of Prussia.—The duchy of Prussia, thus acquired by the elector, formed the eastern half of the territory bearing the name of Preussen, and stretched along the Baltic Sea from the Vistula to the Memel. It still remained a Polish fief, and was separated from the rest of the electoral dominions by West Prussia, which the Teutonic Order had been forced to resign to Poland a century and a half before. The native Prussians were of a race akin to the Letts and Lithuanians, and their name (*Pruzi*, *Prutheni*) was probably derived from a Lettish root meaning "intelligence."[1] Towards the end of the first century of the Christian era we find authentic accounts of the importation by the Romans of amber from the Baltic coast, but the first mention of the Pruzi by name occurs in a document of the 9th century. Their first appearance in German history is connected with the attempt made in 997 by Adalbert, bishop of Prague, to convert them to Christianity. But his efforts, as well as those of his successor Bruno, met with little success, and each of these pious missionaries found a martyr's grave on the shore of the Baltic. The obstinate adherence of the natives to their paganism was strengthened by their natural suspicion of a political aim under cover of missionary enterprise, and they felt that they were fighting for their land as well as for their religion. The next serious attempt at their conversion was made two hundred years later by a Cistercian monk named Christian, who at the outset had some success and was appointed first bishop of Prussia. The Prussians, however, soon expelled Christian and his supporters, and even invaded Polish territory, plundering and exacting tribute. In this extremity Christian and Conrad, duke of Masovia, applied for aid to the knights of the TEUTONIC ORDER (*q.v.*), who gladly embarked on this new crusade. The Prussians made a desperate resistance; but the military discipline and strength of the Teutonic knights were not in the long run to be withstood, reinforced, as they were, by crowds of crusaders and adventurers anxious to share in the pious work, and assisted on two occasions by the troops of Ottocar of Bohemia. The knights entered Prussia in 1230, and after half a century of hard fighting found themselves masters of the entire country. They had previously taken care to procure from the emperor and the pope a grant of all the lands they should conquer, as well as of those offered to them by Conrad of Masovia. At first the government of the Order, though arbitrary, was not unfavourable to the welfare of the land. The few native nobles who adopted Christianity were allowed to retain their privileged position, and the ranks of the noblesse were recruited by grants to German knights. Numerous towns and villages were built; the place of the greatly thinned Prussians was taken by industrious German colonists; agriculture and commerce were carried on with energy and success; and all aggression from without was vigorously repelled. The general plan of colonization was similar to that in Brandenburg, except that the place of the margrave was taken by a class of privileged nobles, who divided the power of government among them. In 1309 Pomerelia, to the west of the Vistula, was subdued, and the headquarters of the Order were removed from Venice to the fortress of Marienburg on the Vistula; and before the end of the century the "Ordensland" of Prussia is said to have contained about fifty walled towns, still more numerous castles, and several hundred villages and hamlets, while it extended from Pomerania to the western frontier of Lithuania. The active trade which now flourished was carried on mainly with England and the Hanseatic towns. As time went on, however, the knights allowed their vows of temperance and chastity to sink into abeyance and became enervated by luxury and excess. Their old military skill declined, and they had sunk to such a state of weakness that the single battle of Tannenberg (1410), in which they were defeated by the Poles, shook their power to its foundations. Their arbitrary and exclusive rule now began to reap its reward: the Prussians took advantage of the weakness of the Order to claim a larger share in the government, and, as their burdens continued to grow more oppressive, finally formed an alliance with its arch-enemy Poland. Attacked from without and weakened by dissension within, the Order was at length compelled to succumb; and a war begun in 1454 ended thirteen years later with the cession of West Prussia to Poland and an acknowledgment of the latter's feudal superiority over the remaining territories of the Order. The knights turned to Germany for help, and endeavoured to persuade powerful German princes to undertake the office of grand master. In 1511 their choice fell on Albert, a member of the Franconian branch of the Hohenzollerns, who undertook the task of reorganization with vigour and attempted to dispense with the oath of fealty to Poland. But, failing to receive any adequate support from the emperor, he at length, acting on the advice of Luther, determined to embrace Protestantism and convert the Ordensland into a secular and hereditary duchy. This momentous transformation was carried out in 1525 without interference from either the empire or Poland, and Albert continued to be a vassal of the latter state as duke of Prussia. The people of Prussia, many of whom had already gone over to the new faith, hailed the reform with great satisfaction, and most of the knights contentedly changed their life-rents for feudal holdings, married, and became hereditary nobles. When it passed into the hands of the elector of Brandenburg, Prussia thus consisted of a compact secular duchy, owing fealty to Poland, and possessing the two well-defined estates of nobles and burghers, the first of which held the reins of power.

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[1] The traditional connexion of the name with the proximity of

Teutonic Order.

George William.

John Sigismund died in 1619, a year after his acquisition of Prussia, and left his territories to his son George William (1619-1640). This unfortunate prince may perhaps be described as the first utterly incompetent ruler of his line, though due allowance must be made for the extreme difficulty of his position. Succeeding to power at the outbreak of the great struggle between Catholicism and Protestantism, he neglected the opportunity of joining with Saxony in the formation of a strong league of German Protestant princes, and by his temporizing policy converted his electorate into the common battle-ground. In the language of Carlyle, "where the Titans were bowling rocks at each other, George William hoped by dexterous skipping to escape share of the game." His own irresolution was aided by the fact that his chancellor and chief adviser, Schwarzenberg, was a Roman Catholic and of strong imperialist sympathies, while the great bulk of his subjects dreaded an increase of the power of Calvinism almost more than that of Roman Catholicism. Brandenburg was overrun in turn by Mansfeld, Tilly, and Wallenstein, and suffered as much as if it had taken an active part in the war. The Restitution Edict of 1628, however, gave the elector serious cause of alarm, and the appearance of Gustavus Adolphus before Berlin in 1631 confirmed his faltering decision and made him for a time throw in his lot with the Protestant cause. After the death of Gustavus, Brandenburg followed the example of Saxony in negotiating a separate peace with the emperor (1635). But this apostasy brought little relief, as the emperor gave no aid in expelling the Swedes from Brandenburg and Pomerania, which they continued to occupy for several years. In 1638 the elector removed his court to Königsberg in Prussia, the only part of his realms in which he was sure of comparative tranquillity, and there he died in 1640, leaving a land devastated in great part by fire and sword and at the lowest ebb of dignity and power.

Frederick William (1640-1688), whom both his contemporaries and after ages have agreed to dignify with the title of the "Great Elector," was only twenty years old when he succeeded to the throne, but he at once began to manifest a decided and vigorous character very different from that of his father. He emancipated himself without delay from the guidance of Schwarzenberg, and, in spite of

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Russia seems unfounded, and the form *Borussia* or *Porussia*, which has been adopted as the Latin appellation of the country, is used for st time by a chronicler of the fifteenth century.

the emperor's displeasure, concluded a peace with Sweden, which provided for the withdrawal of the Swedish troops from the electorate. During the following years of war Frederick William preserved a strict neutrality and utilized the opportunity to restore the material resources of his country and reorganize and strengthen his army. The fruits of this line of action were seen at the peace of Westphalia (1648), when Frederick William, as lord of an efficient army of 25,000 men, was able to secure a ready hearing for his claims to territorial extension. He established his right to the whole of Pomerania, but, as the Swedes refused to give up Western or Hither Pomerania (Vorpommern), he received as compensation the rich ecclesiastical principalities of Magdeburg, Halberstadt, and Minden, in central Germany. In the second Swedish and Polish war, which broke out in 1655, he used his intermediate position with great skill and unscrupulousness, allying himself first with one and then with the other of the belligerents, as seemed likely to be most profitable. Thus the troops of Brandenburg took a prominent share in the defeat of the Poles at the three days' battle of Warsaw (1656), in return for which service Sweden undertook to recognize the elector as independent sovereign of the duchy of Prussia. Scarcely, however, did the scale of victory begin to turn than the elector deserted his former ally, and in the treaty of Wehlau (1657) received his reward in the formal relinquishment by Poland of its feudal rights over Prussia. This important step, which added the electorate to the independent states of Europe and prepared the way for the growth of a great north German power, was ratified three years later at the general peace of Oliva. In 1666 the long-vexed question of the inheritance to the Rhenish duchies was settled by an amicable partition, according to which Cleves, Mark, and Ravensberg fell to the share of Prussia. When Louis XIV. attacked Holland in 1672 Frederick William was at first the only German prince to suspect danger in the ambitious designs of the French monarch. In spite of tempting offers from France, he concluded an alliance with Holland, and at the head of Austrian and Brandenburgian troops joined the Dutch in an ineffectual campaign on the Rhine. In 1673 he was forced, through lack of sufficient support from the emperor, to make peace with France; but he joined the triple alliance of Holland, Spain, and the empire in the following year and took part in an indecisive campaign in Alsace. There he received intelligence that the Swedes, at the instigation of France, had broken into Brandenburg. Hastening back to his own country without delay, he took the enemy by surprise, and at the head of about 6000 men gained a brilliant victory over twice that number of Swedish troops at Fehrbellin (1675), a small town to the north-west of Berlin. This success over the hitherto invincible Swedes lent great prestige to the elector's arms, and he followed it up by a series of vigorous campaigns, in which, with the aid of Denmark, he swept Brandenburg and Pomerania clear of the invaders, capturing Stettin in 1677 and Stralsund in 1678. The invasion of Prussia from Livonia, which formed the last effort of the Swedes, was also triumphantly repelled, the most memorable incident of the short struggle being the elector's forced march over the frozen surface of the Frische Haff. At the peace of St Germain (1679), however, owing to the influence of France and the lukewarm support of the emperor, Frederick William saw himself forced to restore Hither Pomerania to Sweden. The policy of the last years of the Great Elector may be described as an endeavour to hold the balance between France and the emperor. At first he joined in a somewhat unnatural alliance with Louis XIV., but after the revocation of the Edict of Nantes (1685) he drew nearer to Austria and covered the emperor's rear in his war with the Turks. At his death, which took place in 1688, he was engaged in helping the prince of Orange to prepare for his descent on England.

The reign of the Great Elector forms one of the most signal instances in history of the conquest of adverse circumstances by personal energy and merit; and it is with reason that Prussian historians describe him as the second founder of the state. At his accession the greater part of his territory was in the occupation of strangers and devastated by war, and in European politics Brandenburg was regarded as merely an appendage of the empire. Its army was of little value; its soil was poor; and its revenue was insignificant. To other sources of weakness were added the scattered nature of the electoral possessions, their mutual jealousies, and their separate interests. At Frederick William's death the new north German state of Brandenburg-Prussia was a power that had to be reckoned with in all European combinations. Inferior to Austria alone among the states of the empire, it was regarded as the head and patron of German Protestantism; while the fact that one-third of its territory lay outside the empire added to its independent importance. Its area had been raised to 43,000 square miles; its revenue had multiplied fivefold; and its small army was nowhere surpassed in efficiency. The elector had overthrown Sweden and inherited her position on the Baltic, and he had offered a steady and not ineffectual resistance to the ambition of France.

While thus winning for himself a position in the councils of Europe, the elector was not less active in strengthening the central authority within his dominions, and the transformation effected during his reign in the internal government of the state was not less striking than that in its external importance. Frederick William found Brandenburg a constitutional state, in which the legislative power was shared between the elector and the diet; he left it to his successor as in substance an absolute monarchy. Many circumstances helped him in effecting this change, among the chief of which were the want of harmonious action on the part of the estates and the accelerated decline of the political power of the towns. The substitution of a permanent excise for the subsidies granted from time to time by the estates also tended to increase the elector's independence, and the Government officials (*Steuerräthe*) appointed to collect this tax in the towns gradually absorbed many of the administrative functions of the local authorities. The nobles and prelates generally preferred to raise their quota according to the old method of bede or "contribution," and this weakened the last bond of common interest between them and the estate of the burghers. In Brandenburg the elector met with little opposition in establishing his personal sovereignty, and after 1653 no general diet of Brandenburg was held. In Cleves and Mark he gained his end simply by an overwhelming display of force; but in Prussia, where the spirit of independence was fostered by its history and by its distance from the seat of power, he found much greater difficulty. His emancipation from the suzerainty of Poland gave him a great advantage in the struggle, though the estates on their side averred that their relation with Poland was one that could not be dissolved except by common consent. It was not until the elector had occupied Königsberg with an armed force, and imprisoned the one (Burgomaster Roth) and executed the other (Baron Kalkstein) of the principal champions of independence, that he was able to bend the estates to his will. Arbitrary and unconstitutional as this conduct seems to us, we must not forget that Frederick William's idea of the functions of an absolute prince was very superior to the unqualified egotism of the French monarchs, and that, while he insisted upon being master in his own house, it was that he might at the same time be the first servant of the state. In his eyes an absolute government was the best guarantee of the common welfare, and was not sought merely for the sake of personal aggrandizement. It is not without significance in connexion with this that beyond his own territories he twice espoused the cause of the people against an absolute ruler, first in opposing Louis XIV., and again in aiding William of Orange.

In matters of general administration Frederick William showed himself a prudent and careful ruler, and laid the foundation of the future greatness of Prussia in almost every department. The military and bureaucratic systems of the country both received their first important impulse in this reign. The wounds inflicted by the Thirty Years' War were in a great measure healed, and the finances and credit of the state were established on a firm basis. Agriculture and commerce were improved and encouraged by a variety of useful measures, and education was not neglected. The elector even established Prussian colonies in Africa, and formed a small but efficient navy. In matters of religion Brandenburg stands out prominently as the only country of the time in which all Christian confessions were not only tolerated but placed upon an equal footing. The condition of the peasantry, however, reached almost its lowest ebb, and the "recess" or charter of 1653 practically recognizes the existence of villainage. While the barons had been losing power on the one side as opposed to the elector, they had been increasing it on the other at the expense of the peasants. The Thirty Years' War afforded them frequent opportunities of replacing the village "Schulzen" with manorial courts; and the fact that their quota of taxation was wholly wrung from the holdings of the peasants made the burden of the latter four or five times as great as that of the towns. The state of public morals also still left much to be desired, while the clergy were too much occupied with squabbles over Lutheranism and Calvinism to be an effective instrument of reform.

King Frederick I.

The Great Elector's son Frederick I. (1688-1713) was an ostentatious and somewhat frivolous prince, who hazarded the acquisitions of his father by looking on his position as assured and by aiming rather at external tokens of his dignity than at a further consolidation of the basis on which it rested. The Brandenburg troops showed all their wonted prowess in the war of the second coalition against Louis XIV. and in that of the Spanish Succession; but Frederick's interests were only mediately concerned, and neither the peace of Ryswick (1697) nor that of Utrecht (1713) brought him any very tangible advantage. Brandenburg soldiers also helped the emperor in his wars with the Turks, and English readers should not forget that Frederick's action in covering the Dutch frontier with 6000 troops left William of Orange free scope in his expedition to England. The most notable incident in Frederick's reign was, however, his acquisition of the title of king of Prussia, which long formed the principal object of his policy, and which led him to make important concessions to all whose co-operation was necessary. The emperor's consent was finally purchased by the promise of a contingent of 8000 men to aid him in the War of the Spanish Succession, and on 18th January 1701 Frederick crowned himself at Königsberg with accompanying ceremonies of somewhat inflated grandeur. Elector Frederick III. of Brandenburg became henceforth King Frederick I. of Prussia,[1] the title being taken from that part of his territories in which he had no suzerain to acknowledge. Superficial as this incident may at first sight appear, it added considerably to the moral and political momentum of the country, and its advantages were reaped by Frederick's two vigorous successors. About the same time (1697) the elector of Saxony also acquired the kingly dignity by his election to the throne of Poland, but in doing so he had to become a Roman Catholic, and thus left the Hohenzollerns without a rival among the Protestant dynasties of Germany. Frederick was an extravagant ruler, who lavished large sums in maintaining his personal state; but his expenditure was not wholly of this profitless nature, since he founded the university of Halle as a school of liberal theology, established academies of art and science at Berlin, and patronized men of literary eminence. In this he was perhaps mainly inspired by his talented wife Sophia Charlotte, a sister of George I. of England.

The court of Vienna had consoled itself for the growing power of Prussia under the Great Elector by the reflexion that it was probably of a temporary nature and due mainly to the vigorous individuality of that prince. The events of Frederick I.'s reign seemed to justify this view. At his accession Prussia might fairly claim to rank as the second state of Germany and possessed considerable influence as a European power of all but the first order. This, however, had been changed before the death of Frederick. Bavaria, Saxony, and Hanover had all raised themselves to at least a level with Prussia, which now sank back into the position of a merely German state and loyal supporter of the empire. Frederick's preoccupation in the western wars had allowed Sweden to reassert her pre-eminence in northern Europe, and it was Russia and not Prussia that now impeded her progress. The internal soundness of the country had also suffered: the finances were in a state of complete disorganization, and the burden of taxation was almost insupportable. If Frederick's successor had not been a man of vigorous character the downhill progress might have continued until it had removed Prussia altogether from the list of important states. Perhaps the general estimate of Frederick's character is unduly low owing to the fact that he was followed as well as preceded by a ruler of unusual capacity.

Frederick William I.

His son Frederick William I. (1713-1740) possessed administrative talents of no mean order and was singularly painstaking, industrious, and determined in carrying out his plans. Though marked by no great external achievements or exciting events, his reign is of the utmost importance in the Prussian annals from having checked the threatened downfall of Prussia and paved the way for Frederick the Great. By carefully husbanding his finances Frederick William filled his treasury and was able to keep on foot one of the largest and best disciplined armies in Europe, thereby securing for Prussia an influence in European councils altogether disproportionate to its size and population. In internal management he made Prussia the model state of Europe, though his administration was of a purely arbitrary type, in which the estates were never consulted and his ministers were merely clerks to register his decrees. The first act of the young king, who was as economical as his father was extravagant, was to institute a salutary reform in the expensive institutions of the court; and some idea of the drastic nature of this change may be gathered from the fact that the annual allowance for the salaries and pensions of the chief court officials and civil servants was at once reduced from 276,000 to 55,000 thalers. The peace of Utrecht (1713), which added Guelders to the Prussian territories, left Frederick William free to turn his attention to the northern war then raging between Sweden on the one side and Russia, Poland, and Denmark on the other. Though at first disposed to be

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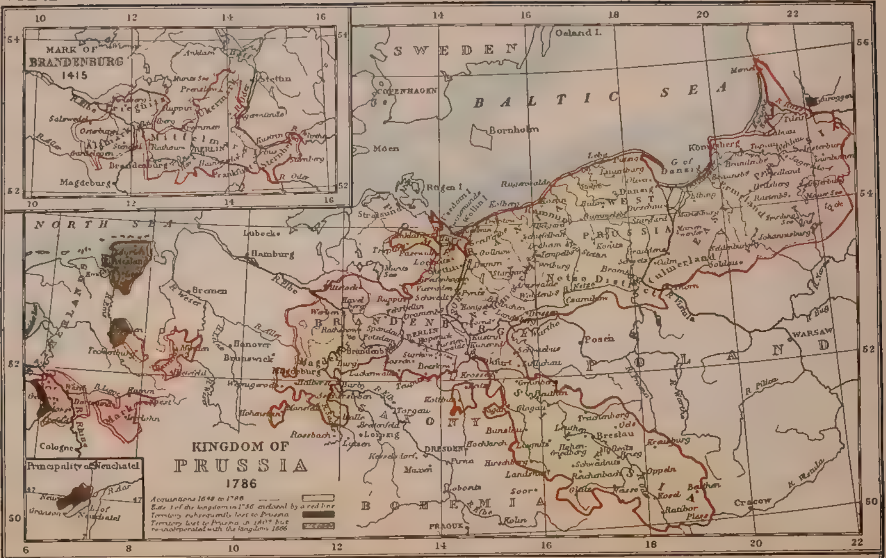
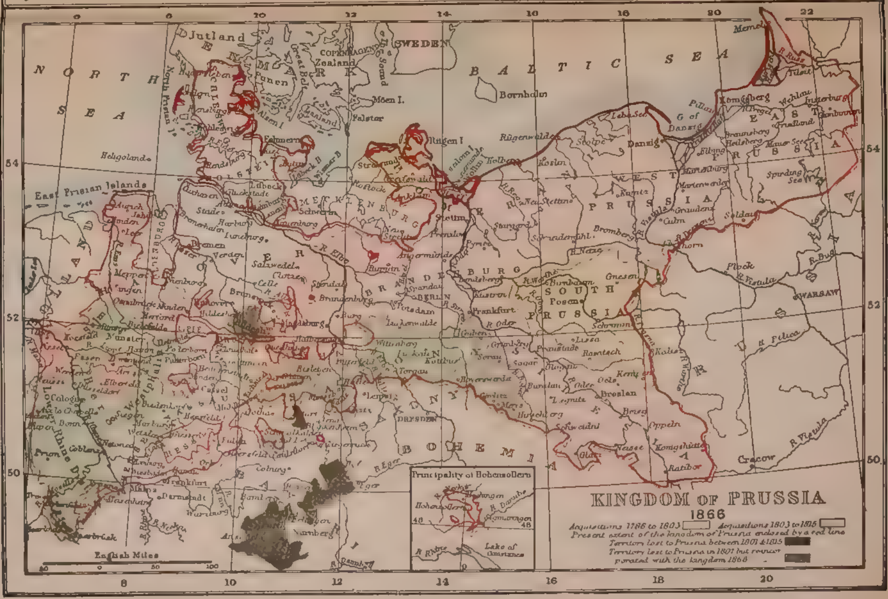
[1] Strictly speaking, the title assumed was "king *in* Prussia" (König in Preussen), this apparently being meant to indicate that there was still a Prussia (West Prussia) of which he was not king, though it has also been otherwise explained.

PRUSSIA


MARK OF BRANDENBURG
1415
Principality of Neuchatel
KINGDOM OF
PRUSSIA
1786
Acquisitions 1648 to 1786 ▭
Extent of the kingdom in 1786 enclosed by a red line
Territory subsequently lost to Prussia ■
Territory lost to Prussia in 1807 but re-incorporated with the kingdom 1866 ▨
BALTIC SEA
NORTH SEA
SWEDEN
POLAND
SAXONY
BOHEMIA
BERLIN
DRESDEN
PRAGUE
WARSAW
COPENHAGEN


KINGDOM OF PRUSSIA
1866
Acquisitions 1786 to 1803 ▭
Acquisitions 1803 to 1815 ▭
Present extent of the kingdom of Prussia enclosed by a red line
Territory lost to Prussia between 1807 & 1815 ■
Territory lost to Prussia in 1807 but reincorporated with the kingdom 1866 ▨
Principality of Hohenzollern
English Miles
BALTIC SEA
NORTH SEA
DENMARK
SWEDEN
EAST PRUSSIA
WEST PRUSSIA
SOUTH PRUSSIA
BRANDENBURG
SAXONY
BOHEMIA
BERLIN
DRESDEN
WARSAW
COPENHAGEN

friendly to Sweden, he was forced by circumstances to take up arms against it. In September 1713 Stettin was captured by the allies and handed over to the custody of Frederick William, who paid the expenses of the siege and undertook to retain possession of the town until the end of the war. But Charles XII. refused to recognize this arrangement and returned from his exile in Turkey to demand the immediate restitution of the town. With this demand the Prussian monarch naturally declined to comply, unless the money he had advanced was reimbursed, and the upshot was the outbreak of the only war in which Frederick William ever engaged. The struggle was of short duration and was practically ended in 1715 by the capture of Stralsund by the united Prussians, Saxons, and Danes under the command of the king of Prussia. The Swedes were driven from Pomerania, and at the peace of 1720 Frederick William received the greater part of Vorpommern, including the important seaport of Stettin. Sweden now disappeared from the ranks of the great powers, and Prussia was left without a rival in northern Germany.

A detailed history of Frederick William's reign would necessitate the recital of a long and tedious series of diplomatic proceedings, centring in the question of the succession to the duchies of Jülich and Berg. In 1725 we find the king trusting for support to an alliance with England, while the queen has set her heart on a double marriage between her eldest son and daughter and an English princess and prince. The treaty of Wusterhausen between Austria and Prussia was concluded in the following year, and was confirmed with some modifications by the treaty of Berlin in 1728. Frederick William engaged to recognize the Pragmatic Sanction, while the emperor on his side undertook to support Prussia's claims to Jülich and Berg. The policy of the latter, however, was far from straightforward, as he had already entered into a similar compact with the count palatine of Sulzbach, the rival claimant to the succession, who was a Roman Catholic and therefore a more sympathetic ally. Frederick William's intervention in the matter of the succession to the throne of Poland, rendered vacant by the death of Augustus II. in 1733, proved barren of advantage to Prussia and failed to secure the hoped-for reversion of the duchy of Courland. A Prussian contingent took part none the less in the ensuing war between Austria and France, but Austria concluded peace in 1735 without consulting her ally. In 1737 the king was resolute enough to withstand the pressure brought to bear upon him by England, France, Holland, and Austria in order to induce him to submit to their settlement of the Jülich-Berg question; and in 1739, convinced at last of the confirmed duplicity of the emperor, he turned to his hereditary enemy for help and concluded a defensive alliance with France. This action may be looked upon as marking the end of that phase in the relations of the houses of Hapsburg and Hohenzollern in which the latter regarded the former with simple loyalty as its natural suzerain; the rivalry between Austria and Prussia had begun, and for the rest of the century formed the pivot on which the politics of Europe mainly turned. Frederick William died in 1740, conscious of his diplomatic failures, but confident that his son would repair his errors.

If the external history of Frederick William's reign is not especially glorious, and if in diplomacy he was worsted by the emperor, the country at least enjoyed the benefits of a twenty-five years' peace and those of a well-meaning, though somewhat too patriarchal, government. During this reign the revenues of Prussia were doubled, and the king left at his death a well-filled treasury and an army of 85,000 men. Though not ranking higher than twelfth among the European states in extent and population, Prussia occupied the fourth place in point of military power. The king himself took the greatest interest in the management of his army, in which the discipline was of the strictest; and he carried the habits of the military martinet into all departments of the administration. His untiring industry occupied itself with the minutest details of government, and his downright blunt character showed there to greater advantage than in diplomatic circles. His chief innovation was the abolition of the distinction between the military and civil funds, and the assignment of the entire financial management of the country to a general directory of finance, war, and domains. Hitherto the proceeds of the excise and contribution had been paid into the military chest, while those of the royal monopolies and domains belonged to the civil service, deficiencies in one department being made good by the surplus of the other. Now, however, the directory was instructed to pay for everything out of a common fund, and so to regulate the expenditure that there should invariably be a surplus at the end of the year. As the army absorbed five-sevenths of the revenue, the civil administration had to be conducted with the greatest economy. The king himself set the example of the frugality which he expected from his officials, and contented himself with a civil list of 52,000 thalers (£7800). The domains were now managed so as to yield a greater income than ever before, and important reforms were made in the system of taxation. By the substitution of a payment in money for the obsolete military tenure the nobles were deprived of their practical exemption from taxation, and they were also required to pay taxes for all the peasant holdings they had absorbed. Attempts were made to better the condition of the peasants, and the worst features of villainage were abolished in the crown domains. The military system of cantonment, according to which each regiment was allotted a district in which to recruit, was of constitutional as well as military importance, since it brought the peasants into direct contact with the royal officials. The collection of the taxes of the peasantry was removed from the hands of the landowners. The duties of the state officials were laid down with great detail, and their performance was exacted with great severity. Official corruption was punished with extreme rigour. Justice seems to have been administered in an upright if somewhat Draconian manner, though the frequent and often arbitrary infliction of the penalty of death by the king strikes us with astonishment. The agricultural and industrial interests of the country were fostered with great zeal. The most important industrial undertaking was the introduction of the manufacture of woollen cloth, the royal factory at Berlin supplying uniforms for the entire army. The commercial regulations, conceived in a spirit of rigid protection, were less successful. In the ecclesiastical sphere the king was able to secure toleration for the Protestants in other parts of Germany by reprisals on his own Roman Catholic subjects, and he also gave welcome to numerous Protestant refugees, including 18,000 exiled peasants from Salzburg. For art, science, and the higher culture he had no respect, but he has the credit of founding the common-school system of Prussia and of making elementary education compulsory.

After the accession of Frederick the Great (1740-1786) the external history of Prussia coincides to such an extent with that of the German empire that it has already been treated with considerable detail in the article GERMANY (vol. x. pp. 503-4; see also FREDERICK II.). The outline of Frederick's foreign policy was probably determined in some degree by the events of the later years of his father's reign, and Austrian duplicity in the matter of Jülich gave him a colourable pretext for his hostile attitude in reviving the long dormant claims of Prussia to the Silesian duchies. Within a year of his accession he had embarked on the first Silesian War, and this was closely followed by the second, which ended in 1745, leaving Frederick in undisputed possession of almost the whole of Silesia, with the frontier that still exists. East Friesland, the Prussian claim to which dated from the time of the Great Elector, was absorbed in 1744 on the death without issue of the last duke. The two Silesian wars completely exhausted the stores left by Frederick William, both of grenadiers and thalers, and Frederick gladly welcomed the interval of peace to amass new treasures and allow his subjects time to recover from their exertions. The measures he took were so successful that when the Seven Years' War broke out in 1756 he had an army of 150,000 men at his command, representing about one-seventh of the available male population of his little kingdom. He had also a fund of eleven million thalers in his treasury, though this would have gone but a small way in defraying the expenses of the protracted struggle had he not been assisted by the subsidies of England and able to make the fertile plains of Saxony his chief basis of supply. The succession of brilliant campaigns in which Frederick maintained himself against a coalition embracing nearly the whole of Europe has been narrated in the article AUSTRIA (vol. iii. p. 127 *sq.*). As Macaulay points out in a somewhat highly-coloured passage, Frederick ruled over a population of less than five million souls, while his adversaries could draw their armies from a joint population of a hundred millions. The disproportion in wealth was at least as great. Nor was the small size of Frederick's land made up for by its strong patriotism and loyalty; on the contrary, the affections of his subjects had been partially alienated by the severity of his rule and the weight of taxation. Prussia had no strong natural bulwarks on its frontiers, but lay exposed to every foe. Yet Frederick's brilliant military genius was able to counteract all these disadvantages and carry on the contest in spite of all odds.

russia nder rederick I.

Though without gain in extent or population, Prussia emerged from the war as an undoubted power of the first rank, and henceforth completely eclipsed Saxony, Bavaria, and Hanover, while it was plain that Austria would no longer stand without a rival for the hegemony of the German empire. The glorious victories over the French and Russians also awakened a spirit of German patriotism that had hitherto been almost unknown. But the price paid for these results was enormous. Of the 850,000 soldiers who, as is estimated, perished during the war about 180,000 fell in the service of Prussia, and the gross population of the kingdom had decreased in seven years to the extent of half a million souls. The misery and poverty indirectly attendant on the war were incalculable. Numerous Prussian towns and villages were destroyed or made tenantless; large tracts were left uncultivated for want of labourers; and famine reigned to such an extent that even the seed-corn was converted into bread. The development of the country was thrown back for many years, which were almost a repetition of the period succeeding the Thirty Years' War. But, while nearly a century elapsed before the traces of that struggle disappeared, Frederick, who showed himself great in peace as in war, repaired most of the ravages of the Seven Years' War in a tenth of the time. By great dexterity in the management of his finances he had kept clear of debt, and was soon able to advance large sums to the most impoverished districts. Foreign colonists were invited to repeople the deserted villages; taxes were in several instances remitted for a series of years; the horses of the army were employed in farm labour; and individual effort in every department was liberally supported by the Government. By 1770 nearly all the ruined villages had been rebuilt; the ground was again under cultivation; order had been restored; the vacant offices had been filled; and the debased currency had been called in. Throughout the kingdom agriculture was encouraged by the drainage of marshy districts; industry was extended by the introduction of new manufactures, by bounties, and by monopolies; and commerce was fostered by a series of well-meant, if economically unsound, measures of protection. Frederick's methods of administration did not greatly differ from those of his predecessor, though the unrelenting severity of Frederick William was relaxed and the peculiarities of his system toned down. Frederick's industry and activity were as great as those of his father, his insight keener, and his views more liberal. His rule was quite as personal and absolute, and the despotism was altered only in so far as the character of the despot was different. His own personal supervision extended to every department, and his idea of his position and duties made him his own first minister in the widest and most exacting sense of the term. He endeavoured to spare his subjects as far as was compatible with the immense army he maintained, and sought to raise the necessary revenues rather by improving the resources of the country than by additional taxation. He kept the charges of the civil administration down to the lowest point consistent with efficiency, and the court establishment was very economical, though it avoided the extreme of shabbiness witnessed under Frederick William. His efforts to improve the administration and the bureaucracy were unceasing, and he succeeded in training a body of admirable public servants. One of his most sweeping reforms was in the department of law, where, with the able aid of Cocceji, he carried out a complete revolution both in procedure and personnel. The expenses of justice were greatly lightened, and no suit was allowed to drag on for more than a year. A complete divorce was effected between the departments of justice and provincial administration, a change that greatly strengthened the position of the private citizen in any contest with the officials of Government. One of the king's first acts was to abolish legal torture, and he rarely sanctioned capital punishment except in cases of murder. The application of the *privilegium de non appellando* (1746) freed Prussia from all relations with the imperial courts and paved the way for a codification of the common law of the land, which was begun under Frederick but not completed till the end of the century. In matters of religion Frederick not only exercised the greatest toleration, remarking that each of his subjects might go to heaven after his own fashion, but distinctly disclaimed the connexion of the state with any one confession. Equal liberty was granted in speaking and writing. Though his finances did not allow him to do much directly for education, his example and his patronage of men of letters exercised a most salutary effect. The old system of rigid social privilege was, however, still maintained, and unsurmountable barriers separated the noble from the citizen and the citizen from the peasant. The position of the last was very deplorable; villainage still to a great extent existed, and the mental attitude of the rural population was servile in the extreme.[1] The paramount defect of Frederick's administration, as future events proved, was the neglect of any effort to encourage independence and power of self-government among the people. Every measure emanated from the king himself, and the country learned to rely on him alone for help in every emergency. Public opinion on political matters could not be said to exist; and the provincial diets met simply to receive the instructions of the royal agents.

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[1] One illustration of this is afforded by the fact that the private soldiers felt no resentment at being struck by their officers.

In 1772 Prussia and Austria, in order to prevent an overweening growth of Russia, joined in the first partition of Poland. Frederick's share consisted of West Prussia and the Netze district, a most welcome addition, filling up the gap between the great mass of his territories and the isolated district of East Prussia. It had also this advantage over later acquisitions at Poland's expense, that it was a thoroughly German land, having formed part of the colonizations of the Teutonic Order. In 1778 Prussia found herself once more in opposition to Austria on the question of the Bavarian succession, but the war that ensued was almost entirely nominal, and the difficulty was adjusted without much bloodshed. The same question elicited the last action of importance in which Frederick engaged,—the formation of a "Fürstenbund," or league of German princes under Prussian supremacy, to resist the encroachments of Austria. The importance of this union was soon obscured by the momentous events of the French Revolution, but it was a significant foreshadowing of the duel of Austria and Prussia for the pre-eminence in Germany. Frederick died on 17th August 1786, having increased his territories to an area of 75,000 square miles, with a population of five and a half millions. The revenue also had immensely increased and now amounted to about twenty million thalers annually, of which, however, thirteen were spent on the army. The treasury contained a fund of sixty million thalers, and the land was free of debt.

A continuation of the personal despotism under which Prussia had now existed for seventy years, as well as of its disproportionate influence in Europe, would have required a ruler with something of the iron-will and ability of Frederick the Great. Unfortunately Frederick's nephew and successor, Frederick William II. (1786-1797), had neither the energy nor the insight that his position demanded. He was too undecided to grasp the opportunity of adding to Prussia's power by adhering to the vigorous external policy of his predecessor, nor did he on the other hand make any attempt to meet the growing discontent of his subjects under their heavy burdens by putting himself at the head of an internal movement of liberal reform. The rule of absolutism continued, though the power now lay more in the hands of a "camarilla" or cabinet than in those of the monarch; and the statesmen who now came to the front were singularly short-sighted and inefficient. The freedom of religion and the press left by Frederick the Great was abrogated in 1788 by royal ordinance. In 1787 the army engaged in an expensive and useless campaign against Holland. The abandonment of Frederick's policy was shown in a tendency to follow the lead of Austria, which culminated in an alliance with that power against revolutionary France. But in 1795 Prussia, suspicious of the Polish plans of Russia and Austria, concluded the separate peace of Basel, almost the only redeeming feature of which was the stipulation that all north German states beyond a certain line of demarcation should participate in its benefits. This practically divided Germany into two camps and inflicted a severe blow on the imperial system. The indifference with which Prussia relinquished to France German lands on the left bank of the Rhine, compared with her eagerness to increase her Slavonic territories on the east, was certainly one of the great blunders of the reign. Prussia's share in the second and third partitions of Poland (1793 and 1795) nearly doubled her extent, but added little or nothing to her real power. The twelve years following the peace of Basel form one of the most sombre periods of the history of Prussia. Her prestige was lost by her persistent and ill-timed neutrality in the struggle with France; the old virtues of economy, order, and justice disappeared from the bureaucracy; the army was gradually losing its excellence and was weakened rather than strengthened by the hordes of disaffected Polish recruits; the treasury was exhausted and a large debt incurred; the newly-awakened feeling of German patriotism had died away, especially among the upper classes.

Frederick William III. (1797-1840) possessed many virtues that did him credit in his private capacity, but he lacked the vigour that was at this juncture imperatively required from a ruler of Prussia, while he was unfortunately surrounded by counsellors who had as little conception as himself of Prussia's proper rôle. He continued to adhere closely to a policy of timid neutrality and seemed content to let Prussia slip back into the position of a second-rate state, the attitude of which in the great European struggle could be of no special importance. Not even the high-handed occupation of Hanover by the French in 1803 could arouse him; and the last shred of self-respect seemed to have been parted with in 1805 when Prussia consented to receive Hanover, the property of its ally England, from the hands of France. The formation of the Confederation of the Rhine in 1806 and the intelligence that France had agreed to restore Hanover to England at last convinced Frederick William of what he had to fear from Napoleon; while Napoleon on his side, being now free of his other antagonists, was only too glad of an opportunity to destroy his tool. Prussia declared war on 9th October 1806; and the short campaign that ensued showed that the army of Frederick the Great had lost its virtue, and that Prussia, single-handed, was no match for the great French commander. On 14th October the Prussian armies were overthrown at Jena and Auerstädt, and a total collapse set in. Disgraceful capitulations of troops and fortresses without a struggle followed one another in rapid succession; the court fled to East Prussia; and Napoleon entered Berlin in triumph. At the peace of Tilsit (9th July 1807) Frederick William lost half his kingdom, including all that had been acquired at the second and third partitions of Poland and the whole of the territory to the west of the Elbe. An enormous war indemnity was also demanded, and the Prussian fortresses were occupied by the French until this should be paid. Prussia now paid heavily for its past remissness and drained the cup of humiliation to the dregs.

Stein's reform.

The next half-dozen years form a period of the greatest significance in the history of Prussia, embracing, as they do, the turning-point in the moral regeneration of the country. The disasters of 1806 elicited a strong spirit of devoted patriotism, which was fanned by the exertions of the "Tugendbund," or League of Virtue, and by the writings of men like Fichte and Arndt. This was accompanied by a wonderful revelation of vitality and recuperative power. The credit of the reformation belongs mainly to the great minister Stein, and in the second place to the chancellor Hardenberg. The condition on which Stein based his acceptance of office was itself of immense importance; he insisted that the system of governing through irresponsible cabinet councillors, which had gradually become customary, should cease, and that the responsible ministers of departments should be at once the confidential advisers and the executive agents of the king. Stein's designs and wishes extended to the establishment of a regular system of parliamentary and local government like that of England, but he had not an opportunity to do much more than begin the work. His edict of 1807 abolished serfdom and obliterated the legal distinction of classes by establishing freedom of exchange in land and free choice of occupation.[1] The "Städteordnung" of 1808 reformed the municipalities and granted them important rights of self-government. His administrative reforms amounted to a complete reconstruction of the ministerial departments and the machinery of provincial government, and practically established the system now in force. In 1810 Hardenberg, with a precipitancy which Stein would scarcely have approved, continued the reform in the condition of the peasants by making them absolute owners of part of their holdings, the landlords obtaining the rest as an indemnity for their lost dues.[1] The revolution thus effected in Prussia has been aptly compared in its results to the great revolution in France; but, while there the reforms were exacted by a people in arms, here they were rather forced upon the people by the crown. The army was also reorganized by Scharnhorst and Gneisenau, while the condition imposed by Napoleon that it should not exceed 42,000 men was practically evaded by replacing each body of men by another as soon as it was fairly versed in military exercises. The educational reforms of William von Humboldt established the school system of Prussia on its present basis, and the university of Berlin was founded in 1809.

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[1] Previous to this measure the distinction between "noble," "burgher," and "peasant" land and occupations was strictly observed, and no transition of property or employment from one class to another was possible.

Frederick William hesitated to take part in the Austrian rising of 1809, but his opportunity came in 1813, when Napoleon fled from Russia, denuded of his troops. General York, commander of the corps that Prussia had been obliged to contribute to the French expedition, anticipated the formal declaration of war by joining the Russians with his troops on his own responsibility (30th December 1812). On the outbreak of the war the people rose *en masse* and with the utmost enthusiasm. The regular army was supported by hosts of "Landwehr," or militia, eager to share in the emancipation of their country. A treaty of alliance between Russia and Prussia was concluded at Kalisch, and Austria, after some hesitation, also joined the league against Napoleon. In the struggle that followed (see AUSTRIA, vol. iii. pp. 134-135) Prussia played one of the most prominent parts, and her general Blücher ranks high among the heroes of the war. Between 1813 and the battle of Waterloo Prussia lost 140,000 men, and strained her financial resources to the utmost. As compensation she received at the congress of Vienna the northern half of Saxony, her old possessions to the west of the Elbe, Swedish Pomerania, the duchies of Berg and Jülich, and other districts in Westphalia and on the Rhine. The acquisitions of the last partition of Poland, with the exception of the grand-duchy of Posen, were resigned to Russia, Friesland went to Hanover, and Bavaria was allowed to retain Baireuth and Ansbach, which had come into her hands in 1806. This rearrangement of the map did not wholly restore Prussia to its former extent, as its area was now only 108,000 square miles compared with 122,000 square miles at the beginning of 1806, but the substitution of German for Slavonic territory and the shifting of the centre of gravity towards the west more than made up for any slight loss in mere size. Hanover still formed a huge wedge splitting Prussia completely in two, and the western frontier was very ragged. Prussia's position required caution, but forced upon it a national German policy, and the situation of the new lands was vastly more effectual in determining the future leader of Germany than was Austria's aggrandizement in Italy. The work of incorporating the new provinces was accomplished with as little friction as possible, and the Prussian statesmen had the good sense to leave the Rhenish districts in the full enjoyment of the institutions they had been used to under the French régime.

The remainder of Frederick William III.'s reign, though marked by much material and social progress, was in the political sphere a period of the most deplorable reaction. At first the king seemed disposed to fulfil his promise of 1815 and grant the country a constitution, but ultimately both he and his minister Hardenberg suffered themselves to be dragged in the wake of the retrogressive policy of Metternich. The only concession made to the popular demand was the utterly inadequate patent of 1823, appointing triennial provincial diets with a merely consultative function. The king also allowed himself to be alarmed by the ultra-liberal movement at the universities, and joined in the notorious Carlsbad decrees (1819) and in the senseless prosecutions of demagogues that formed the sequel. Many of Prussia's noblest and most patriotic sons now suffered unmerited punishment, and the Government showed a total incapacity to understand the real state of affairs. Respect for the aged king, however, prevented an outburst during his reign. After 1830 Prussia began to shake herself clear of the Austrian leading-strings, and the establishment of the "Zollverein," or customs union of the German states under Prussian supremacy, was a decided step towards a policy of independence. In ecclesiastical matters this reign is memorable for the union forced by the crown upon the Lutherans and Calvinists, and for the preliminary symptoms of the "Culturkampf."

Frederick William IV. (1840-1861), a man of character and intelligence, began his reign promisingly by an amnesty for political offenders and by well-meant concessions to the dissatisfied Ultramontanes; but it soon became evident that he held too exalted an idea of the divine right of kings willingly to grant such a constitution as was required. Then followed the contest between the crown and the people, the various steps of which have been chronicled in the article GERMANY. At last the king had to give way and grant a constitution based upon democratic principles, and substituting a representative parliament for the old Prussian system of estates. This constitution was promulgated on 31st January 1850, and Prussia therewith formally entered the ranks of modern and constitutional states. But in the following years the king maintained as reactionary a policy as was in any way compatible with the constitution, receiving his chief support in this line of action from the Prussian "Junkerthum," or squirearchy. In external politics the chief feature of the reign is Prussia's neglect of the opportunity to take up a strong position as the political and military leader of northern and central Germany: the king refused the imperial crown offered to him by the Frankfort Parliament in 1849, and allowed Prussia to play a subordinate rôle at Olmütz in the following year. Towards the close of his life the Prussian Government was distrusted at home and discredited abroad.

William I.

In 1858 William, prince of Prussia, became regent in consequence of the mental illness of his brother, and in 1861 he succeeded to the throne as William I. His accession was hailed as likely to increase both the liberalism of Prussia's internal institutions and the vigour of its external policy; and the second at least of these expectations was not disappointed. But at an early period of his reign the king became involved in a constitutional dispute with the House of Representatives, which declined to grant the supplies necessary for an extensive system of military reorganization. Bismarck, who became prime minister in 1862, refused to allow the crown to be hampered by parliamentary restrictions and raised the funds required in defiance of the attitude of the lower house. This internal conflict may have had its influence in forcing upon the ministry the necessity of a strong foreign policy, especially in its dealings with Austria, though the party of reform believed that the hegemony of Germany might have been secured by Prussia without war if she had simply placed herself at the head of the liberal movement. Prussia's neutral attitude in the Austro-Italian War was the first sign of the coming storm; and then followed the Schleswig-Holstein episode, culminating in the war of 1866 (see **Austria**), the successful issue of which expelled Austria from Germany and left its rival in undisputed possession. The territorial acquisitions which Prussia now made, consisting of Hanover, Hesse-Cassel, Hesse-Nassau, Frankfort, and Schleswig-Holstein, increased its extent by about a fifth and for the first time gave a satisfactory rounding-off to its form. The Prussian landtag, carried away by success, granted Bismarck, by a large majority, the indemnity he had the grace to ask for in regard to his previous unconstitutional proceedings in the financial dispute.

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[1] The patrimonial jurisdiction of the landowners was not taken away till 1848.

The war of 1866 gave the deathblow to the Germanic Confederation of 1815, and in its place appeared the North German Confederation under the lead of Prussia. The transformation was completed five years later, after the successful war with France, when the south German states also joined the union and the king of Prussia became the German emperor. The united Germany that Frederick the Great had sought in the Fürstenbund, that Frederick William III. had tried to organize in 1806 in opposition to the Confederation of the Rhine, that Frederick William IV. had hoped to achieve in 1850, was at length an accomplished fact. In entering this union Prussia may in a sense be said to have abdicated her position as a great power in favour of Germany, but her influence within the empire, practically comprising that of all the small north German states, is so overwhelming that her identity is not likely ever to be wholly lost. Any measure increasing the power of the empire at the expense of the individual states is tantamount to an increase of the power of Prussia.

Since the Franco-German War the history of Prussia has been for the outside world practically identical with that of Germany and has centred in the figure of Prince Bismarck. The policy of the imperial chancellor and Prussian premier is essentially autocratic in its nature, and seems to have for its keynote the necessity of maintaining at any price a strong central Government to cope with external emergencies. He identifies himself with no party, but generally manages by timely concessions to form such temporary parliamentary combinations as are necessary to carry the measures he has most at heart. On the other hand, he does not hesitate freely to call into requisition the royal veto on resolutions of parliament of which he does not approve. His reversion to a strong protectionist policy, which became marked in 1879, the date to which the history is brought down in the article **Germany**, has so far proved permanent, and numerous protective measures have been passed, though his favourite scheme of a Government monopoly of tobacco has been decisively rejected both by the imperial and the Prussian chambers. As a pendant to these measures may be mentioned the laws intended to improve the position of the working classes, most of which are inspired by a spirit of state socialism. The alienation of the National Liberals, occasioned by the change in Bismarck's economic policy, has compelled him to seek his later majorities in a combination of Conservatives and Ultramontanes, the benefit of which has been mainly reaped by the latter. On the accession of Pope Leo XIII. some conciliatory advances were made by Rome and Prussia; in 1881 diplomatic relations were reopened with the Vatican, and several important concessions were made by a measure passed in 1883. The May laws have not been repealed, but they have latterly been put in force with much less stringency, and a great many of the vacant bishoprics and pastorates have been at least temporarily filled. The Ultramontanes continue to form one of the largest "fractions" both in the reichstag and in the Prussian landtag. In spite of the continued existence of the special law passed against the socialists, which has been prolonged from time to time, their numbers have grown steadily, and in the autumnal election of 1884 they returned no fewer than twenty-four of their candidates to the reichstag, polling 550,000 votes, or about ten per cent. of the total number recorded. Their success was especially marked in Berlin, where they returned two members and polled 70,000 votes. The same election was also remarkable for the diminution of the German Liberalists (*Deutsch-Freisinnige*), a party formed by the fusion of the Progressists and Secessionists.

Perhaps the most significant event in the recent history of Germany has been her entrance into the ranks of the colonial powers by the annexation in 1884 of several districts on the west coast of Africa, and among the islands of the Pacific Ocean. In this step Prince Bismarck has revived a policy that has slumbered since the time of the Great Elector (see p. 8), but there seems little reason to doubt that this new scheme of colonization will prove of more permanent importance than that of the 17th century.

CHRONOLOGICAL TABLE OF THE CHIEF EVENTS IN THE HISTORY OF PRUSSIA.

930. Foundation of the North Mark, the nucleus of Brandenburg. 1134. Albert the Bear is invested with the North Mark, and founds the Ascanian line of margraves. 1230-83. Conquest of Preussen by the Teutonic Order. 1324-66. Margraves of the Bavarian line. 1356. Brandenburg definitely recognized as an electorate. 1373-1413. Luxemburg line of electors. 1415. Frederick of Hohenzollern becomes elector of Brandenburg. 1539. Reformation proclaimed by Joachim II. 1618. Duchy of Prussia inherited by Elector John Sigismund. 1640. Accession of Frederick William, the Great Elector. 1648. Brandenburg-Prussia receives Farther Pomerania, Magdeburg, Halberstadt, and Minden at the peace of Westphalia. 1657 Independence of the duchy of Prussia recognized. 1675. Victory over the Swedes at Fehrbellin. 1701. Elector Frederick assumes the title of "king of Prussia." 1720. Acquisition of Hither Pomerania. 1740. Accession of Frederick the Great. 1742. Acquisition of Silesia at the close of the first Silesian War. 1744-45. Second Silesian War. 1756-63. Seven Years War; principal victories: Prague (6th May 1757), Rossbach (5th November 1757), Leuthen (5th December 1757), Liegnitz (15th August 1760), and Torgau (3d November 1760); principal defeats: Kolin (18th June 1757), Hochkirch (14th October 1758), Kunersdorf (12th August 1759). 1772. First partition of Poland; acquisition of West Prussia. 1792. War with France. 1793. Second partition of Poland; acquisition of South Prussia. 1795. Third partition of Poland; acquisition of New East Prussia; peace of Basel, providing for Prussia's neutrality in the struggle with France. 1806. War declared against Napoleon; defeats of Jena and Auerstädt; Prussia conquered by the French. 1807. Peace of Tilsit and dismemberment of the kingdom. 1808. Beginning of Stein's constitutional reforms. 1813. War of liberation; battle of Leipsic (16th to 19th October). 1814-15. Congress of Vienna; Prussia rehabilitated; establishment of the Germanic Confederation. 1815. Battle of Waterloo. 1850. Promulgation of the Prussian constitution. 1864. War with Denmark. 1866. War with Austria; battle of Königgrätz (3d July); acquisition of Hanover, Schleswig-Holstein, and electoral Hesse; establishment of North German Confederation. 1870-71. War with France. 1871. The king of Prussia proclaimed German emperor.

GEOGRAPHY AND STATISTICS.

Physical features.

Physical Features.[1]—Fully three-fifths of Prussia belong to the great north European plain and may be generally characterized as lowlands. The plain is much wider on the east, where only the southern margin of Prussia is mountainous, than on the west, where the Hanoverian hills approach to within less than 100 miles of the sea. A line drawn from Dusseldorf through Halle to Breslau would, roughly speaking, divide the flat part of the country from the hilly districts. In the south-east Prussia is separated from Austria and Bohemia by the Sudetic chain, which begins at the valley of the Oder and extends thence towards the north-west. This chain includes the Riesen Gebirge, with the highest mountain in Prussia (Schneekoppe, 5266 feet), and subsides gradually in the hills of Lusatia. The Harz Mountains, however, beyond the Saxon plain, follow the same general direction and may be regarded as a detached continuation of the system. To the south of the Harz the Prussian frontier intersects the northern part of the Thuringian Forest, which is also prolonged towards the north-west by the Weser Hills and the Teutoburgian Forest. The south-west of Prussia is occupied by the plateau of the lower Rhine, including on the left bank the Hundsrück and the Eifel, and on the right the Taunus, the Westerwald, and the Sauerland. Between the lower Rhenish and Thuringian systems are interposed the Vogelsberg, the Rhön, and other hills belonging to the Triassic system of the upper Rhine. The Silesian mountains are composed chiefly of granite, gneiss, and schists, while the Harz and the lower Rhenish plateau are mainly of Devonian and Silurian formation. To the north of the Sauerland is the important Carboniferous system of the

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[1] The physical features of Prussia have been already so fully described under GERMANY that it has been deemed unnecessary to give here more than the briefest recapitulation. For other points which the reader may here miss he is also referred to that article.

Ruhr, and there are also extensive coal-fields in Silesia. With the exception of the Danube Prussia is traversed by all the chief rivers of Germany, comprising almost the entire course of the Oder and the Weser. Nearly the whole of the German coast-line belongs to Prussia, and it possesses all the important seaports except the two most important of all, Hamburg and Bremen.

Climate.—The climate of Prussia is rendered more uniform than it would otherwise be by the fact that the average elevation increases from north to south. The greatest extremes of temperature are found between the east and west, the mean annual warmth in the bleak and exposed provinces of the north-east being about 44° Fahr., while that of the sheltered valley of the Rhine is 6° higher. The difference is greatest in winter, when the respective means are 28° and 35°; in summer the difference is not above 2° to 4°. In Prussia as a whole the thermometer ranges from 100° to −30°, but these extremes are rarely reached. The average annual rainfall is about 21 inches; it is highest in the hilly district on the west (34 inches) and on the north-west coast (30 to 32 inches), and lowest (16 inches) in the inland parts of the eastern provinces.

Soil.—According to the most recent official returns, about 29 per cent. of the soil of Prussia consists of good loam or clay, 32 per cent. is mediocre or of loam and sand mixed, 31 per cent. is predominantly sandy, and 6 per cent. is occupied by bogs and marshes. The north-eastern provinces contain a high proportion of poor soil, and in the north-west occur large tracts of heath and moor. The reclaimed marshlands in both districts, as well as the soil in the immediate neighbourhood of the rivers, are usually very fertile, and admirable tracts of fruitful ground are found in the valleys of the Rhine and its affluents and in the plain around Magdeburg. Patient and long-continued effort has, however, done much to equalize production, and large crops are now grown in some of the most unpromising parts of the kingdom. Prussia contains a greater proportion of tilled land than any of the countries of south Germany, while it is surpassed in this respect by Saxony, Hesse-Darmstadt, and the Thuringian states. The most fertile Prussian province is Saxony, while the least productive are East and West Prussia. The following table shows the distribution of the cultivable area in the different provinces and in the country as a whole:—

Province.	Area.	Arable Land, 50 per cent.	Meadow and Pasture, 20·4 per cent.	Forests, 23·3 per cent.
	Sq. miles.	Acres.	Acres.	Acres.
East Prussia	14,280	4,709,295	2,127,317	1,081,057
West Prussia	9,850	3,455,000	1,124,885	1,349,892
Brandenburg	15,410	4,586,360	1,487,872	3,205,635
Pomerania	11,620	4,152,002	1,408,882	1,480,990
Posen	11,180	4,452,360	934,450	1,464,449
Silesia	15,560	5,588,090	1,055,487	2,907,570
Saxony	9,750	3,836,192	826,352	1,269,920
Schleswig-Holstein	7,280	2,712,575	1,357,905	287,917
Hanover	14,840	3,126,182	4,365,115	1,512,567
Westphalia	7,800	2,121,745	1,262,530	1,411,085
Hesse-Nassau	6,060	1,561,552	623,872	1,572,492
Rhenish Prussia	10,420	3,134,190	1,158,065	2,073,580
Hohenzollern	440	130,907	50,212	94,652
Total	134,490	43,566,510	17,782,944	20,311,299

Prussia contains a greater proportion of woodland than any other large country in the south or west of Europe (France 17 per cent., Italy 12 per cent., Great Britain 3 per cent.), though not so large a proportion as Russia, Austria, and some of the minor German states. The most extensive forests are in East and West Prussia, Silesia, and Brandenburg, where coniferous trees prevail, and in the Rhenish and Hessian districts, where oaks and beeches are the most prominent growths. The north-west is almost entirely destitute of timber, and peat is there used universally as fuel. The Government forests cover about 6,000,000 acres, or upwards of one-fourth of the whole, and are admirably managed, bringing in an annual revenue of 1¼ millions sterling. The state also controls the management of forests in private possession, and exerts itself to secure the planting of waste lands.

Products.—The principal crop in Prussia is rye, of which the ordinary bread of the country is made; it grows in all parts of the kingdom, especially in the north and east, and occupies about one-fourth of the whole tilled surface. Oats occupy an area equal to about half that devoted to rye, and are also grown most extensively in the north-eastern districts. Wheat, which is chiefly cultivated in the south and west, does not cover more than a fourth as much ground as rye. Barley is most largely grown in Saxony and Silesia. Other grain crops are spelt (chiefly on the Rhine), buckwheat (Hanover and Schleswig-Holstein), and millet; maize is grown for fodder in some districts. The produce of grain scarcely covers the consumption and is supplemented by imports of rye and other cereals from Russia and Holland. Potatoes, used both as food and for the distillation of spirits, are cultivated over nearly as large an area as rye and are especially predominant in the eastern provinces. The common beet is extensively grown for the production of sugar in Saxony, Hanover, Silesia, Pomerania, and Brandenburg. Flax and hemp occupy considerable areas in East Prussia, Silesia, and Hanover, while hops are raised chiefly in Posen and Saxony. The cultivation of rape-seed for oil has fallen off since the use of petroleum has become general. The tobacco of Silesia, Brandenburg, Hanover, and the Rhine province is inferior to that of southern Germany; the annual value of Prussian-grown tobacco is about £500,000, or one-fourth of the total produce of the empire. Only a comparatively small part of the Rhenish wine district falls within Prussia, which does not claim more than a sixth (200,000,000 gallons, value £400,000) of the annual produce of Germany; but this includes many of the choicest varieties, such as Steinberger, Johannisberger, and Rüdesheimer. The best vineyards of the Moselle also belong to Prussia, and inferior kinds of wine are produced in Saxony and Lower Silesia. Great quantities of apples, cherries, and plums are raised on the Rhine, in Saxony, and other districts, while market-gardening on an extensive scale is practised near Erfurt and some other large towns. The hay-meadows of the eastern provinces are the largest, but those in the west bear heavier crops. The richest pasture is afforded by the marshlands along the North Sea and by the plain of the lower Rhine, while the large moors of Westphalia and Hanover are of comparatively little value in this respect. The accompanying table shows the yield in tons of the principal crops in 1883, in which year, however, the returns were rather below the average:—

Province.	Rye.	Wheat.	Barley	Oats.	Potatoes.	Hay.
East Prussia	330,565	88,585	71,987	211,139	586,640	600,231
West Prussia	269 030	83,608	69,600	119,710	838,953	320,984
Brandenburg	499,957	55,963	74,330	140,782	2,555,660	699,751
Pomerania	310,789	64,406	59,554	183,554	1,240,691	678,290
Posen	366,707	82,999	71,156	93,670	1,377,857	435,534
Silesia	481,706	177,981	174,671	330,810	1,929,859	708,269
Saxony	377,259	197,223	278,237	224,808	1,744,984	424,477
Schleswig Holstein	181,793	75,049	60,775	196,751	224,869	375,469
Hanover	459,780	130,438	44,053	177,401	1,008,765	715,734
Westphalia	204,858	85,153	27,976	116,435	714,486	333,833
Hesse-Nassau	117,988	60,110	28,156	96,642	642,360	386,781
Rhenish Prussia	237,883	151,309	43,078	224,720	1,383,132	478,575
Hohenzollern	852	1,894	6,403	9,433	19,955	48,197
Total	3,898,617	1,257,718	1,010,030	2,125,435	14,263,211	6,101,125

About one-half of the cultivable soil is in the possession of owners with properties exceeding 180 acres in extent and averaging 860 acres, while one-half of the total number of owners occupy only one-fortieth of the entire area. The manner of distribution varies greatly in different parts of the kingdom, large properties prevailing in the less fertile regions in the east and peasant-holdings in the west. In the district of Stralsund the average number of landowners for each German square mile is 100, while in the district of Wiesbaden it is ten times as high. In Silesia and Posen *latifundia* occupy nearly half the total area, though this disproportion is gradually disappearing there as elsewhere. As a general rule the best crops seem to be raised on the holdings of intermediate size.

Live stock.

Live Stock.—According to an enumeration made in 1883, Prussia contains 2,417,641 horses, 8,737,367 cattle, 14,752,328 sheep, 5,819,136 pigs, and 1,680,686 goats. The province of East Prussia, with the principal Government stud of Trakehnen, is the headquarters of horse-rearing, and contains the greatest number of horses both relatively (1 per 5 inhabitants) and absolutely (383,555). The horses bred there are generally suitable for the lighter kind of work only, and are in great request for military purposes. Horses of a stouter type are bred in Schleswig-Holstein and on the Rhine, but heavy draught horses have to be imported from France, Holland, Belgium, and Denmark. The best cattle are reared in the maritime provinces, and the highest proportion (65 per 100 inhabitants) is found in Schleswig-Holstein, whence, as well as from the marshy lowlands of Hanover, large numbers are exported to England. As a rule, however, the south German states are richer in cattle than Prussia. Prussia is one of the leading sheep-breeding countries of Europe, and much has been done to improve the race and increase the value of the flesh and wool. In Pomerania there are 170 sheep for every 100 inhabitants, and West Prussia and Posen also contain a high proportion. The total number of sheep in Prussia is, however, diminishing owing to the spread of agriculture and the increased importation of wool; in 1861 it was nearly 21 millions. Swine abound in the central provinces, and hams and sausages are largely exported from Westphalia, Hanover, and Saxony. Huge flocks of geese are reared in Pomerania, and bee-keeping is a profitable industry in Hanover, East and West Prussia, and the province of the Rhine.

Fisheries.—The fishery on the Baltic Sea and its haffs employs about 15,000 men, and that on the North Sea about 2000 more. In the former the take consists mainly of herrings, flat fish, salmon, mackerel, and eels, while the chief objects of the latter are cod and oysters. Inland fishery has been encouraged by the foundation of numerous piscicultural establishments and by the enactment of close-time laws. Carp, perch, pike, and salmon, the latter especially in the Rhine, are the principal varieties; sturgeon are taken in the Elbe and Oder, and the lakes of East Prussia swarm with bream and lampreys. Game of various kinds abounds in different parts of Prussia, and the lakes are frequented by large flocks of water-fowl.

Minerals.—Although it is obvious that the recent formations of the north German plain can boast of little or no mineral wealth, Prussia still takes rank among the great mining states. Its produce of coal and iron exceeds that of any country in Europe. except Great Britain; in the production of zinc it is the foremost country in the world; and its stores of salt are very considerable. In 1882 the total value of the mineral produce of Prussia was about 17¾ millions sterling. About 370.000 persons are employed in its mines, the larger part of whom are engaged in the production of coal. For purposes of administration and supervision the entire country is divided into five mining districts (*Oberbergamtsbezirke*), the headquarters of which are Breslau. Halle, Klausthal (in the Harz), Dortmund. and Bonn.

The two great deposits of coal are in the basin of the Ruhr on the west, where about 20 million tons are raised annually, and in Upper Silesia. where the beds are still more extensive but the coal of a somewhat inferior quality. The greater part of the smaller but valuable coal-field of the Saar also belongs to Prussia, and other important beds occur in Lower Silesia, near Halle, and near Aix-la-Chapelle. In 1882 Prussia produced upwards of 47 million tons of coal, equal to 90 per cent. of the total yield of Germany, and double the output of 1869. Nearly three-fourths of this amount came from the western coal-fields and upwards of one-fourth from the coal-measures of Silesia. The total value was £11,636,250. Brown coal or lignite is found throughout the whole of Prussia, except in the extreme north-east and north-west, but occurs most plentifully in Saxony, Brandenburg, and north Silesia. In 1882 the produce was nearly 11 million tons, value 1¼ millions sterling. Peat is cut in large quantities in Hanover, where 15 per cent. of the surface consists of moorland. Iron is found in all parts of Prussia, occurring in the form of bog-iron ore even in the northern lowlands. The richest districts are those of Coblentz in the province of the Rhine, Arnsberg in Westphalia, Oppeln in Silesia, and Wiesbaden. A valuable bed of magnetic-iron ore occurs in the Harz. In 1882 fully 4,000,000 tons of iron ore were raised in Prussia, valued at £1,415,950 and forming 70 per cent. of the total yield of Germany. The quantity of pig-iron smelted from these and from imported ores was 2,467,500 tons and its value £7,490,000. Prussia produces nearly the whole of the zinc of Germany, and Silesia three-fourths of that of Prussia; in 1882 the amount was 113,300 tons, valued at £1.795,000. The produce of lead in the same year was 88,300 tons, valued at £1,200,000 and found mainly in the valley of the Lahn near Coblentz, in Silesia, in the Harz, and in Hesse-Nassau. Copper was produced to the extent of 15,400 tons and the value of £1,025.000; five-sevenths were raised in Saxony, which includes some of the productive mines of the Harz. Silver and gold are extracted from the copper ore of Mansfeld in Saxony, and silver also from the lead ores of Silesia, Aix-la-Chapelle, Wiesbaden, and Arnsberg. In 1882 the value of the silver smelted out was £1.214.700, of gold only £9050. Salt also ranks high in importance among the mineral treasures of Prussia. In 1882 the total yield included 252,300 tons of boiled salt, 210,100 tons of rock-salt, and 85,400 tons of other salts, with a total value of £719,600. Brine springs occur throughout almost the whole kingdom, but by far the most productive provinces are Saxony and Hanover. Rock-salt is mined at Stassfurt in the province of Saxony, and in Posen. Chloride of potash and potassium salts are also extensively found in Saxony. The other mineral products include manganese, nickel, pyrites, cobalt, quicksilver, alum, gypsum, and sulphuric acid. Good building-stone is common throughout the country, marble is found in Silesia, and roofing slates in the Devonian formations of the Rhine and the Harz. Chalk pits and cliffs abound in the Island of Rügen. The amber of the Baltic coast is picked up on the beach after a storm, and is also found by digging and dredging. About 3000 persons are employed in the search, and in favourable seasons 3000 to 4000 cwts. are collected. Mineral springs are numerous among the mountains of Silesia, the Taunus, and the Eifel. The most generally known are those in the district of Wiesbaden, including Wiesbaden itself, Ems, Homburg, Schlangenbad, and Schwalbach.

Industries.—Prussia now takes a high place among the manufacturing states of Europe, though the foundation of its industrial importance cannot be dated farther back than the reign of the Great Elector (1640-88). As a general rule, apart from a few of the larger towns, the busiest manufacturing centres are found on the lower slopes and outskirts of the mountainous districts, such as the Rhenish valleys, Lusatia, and the vicinity of the Silesian coal-fields. About 35 per cent. of the population are supported by industrial pursuits. The district of Düsseldorf is the busiest in Prussia, and Berlin and Elberfeld-Barmen are among the chief hives of industry on the Continent. The principal manufactured products are woollen, linen, cotton, silk, and iron goods.

The metallic industries, as might be expected, flourish chiefly in the neighbourhood of the coal-fields and have reached their highest development in the district of the Ruhr. Steel is made most extensively in the districts of Arnsberg (Westphalia) and Düsseldorf; at Essen in the latter is Krupp's celebrated cannon-foundry, with 20,000 workmen. Small iron and steel goods also come chiefly from the Westphalian and Rhenish districts; and the cutlery of Solingen, the tools of Remscheid, and the needles of Aix-la-Chapelle enjoy a widespread reputation. Berlin is the chief seat of the manufacture of machinery and locomotives. Small arms are made at Suhl, Spandau, Potsdam, and Sömmerda (Erfurt). Articles in bronze, brass, and electro-plate are largely made at and exported from Berlin, Frankfort-on-the-Main, Iserlohn, and Altena, while gold and silver goods are produced chiefly at Berlin and Hanau.

The textile industries of Prussia are also important, employing 400,000 workpeople, though they do not rank in extent with those of Great Britain. Until recently the chief textile manufacture was linen, which was largely made by hand in Silesia, Westphalia, and Saxony. The domestic mode of manufacture has now to a great extent disappeared, but Westphalian and Silesian linens still maintain their reputation. The manufacture covers the home demand, but about one-third of the necessary flax and hemp has to be imported. Jute is made at Bielefeld and Bonn. The manufacture of cotton has of late made great progress, though it is not so important in Prussia as in the kingdom of Saxony and in Alsace. The chief centres of this branch of industry are Düsseldorf, Münster, Elberfeld-Barmen, Hanover, Breslau, and Liegnitz. About 65 per cent. of the woollen yarn of Germany is made in Prussia, and woollen cloth of good quality is produced in the province of the Rhine, Silesia, Brandenburg, and Saxony. The spinning and weaving of worsted and woollen cloth are also still carried on throughout the country as domestic industries, but not to such an extent as formerly. Wool and worsted yarn are imported from England and other countries, but the cloth manufactured is much in excess of the home demand and forms an important article of export. Carpets are made at Berlin and at Düren in the Rhine province. Silk is manufactured at Crefeld, Elberfeld-Barmen, and other places near the Rhine. Though hardly reaching the high standard of that of Lyons, Rhenish silk commands a good price, and is exported to England, America, Russia, and Austria.

Tobacco and cigars are largely manufactured at Berlin and numerous other towns, and to some extent wherever the tobacco plant is cultivated. The annual consumption of tobacco amounts to about 4 lb per head of population, or nearly thrice as much as in Great Britain; but the revenue derived from the tobacco excise, owing to the small impost on home-made tobacco, is not more than 6d. a head as compared with 5s. per head in England. A comparatively modern but very important branch of industry is the manufacture of sugar from the common beet. The great centre of this industry is the province of Saxony, which in 1882-83 contained nearly half the 280 sugar-works in the kingdom, the remainder being chiefly in Hanover and Silesia. Upwards of 600,000 tons of raw sugar and 160,000 tons of molasses are produced annually.[1] About 320 million gallons of beer are brewed in Prussia per annum and about 35 million more are imported from Bavaria and Bohemia; the consumption per head, amounting from 65 to 70 quarts, is about half of the English and one-fourth of the Bavarian rate. Wine-making, as already mentioned, is an important industry on the Rhine, and large quantities of spirits are distilled from potatoes in Brandenburg and the eastern provinces. The remaining industrial products of Prussia include chemicals. chiefly made in Saxony, Silesia, and the Rhenish province; dyes, at Elberfeld-Barmen and Crefeld; paper, in the districts of Aix-la-Chapelle, Arnsberg, and Liegnitz; glass ("Bohemian glass"), in Silesia; pianos, at Berlin, Breslau, Cassel, and Erfurt; and scientific instruments, at Berlin and Halle. The artistic furniture and porcelain of Berlin are characteristic specialities. In nearly every department there has been in recent years a steady advance both in quantity and quality.

Trade.—The commerce of Prussia is greatly facilitated by its central position, which enables it to carry on a very extensive transit trade; but, as the returns are not separated from those of the other members of the Zollverein, it is impossible to do more than guess at its annual value. According to the *Almanach de Gotha*, the total value of the exports and imports of the German Customs Union in 1883 amounted to upwards of £330,000,000; and. to judge from the customs receipts, about three-fifths of this amount must be credited to Prussia. The chief imports are tea. coffee. sugar, and other colonial products, grain, wine, textile fabrics, fruit, petroleum, and manufactured articles of various kinds. Among the principal exports are grain, cattle, wine, potatoes, woollen and linen goods, hides and leather, chemicals, iron and steel wares, lead. and zinc. The export of grain to France and England has fallen off greatly of recent years, owing to the increasing demand at home. The inland trade is fostered by numerous fairs, the most important of which take place at the two Frankforts, Breslau, and Magdeburg. The money-markets of Berlin and Frankfort-on-the-Main are among the most influential in Europe.

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[1] Over-production, stimulated by over-protection and the high bounty on exportation, produced a serious crisis in this industry in 1884.

In 1883 Prussia possessed upwards of three-fifths of the merchant ships of Germany, including 2586 sailing vessels and 229 steamers, manned by 17,315 men. Their burden, however, amounting to 449,391 tons, was little more than one-third of the whole, and was exceeded by that of Bremen and Hamburg taken together. None of the Prussian seaports vies with either Hamburg or Bremen ; the largest is Stettin, which possesses a fleet of 40 steamers and 280 sailing ships. In 1881 the Prussian harbours were entered by 38,054 vessels of 3,483,545 tons burden, and cleared by 38,005 of 3,518,098 tons burden. The best seamen are furnished by the fishing population of Friesland or Frisia.

Communication.—With most internal means of communication Prussia is well provided. Almost none of its excellent highroads existed in the time of Frederick the Great, and many of them date from the Napoleonic era. The first Prussian railway was laid in 1838, but the railway system did not receive its full development until the events of 1866 removed the obstacles placed in the way by Hanover. Most of the lines were easy of construction, and absorbed comparatively little capital. The great majority were laid by private companies, and the Government confined itself to establishing lines in districts not likely to attract private capital. In 1879, however, a measure was passed authorizing the acquisition by the state of the private railways, and in 1884 nine-tenths of the 13,800 miles of railway in Prussia were in the hands of Government. The proportion of railway mileage in Prussia (5 miles per 10,000 inhabitants) is nearly as high as in Great Britain, but the traffic is much less. Thus in 1880-81 the Prussian railways carried only 124 million passengers, while the British lines conveyed 622 millions. The expenses swallowed up 56 per cent. of the gross receipts, or 4 per cent. more than those of England in the same year ; but in the matter of railway accidents the comparison is more favourable to the Prussian railways, on which only 235 persons lost their lives as compared with about four times as many in Great Britain. The passenger traffic has not increased in proportion to the extension of the railway system and the growth of population, but the goods traffic has steadily advanced. The canal system of Prussia is little beyond its infancy, the total length of all the canals in the kingdom being only 1200 miles, a very small number as compared with either England or France. Among the most important are those uniting the Pregel with the Memel, and the Vistula with the Oder (*via* the Netze), and those bringing the Spree and Havel into communication with the Elbe on the one side and the Oder on the other. Canals uniting the Ems and the Rhine, the Ems and the Weser, and the Weser and the Elbe are still desiderata. On the other hand, Prussia has a large supply of navigable rivers.

Population.

Population.—The last census of Prussia was taken in 1880, and the accompanying table summarizes the principal results then ascertained. The total population amounts to about 60 per cent. of that of the German empire.

Provinces	Population.	Pop. per sq. mile	Protestants.	Roman Catholics.	Other Christian Sects.	Jews.	Others.
East Prussia .	1,933,936	135	1,654,510	250,462	7,483	18,218	3,263
West Prussia	1,405,898	142	672,402	693,719	2,390	26,547	840
Brandenburg	3,389,155	2[illegible]0	3,182,486	131,781	6,087	66,245	2,556
Pomerania	1,540,034	132	1,498,930	23,877	1,962	13,886	1,379
Posen	1,703,397	152	532,499	1,112,020	451	56,609	1,818
Silesia	4,007,925	2[illegible]7	1,867,470	2,082,084	3,329	52,682	2,361
Saxony..........	2,312,007	2[illegible]7	2,154,655	145,518	3,394	6,700	1,740
Schleswig-Holstein	1,127,149	154	1,111,252	8,903	1,687	3,522	1,785
Hanover	2,120,168	142	1,842,136	258,824	2,738	14,790	1,680
Westphalia......	2,043,442	262	949,644	1,070,212	2,614	18,810	2,162
Hesse-Nassau ..	1,554,376	256	1,087,901	420,206	3,073	41,316	1,880
Rhineland	4,074,000	390	1,077,173	2,944,186	7,015	43,694	1,932
Hohenzollern....	67,624	153	2,221	64,491	3	771	138
	27,279,111	202	17,633,279	9,206,283	52,225	363,790	23,534

The following table shows the growth of the population since the death of Frederick, the first king of Prussia. The first trustworthy census of Prussia was taken in 1816 ; the earlier figures are only more or less reasonable estimates.

Date.	Population.	Area in square miles.	Average per square mile.
1713	1,731,000	43,425	39
1740	2,486,000	45,900	54
1786	5,430,000	75,220	72
1797	8,700,000	118,000	73
1816	10,349,031	108,100	95
1831	13,038,070	108,100	120
1864	19,254,649	108,430	177
1880	27,279,111	134,490	202·8

Between 1816 and 1831 the increase of the population of Prussia was about 30 per cent., and between 1831 and 1864 it was 46 per cent. Some districts have more than doubled their population since 1816, but the annual increment since 1866 has not exceeded 1 per cent., a fact due to the less rapid multiplication in the new provinces and the losses in the Franco-German War. The rate of increase in the latter part of the period 1867-84 has, however, been considerably more rapid than in the first half. The increase is entirely due to the surplus of births over deaths, as emigration is very much in excess of immigration. With the exception of Saxony and some of the smallest states, Prussia is increasing more rapidly in population than any other member of the German empire. Its rate of increase is fully twice that of France and about the same as that of the United Kingdom. The highest rate of increase in 1875-80 took place in Berlin (2·92 per annum) and Westphalia (1·39), the lowest in Hohenzollern (0·35) and East Prussia (0·82). The birth-rate, which for the entire country is 40 per 1000, is highest in West Prussia, Posen, and Westphalia and lowest in Schleswig-Holstein, Hanover, and Hesse-Nassau. The death-rate for the whole monarchy is about 27 per 1000, considerably higher than that of Great Britain, which is about 20 per 1000. Pomerania is remarkable for its low death-rate, West Prussia and Silesia for a high one. Both the birth-rate and the death-rate show a tendency to diminish. Of the births in 1882 8·11 per cent. were illegitimate, the proportion varying from 2·92 per cent in Westphalia to 11 per cent. in Pomerania, and nearly 15 per cent in Berlin. Between 1872 and 1880 the number of marriages diminished with almost unvarying steadiness ; since 1880 it has risen again and now amounts to about 8 per 1000 inhabitants. An interesting feature is the large proportion of mixed confessional marriages, amounting as a rule to about 7 per cent. of the whole. Between 1871 and 1881 the annual emigration from Prussia amounted to 1·8 per 1000 inhabitants ; in 1882 no fewer than 129,894, and in 1883 104,167 emigrants left the country by the German ports and Antwerp. The highest proportion of emigrants comes from Pomerania (5·6) and Posen (4·3), the lowest from Silesia, the Rhineland, and Saxony.

A study of the figures in the table given above will show that as a rule the density of population increases from north to south and from east to west. As might be expected, the thickest population is found in the mining and manufacturing district of the Rhine, which is closely followed by the coal-regions of Silesia and parts of Saxony and Westphalia. The proportion for the whole kingdom is about 200 per square mile, but in the district of Düsseldorf this figure rises to 750 and in the moorlands of Hanover it sinks to less than 50. According to the census of 1880, 57·4 per cent. of the population is rural, and 42 6 per cent. urban, *i.e.*, lives in communities of more than 2000 inhabitants. The relative proportions vary greatly in the different provinces, as much as 62 per cent. of the population living in towns in the Rhineland, and as little as 23 or 24 per cent. in East Prussia and Posen. About 17 per cent. of the population is absorbed by towns each with 20,000 inhabitants and upwards, while in Great Britain half the population is massed in the large towns and from 65 to 70 per cent. is urban. In Prussia also there is observable a strong movement towards concentration in towns, the annual rate of increase in the urban population being six times as great as that in the rural communities. In 1880 Prussia contained 24 towns each with upwards of 50,000 inhabitants, and 7 with upwards of 100,000 inhabitants, the corresponding numbers in Great Britain being 59 and 26. The following are the towns with upwards of 100,000 inhabitants each :—

Berlin	1,122,330	Konigsberg	140,909
Breslau	272,912	Frankfort-on-the-Main ..	136,819
Hanover	145,227	Dantsic	108,551
Cologne	144,772		

Elberfeld and Barmen practically form one town with a population of 189,479 ; and Magdeburg, Düsseldorf, Stettin, and Altona are all above 90,000. The annual rate of suicides in Prussia is 18 to 20 per 100,000 inhabitants, a proportion seldom exceeded among European states. Divided according to nationalities, the present (1885) population of Prussia consists roughly of 24,000,000 Germans, 2,800,000 Poles in the eastern provinces, 150,000 Lithuanians in the north-east, 180,000 Danes in Schleswig-Holstein, 90,000 Wends in Brandenburg and Silesia, 60,000 Czechs in Silesia, and 12,000 Walloons near the Belgian frontier. In the rural districts of Posen and in parts of Silesia the Poles form the predominant element of the population.

In 1882 a census of occupations was taken in the German empire, the main results of which, so far as they relate to Prussia, are summarized in the following table. The figures include the wives, families, and other dependants of those actually engaged in the several occupations. The actual workers are about 11 millions in number and their dependants 16 millions.

Occupations.	Number of persons supported.	Percentage of total population.
1. Agriculture, forestry, and fishing	11,904,407	43
2. Industrial pursuits	9,393,750	35
3 Trade	2,725,344	10
4. Domestic servants (and general labourers)	690,892	2·4
5. Official, military, and professional classes	1,305,657	5
6. Persons not returned under any occupation	1,267,810	4·6

Religion. *Religious Statistics.*—According to the census returns of 1880 (see table, p. 16), 64·64 per cent. of the population of Prussia were Protestants, 34 per cent. Roman Catholics, and 1·33 Jews. A glance at a confessional map of Prussia shows that the centre of the kingdom is solidly Protestant, the proportion of Roman Catholics increasing as the eye travels east or west and reaching its maximum on the Rhine and in the Slavonic provinces. East Prussia, however, with the exception of Ermland, is Protestant. The Roman Catholics outnumber the Protestants in the provinces of the Rhine (3 to 1), Posen, Silesia, and West Prussia. All religious bodies are granted freedom of worship, and civil rights are not conditional upon religious confession.

The Evangelical or Protestant State Church of Prussia consists as it now stands of a union of the Lutherans and Calvinists, effected under royal pressure in 1817. According to the king this was not a fusion of two faiths but an external union for mutual admission to the Eucharist and for the convenience of using the same liturgy, prepared under the royal superintendence. Those who were unable from conscientious scruples to join the union became Separatist or Old Lutherans and Old Calvinists, but their numbers were and are insignificant. The king is "summus episcopus," or supreme pontiff of the church, and is represented in the exercise of his ecclesiastical functions by the minister of public worship and instruction. The highest authority for the ordinary management of the church is the "Oberkirchenrath," or supreme church council at Berlin, which acts through provincial consistories and superintendents appointed by the crown. Recent legislation has made an effort to encourage self-government and give a congregational character to the church by the granting of a presbyterial constitution, with parish, diocesan, provincial, and general synods. The clergy, of whom there were 9146 in 1880, are appointed by the crown, by the consistories, by private or municipal patronage, or by congregational election.

The hierarchy of the Roman Catholic Church in Prussia consists of two archbishops (Cologne, Gnesen-Posen) and ten bishops. The prince-bishop of Breslau and the bishops of Ermland, Hildesheim, and Osnabrück are directly under the pope, and the bishoprics of Fulda and Limburg are in the archiepiscopal diocese of Freiburg in Baden. The higher ecclesiastics receive payment from the state, and the annual appropriation appearing in the budget for the Roman Catholic Church is as high as that made for the State Church. All the Roman Catholic religious orders in Prussia have been suppressed except those mainly or wholly occupied with attendance on the sick.

The relations of the state with the dissenting Christian sects, such as the Baptists, Mennonites, and Moravian Brethren, are practically confined to granting them charters of incorporation which ensure them toleration. The Mennonites were formerly allowed to pay an extra tax in lieu of military service, which is inconsistent with their belief, but this privilege has been withdrawn. The Old Catholics number about 30,000, but do not seem to be increasing.

The Jews belong mainly to the urban population and form 20 to 30 per cent. of the inhabitants in some of the towns in the Slavonic provinces. They are especially prominent in commerce, finance, and on the stage, and also exercise great influence on the press. Perhaps the actual majority of newspaper editors and proprietors are of Jewish blood. The wave of social persecution to which they were subjected from 1876 onwards, especially in Berlin and Pomerania, has, to some extent at least, subsided.

Education. *Education.*—In Prussia education is looked upon as the province of the state, and the general level attained is very high. All schools, public and private, are under state supervision, and no one is allowed to exercise the profession of teacher until he has given satisfactory proof of his qualifications. At the head of the administration stands the minister of public instruction, to whom the universities are directly subordinate. The secondary schools are supervised by provincial "Schulcollegia," or school-boards, appointed by Government, while the management of the elementary and private schools falls within the jurisdiction of the ordinary "Regierungen," or department officials. This they carry out through qualified school-inspectors, frequently chosen from among the clergy. All children must attend school from their sixth to their fourteenth year.

The expenses of the primary schools (*Volksschulen*) are borne by the communes (*Gemeinden*, see *infra*), aided when necessary by subsidies from the state. The subjects of instruction are theology, reading, writing, spelling, arithmetic, the elements of geometry, history, geography, and natural science, singing, drawing, sewing, and gymnastics. The fees are extremely small, amounting in the rural districts to about 1d. per week, and in Berlin and some other towns they have been entirely done away with. In 1882 Prussia contained 33,040 primary schools with 59,917 teachers and 4,339,729 pupils. This shows an average of 159 children attending school out of every 1000 inhabitants, the proportion varying from 120 to 130 in the north-eastern provinces to 175 to 180 in Westphalia and Rhenish Prussia. The number of illiterate recruits among those called upon each year to serve in the army affords a good test of the universality of elementary education. In 1882-83 the proportion of "Analphabeti," or men unable to read or write, among the recruits levied was only 2 per cent., the rate varying from 9·75 per cent. in Posen to 0·03 in Schleswig-Holstein, where there was only one illiterate recruit among 3662. The teachers for the elementary schools are trained in normal seminaries or colleges established and supervised by the state, and much has been done of late years to improve their position. In most of the larger towns the elementary schools are supplemented by middle schools (*Bürgerschulen*, *Stadtschulen*), which carry on the pupil to a somewhat more advanced stage, and are partly intended to draw off the unsuitable elements from the higher schools.

The secondary schools of Prussia may be roughly divided into classical and modern, though there are comparatively few in which Latin is quite omitted. The classical schools proper consist of *Gymnasia* and *Progymnasia*, the latter being simply gymnasia wanting the higher classes. In these boys are prepared for the universities and the learned professions, and the full course lasts for nine years. In the modern schools, which are divided in the same way into *Realgymnasia* and *Realprogymnasia*, and also have a nine years' course, Latin is taught, but not Greek, and greater stress is laid upon modern languages, mathematics, and natural science. The three lower classes are practically identical with those of the gymnasia, while in the upper classes the thoroughness of training is assimilated as closely as possible to that of the classical schools, though the subjects are somewhat altered. Ranking with the realgymnasia are the *Oberrealschulen*, which differ only in the fact that Latin is entirely omitted, and the time thus gained devoted to modern languages. The *Höhere* (or upper) *Bürgerschulen*, in which the course is six years, rank with the middle schools above mentioned, and are intended mainly for those boys who wish to enter business life immediately on leaving school. All these secondary schools possess the right of granting certificates entitling the holders, who must have attained a certain standing in the school, to serve in the army as one-year volunteers. The gymnasial "certificate of ripeness" (*Maturitätszeugniss*), indicating that the holder has passed satisfactorily through the highest class, enables a student to enroll himself in any faculty at the university, but that of the realgymnasium qualifies only for the general or "philosophical" faculty, and does not open the way to medicine, the church, or the bar. Considerable efforts are, however, now being made to have the realgymnasium certificate recognized as a sufficient qualification for the study of medicine at least. At any of these schools a thoroughly good education may be obtained at a cost seldom exceeding, in the highest classes, £5 per annum. The teachers are men of scholarship and ability, who have passed stringent Government examinations and been submitted to a year of probation. The great majority of the secondary schools have been established and endowed by municipal corporations. In 1881 Prussia contained 251 gymnasia, 64 progymnasia, 88 realgymnasia, 15 oberrealschulen, 27 realschulen, 47 höhere bürgerschulen, and 276 *Höhere Töchterschulen*, or higher schools for girls. Besides these there are, of course, numerous commercial, technical, industrial, and other special schools.

Prussia possesses ten of the twenty German universities, attended by 12,800 students, or at the rate of one student for 2125 inhabitants. The largest Prussian university is that of Berlin, attended by more than 4000 students, while Breslau, Bonn, Göttingen, and Halle have each upwards of 1000. The oldest is the university of Greifswald, founded in 1456. Like the schools the universities are state institutions, and the professors are appointed and paid by Government, which also makes liberal annual grants for apparatus and equipment. The full obligatory course of study extends over three, and in the case of medicine four years. It is, however, not unusual for non-medical students also to spend four years at the university, and there is an agitation to make this compulsory. Students qualifying for a Prussian Government appointment are required to spend at least three terms or half-years (*Semester*) at a Prussian university.

Ranking with the universities are the large polytechnic colleges at Berlin, Hanover, and Aix-la-Chapelle, the mining academies of Berlin and Klausthal, and the academies of forestry at Eberswalde and Münden. Departments for the study of agriculture are attached to many of the universities. Music is taught at several conservatoria, the best known of which are at Berlin and Frankfort-on-the-Main.

The science and art of Prussia find their most conspicuous external expression in the academies of science and art at Berlin, both founded by Frederick I.; and each town of any size throughout the kingdom has its antiquarian, artistic, and scientific societies. Recognized schools of painting exist at Berlin and Düsseldorf, and both these towns, as well as Cassel, contain excellent picture galleries. The scientific and archæological collections of Berlin are also of great importance. Besides the university collections, there are numerous large public libraries, the chief of which is the royal library at Berlin (1,000,000 vols.).

Constitution.—The present form of the government of Prussia, consisting of an hereditary monarchy with two houses of parliament, is based upon a fundamental law promulgated in 1850, and subsequently somewhat modified by various enactments. The constitution affirms the legal equality of all citizens in the eye of the law, provides for universal military service, and guarantees the personal liberty of the subject, the security of property, immunity from domiciliary visits, the inviolability of letters, toleration of religious sects, freedom of the press, the right of association and public meetings, and liberty of migration.

The monarchy is hereditary in the male line of the house of Hohenzollern, and follows the custom of primogeniture. The king alone exercises the executive power, but shares the legislative power with his parliament. He appoints and discharges the ministers and other officials of the crown, summons and dissolves parliament, possesses the right of pardon and mitigation of punishment, declares war and concludes peace, and grants orders and titles. He is held to be irresponsible for his public actions, and his decrees require the countersign of a minister, whose responsibility, however, is not very clearly defined. The national tradition and feeling lend the crown considerable power not formulated in the constitution, and the king is permitted to bring his personal influence to bear upon parliament in a way quite at variance with the English conception of a constitutional monarch. The annual civil list of the king of Prussia amounts to £600,000.

The legislative assembly consists of two chambers, which are convoked annually at the same time but meet separately. The right of proposing new measures belongs equally to the king and each of the chambers, but the consent of all three estates is necessary before a measure can pass into law. The chambers have control of the finances and possess the right of voting or refusing taxes. Financial questions are first discussed in the lower house, and the upper house can accept or reject the annual budget only *en bloc*. All measures are passed by an absolute majority, but those affecting the constitution must be submitted to a second vote after an interval of at least twenty-one days. Members may not be called to account for their parliamentary utterances except by the chamber in which they sit. No one may at the same time be a member of both chambers. The ministers of the crown have access to both chambers and may speak at any time, but they do not vote unless they are actually members. The general scheme of government, though constitutional, is not exactly "parliamentary" in the English sense of the word, as the ministers are independent of party and need not necessarily represent the opinions of the parliamentary majority. The *Herrenhaus*, or house of peers, contains two classes of members, the hereditary and non-hereditary. The former consists of the adult princes of the house of Hohenzollern, the mediatized princes and counts of the old imperial nobility, and the heads of the great territorial nobility. The non-hereditary members comprise life peers chosen by the king from the ranks of the rich landowners, manufacturers, and men of general eminence, and representatives "presented" for the king's approval by the landowners of the nine old provinces, by the larger towns, and by the universities. The *Abgeordnetenhaus*, or chamber of deputies, consists of 433 members, elected for periods of three years by indirect suffrage, exercised by all male citizens who have reached the age of twenty-five and have not forfeited their communal rights. The original electors are arranged in three classes, according to the rate of taxes paid by them, in such a way that the gross amount of taxation is equal in each class. The country is accordingly divided into electoral districts, with the electors grouped in three categories, each of which selects a *Wahlmann* or electoral proxy, who exercises the direct suffrage. Members of the lower house must be thirty years old and in full possession of their civic rights. They receive a daily allowance (*Diäten*) during the sitting of the house.

The king exercises his executive functions through an irresponsible *Staatsrath*, or privy council, revived in 1884 after thirty years of inactivity, and by a nominally responsible cabinet or council of ministers (*Staats-Ministerium*). The latter consists at present of the minister-president and of the ministers of foreign affairs, war, justice, finance, the interior, public worship and instruction, industry and commerce, public works, agriculture, domains, and forests. Ministers conduct the affairs of their special departments independently, but meet in council for the discussion of general questions. They represent the executive in the houses of parliament and introduce the measures proposed by the crown, but do not need to belong to either chamber. The affairs of the royal household and privy purse are entrusted to a special minister, who is not a member of the cabinet.

The Prussian governmental system is somewhat complicated by its relation to that of the empire. The king of Prussia is at the same time German emperor, and his prime minister is also the imperial chancellor. The ministries of war and foreign affairs practically coincide with those of the empire, and the customs-dues and the postal and telegraph service have also been transferred to the imperial Government. Prussia has only seventeen votes in the federal council, or less than a third of the total number, but its influence is practically assured by the fact that the small northern states almost invariably vote with it. To the reichstag Prussia sends more than half the members. The double parliamentary system works in some respects inconveniently, as the reichstag and Prussian landtag are often in session at the same time and many persons are members of both. Where imperial and Prussian legislation come into conflict the latter must give way.

For administrative purposes Prussia is divided into *Provinzen* or provinces, *Regierungsbezirke* or governmental departments, *Kreise* or circles, and *Gemeinden* or communes. The city of Berlin and the district of Hohenzollern are not included in any province, and the larger towns usually form at once a commune and a circle (*Stadtkreis*). Recent legislation has aimed at the encouragement of local government and the decentralization of administrative authority by admitting lay or popularly elected members to a share in the administration alongside of the Government officials. Certain branches of administration, such as the care of roads and the poor, have been handed over entirely to local authorities, while a share is allowed them in all. As a general result it may be stated that the Prussian administrative system intervenes between the strongly centralized government of France and the liberty of local government enjoyed in England. In the province the Government is represented by the *Oberpräsident*, whose jurisdiction extends over all matters affecting more than one department. He is assisted by a council (*Provinzialrath*), consisting, besides himself as chairman, of one member appointed by Government and five members elected by the provincial committee (*Provinzialausschuss*). The latter forms the permanent executive of the provincial diet (*Provinzial-Landtag*), which consists of deputies elected by the kreise or circles, and forms the chief provincial organ of local government. The regierungsbezirk is solely a Government division and is only indirectly represented in the scheme of local administration. The Government authorities are the *Regierungs-Präsident*, who is at the head of the general internal administration of the department, and the *Regierung*, or Government board, which supervises ecclesiastical and educational affairs and exercises the function of the state in regard to the direct taxes and the domains and forests. The departmental president is also assisted by a *Bezirksrath* or district council, consisting of one official member and four others selected from inhabitants of the department by the provincial committee. The governmental official in the kreis (county, circle) is the *Landrath*, an office which existed in the Mark of Brandenburg as early as the 16th century. He is aided by the *Kreissausschuss*, or executive committee of the *Kreistag* (the diet of the circle), the members of which are elected by the rural and urban communes. The kreis is the smallest state division; the communes, divided into urban and rural, are left almost entirely to local government, though the chief officials must obtain the sanction of the central authority. In the rural communes the head magistrate, called a *Schulze* or *Dorfrichter*, is elected for six years and is assisted by assessors called *Schöffen*. The regulations for the government of towns still rest in great measure on the liberal reforms effected by Stein at the beginning of the century. The chief power rests in the hands of the *Stadtrath*, which consists of *Stadtverordneten*, or town deputies elected by the citizens for six years. The practical executive is entrusted to the magistracy (*Magistrat*), which usually consists of a burgomaster, a deputy burgomaster (both paid officials), several unpaid members, and, where necessary, a few other paid members. The unpaid members hold office for six years; the paid members are elected for twelve years, and their election requires ratification from the state. The administrative system above described applies as yet in its full extent to about three-fourths of the provinces only, but is to be extended to the others in due course. Though in some respects rather cumbrous in its machinery, the system is on the whole found to work well and with economy.

In the seven eastern provinces, Westphalia, and part of the Rhenish province the common law of Prussia (*Landrecht*), codified in 1794, is in force, while the common law of the German empire, formed by an amalgamation of Roman, canon, and German law, prevails in the three new provinces and part of Pomerania. The Code Napoléon, however, still exists in the greater part of the Rhine district, and the commercial law has been consolidated in the German commercial code of 1861. A new penal code, promulgated in 1850, did away with the old patrimonial or seigniorial jurisdiction, and the administration of justice is now wholly in the hands of Government. The courts of lowest instance are the *Amtsgerichte*, in which sits a single judge, accompanied in penal cases by two *Schöffen* or lay assessors (a kind of jurymen, who vote with the judge). Cases of more importance are decided by the *Landgerichte* or county courts, in which the usual number of judges is three, while in important criminal cases a jury of twelve persons is generally empanelled. From the landgerichte appeals may be made to the *Oberlandesgerichte* or provincial courts. The oberlandesgericht at Berlin is named the *Kammergericht* and forms the final instance for summary convictions in Prussia, while all other cases may be taken to the supreme imperial court at Leipsic. The judges (*Richter*) are appointed and paid by the state, and hold office for life. After finishing his university career the student of law who wishes to become a judge or to practise as qualified counsel (*Rechtsanwalt*, barrister and solicitor in one) passes a Government examination and becomes a *Referendarius.* He then spends at least four years in the practical work of his profession, after which he passes a second examination, and, if he has chosen the bench instead of the bar, becomes an *Assessor* and is eligible for the position of judge. A lawyer who has passed the necessary examinations may at any time quit the bar for the bench, and a judge is also at liberty to resign his position and enter upon private practice. In all criminal cases the prosecution is undertaken by Government, which acts through *Staatsanwälte*, or directors of prosecutions, in the pay of the state.

Finances.—The finances of the Prussian Government are well managed, and a deficit is now a rare occurrence. The expenditure has been considerably relieved by the transference of the cost of the army and navy to the imperial treasury, while on the other hand the customs-dues and several excise duties have been relinquished to the empire and an annual "matricular" contribution paid towards its expenses. The budget is voted annually by the abgeordnetenhaus: the following table is an abstract of that for 1884-85:—

Revenue		*Expenditure.*	
Direct taxes	£7,296,286	Expenses of collection and management	£28,234,532
Indirect taxes	4,586,510	Civil list	225,000
State lottery	201,700	Interest and management of public debt	7,677,316
Marine institute and mint	128,225	Houses of parliament	68,682
Domains and forests	3,805,857	Apanages, annuities, and indemnities	3.262,017
Mines and salt-works	5,120,752	Matricular contribution to the German empire	2,038,460
State railways	28,798,867	Administrative expenditure	12,832,930
General financial administration	5,582,368	Justice	2,017,020
Administrative revenues	1,160,253	Education	1,644,670
		Religion	596,233
		Ministry of the interior	2,077,510
		Occasional and extraordinary expenses	2,341,881
Total	£56,680.818	Total	£56,680,818

Perhaps the only item requiring explanation in the above summary is the general financial administration under the head of revenue; this includes advances from the surplus in the treasury, Prussia's proportion of the profits of the imperial customs and excises, repayments, interest, and other miscellaneous sources of revenue. The extraordinary expenses included upwards of £450,000 for railways and £750,000 for public works. The total expenditure is rather more than £2 per head of population, while in the United Kingdom it is about £2, 10s. Between 1821 and 1844 the rate in Prussia was 11s. 6d. per head, and even in 1858 it was only 21s. 8d. The incidence of direct taxation in Prussia is also less than in Great Britain, the respective figures being 5s. 3d. and 7s. per head. The principal direct imposts are the income-tax, which brings in 40 per cent. of the whole, the land-tax producing 37 per cent., and the house-tax producing 19 per cent. The proceeds of the income-tax amount to about 1s. 2d. per head, as compared with 6s. per head in Great Britain (in 1881). The comparative insignificance of the sum raised by indirect taxation is mainly due to the above-noted fact that the customs-dues and the most important excise duties have been made over to the imperial exchequer. In the preliminary estimates for 1885-86 the receipts and expenditure are balanced at £62,886,250.

Local taxation in Prussia is often very high. The state income-tax is limited to 3 per cent. of the assessed income, but the communes and towns are allowed to make an arbitrary addition for local purposes, sometimes amounting to twice or thrice the sum paid to the state. This is chiefly owing to the fact that the state reserved for itself all taxation on real property, while imposing on the communes the principal share in maintaining the expensive system of public schools. Incomes below £45 (900 marks) are not now taxed, but this exemption is of very recent origin. A few facts from the statistics of taxation and allied subjects may be of interest as affording some slight index to Prussia's growth in prosperity. Between 1864 and 1878 the entire capital subject to income-tax increased from 24 to 48 marks per head of population, while the proportionate number of those liable to the tax had increased by about 75 per cent. It has also been computed that the average income per head increased between 1872 and 1881 by 15 marks, equivalent to a rise of 5 per cent.; that of Great Britain increased in the same period by 88s., or 15 per cent. Of all the payers of income-tax in 1872-81 only 0·10 per cent. had incomes of or above £1000, while 43 per cent. had not more than £25 and 52 per cent. between £25 and £100. Between 1867 and 1880 the proceeds of the house-tax increased by over 100 per cent. It now averages 1s. per head, varying from 6d. in country districts up to 5s. or 5s. 6d. in Berlin, Frankfort-on-the-Main, and Cologne. In 1875 the number of depositors in savings banks was 86 per 1000 inhabitants, and by 1880 the number had risen to 107. The sum deposited amounted to £79,643,400, equivalent to 58s. per head of population. At the same date Austria alone of European powers had a higher proportion (67s.), while in Great Britain the sum was 44s. and in France 27s.

The public debt of Prussia in 1884 amounted to 3,345,097,438 marks, or £167,254,872. This is equivalent to about £5 per head of population, as compared with three and a half times as much in England. The annual charge for interest on the debt is 5s. 8d. per head in Prussia and 16s. 2d. in England. Between the end of the struggle with Napoleon and 1848 the debt was considerably reduced; since 1848 it has steadily increased. It is, however, admirably secured, and a great part of it was incurred in the construction and acquisition of railways, the clear income from which covers the annual charges on the entire debt. The various branches of the debt are being gradually united in a consolidated fund, bearing interest at the rate of 4 per cent.

Army and Navy.—The Prussian army now forms about 75 per cent. of that of the German empire, of which it also furnished the model. (See GERMANY.) The first attempt at the foundation of a Prussian navy was made by the Great Elector, who established a small fleet of eight or ten vessels. This, however, was completely neglected by his successors, and the present marine establishment is of quite recent origin. The present imperial navy is simply the Prussian navy under a different name. (See GERMANY.)

Bibliography.—The statistical facts in the foregoing article have been mainly drawn from the *Jahrbuch für die amtliche Statistik des preussischen Staats*, the *Statistisches Jahrbuch für das deutsche Reich*, and other publications of the statistical offices of Prussia and Germany. Good general accounts of the natural, social, and political features of the country are given in Eiselen's *Der preussische Staat* (Berlin, 1862) and in Daniel's *Handbuch der Geographie* (5th ed., 1881 sq.). The Prussian constitution and administrative system are concisely described in the *Handbuch der Verfassung und Verwaltung in Preussen*, by Graf Hue de Grais, and are treated at length in Von Rönne's *Staatsrecht der preussischen Monarchie* (4th ed., 1881-84). For English readers the most interesting introduction to Prussian history is perhaps still to be found in the first part of Carlyle's *Frederick the Great*, the not invariably unprejudiced views of which may be corrected by Professor Tuttle's *History of Prussia to the Accession of Frederick the Great* (Boston, 1884). The latter admirable little work is, indeed, almost indispensable to every English student of Prussian constitutional history. Professor Seeley's *Life of Stein* (London, 1879) contains an excellent account of Prussia in the Napoleonic period, especially with regard to the important internal reforms carried out at the beginning of the present century. Among the numerous German histories of Prussia two of the best are Droysen's *Geschichte der preussischen Politik* and Ranke's *Zwölf Bücher preussischer Geschichte*; the former is authoritative from the writer's copious use of the Prussian archives, but the latter is less diffuse and more interesting. Other standard works are those of Stenzel, Pauli, Riedel, and Lancizolle, while among shorter histories may be mentioned the manual of F. Voigt. Fix's *Territorial-Geschichte des brandenburgisch-preussischen Staates*, with ten historical maps, is a convenient sketch of the territorial growth of Prussia. The period since the death of Frederick the Great is treated in Förster's *Neuere und neueste preussische Geschichte* and in Reimann's *Neuere Geschichte des preussischen Staats* (1882 sq.). The history of the present century is perhaps most fully given in Treitschke's *Deutsche Geschichte im neunzehnten Jahrhundert* (1879 sq.). Until recently the standard work on the history of Prussia proper was that of Johannes Voigt, but this is now being superseded by Lohmeyer's *Geschichte von Ost u. West Preussen* (1881 sq.). The latter forms one of an admirable series of provincial histories in course of publication by Perthes of Gotha. The development of the Prussian bureaucracy is traced in Isaacsohn's *Geschichte des preussischen Beamtenthums* (1870-84). Several points are most satisfactorily handled in the numerous monographs on special periods, the lives of kings and statesmen, and the like. (J. F. M.)

PRUSSIA, in the original and narrower sense of the word, is a district in the north-eastern corner of the modern kingdom of the same name, stretching along the Baltic coast for about 220 miles, and occupying an area of upwards of 24,000 square miles. The eastern part of this territory formed the duchy of Prussia, which was acquired by the electors of Brandenburg in 1618, and furnished them with their regal title. The western part, which had been severed from the eastern half and assigned to Poland in 1466, was not annexed to Prussia until the partition of Poland in 1772, while the towns of Dantsic and Thorn remained Polish down to 1793. In spite of the contrast between the political and social conditions of the two districts, arising from the difference of their history, they were united in 1824 to form a single province. But, as might have been expected, the union did not work well, and it was dissolved in 1878, giving place to the modern provinces of East and West Prussia. The early history of the whole district is related under the kingdom of PRUSSIA (above) and TEUTONIC ORDER, while the former article also gives (p. 14) some statistics as to the produce of the two provinces.[1]

EAST PRUSSIA (*Ostpreussen*), the larger of the two provinces, has an area of 14,280 square miles, and is bounded by the Baltic Sea, Russia, and West Prussia. It shares in the general characteristics of the great north German plain, but, though low, its surface is by no means absolutely flat, as the southern half is traversed by a low ridge or plateau (comp. GERMANY), which attains a height of 1025 feet at a point near the western boundary of the province. This plateau, here named the Prussian Seenplatte, is thickly sprinkled with small lakes, among which is the Spirding See, 46 square miles in extent and the largest inland lake in the Prussian monarchy.

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[1] Compare Lohmeyer's *Geschichte von Ost u. West Preussen* (1881, sq.),

The coast is lined with low dunes or sandhills, in front of which lie the large littoral lakes or lagoons named the Frische Haff and the Kurische Haff. (See GERMANY.) The first of these receives the waters of the Nogat and the Pregel, and the other those of the Memel or Niemen. East Prussia is the coldest part of Germany, its mean annual temperature being about 44° Fahr., while the mean January temperature of Tilsit is only 25°. The rainfall is 24 inches per annum. About half the province is under cultivation; 18 per cent. is occupied by forests, and 23 per cent. by meadows and pastures. The most fertile soil is found in the valleys of the Pregel and the Memel, but the southern slopes of the Baltic plateau and the district to the north of the Memel consist in great part of sterile moor, sand, and bog. The chief crops are rye, oats, and potatoes, while flax is cultivated in the district of Ermland, between the Passarge and the upper Alle. East Prussia is the headquarters of the horse-breeding of the country and contains the principal Government stud of Trakehnen; numerous cattle are also fattened on the rich pastures of the river-valleys. The extensive woods in the south part of the province harbour a few wolves and lynxes, and the elk is still preserved in the forest of Ibenhorst, near the Kurische Haff. The fisheries in the lakes and haffs are of some importance; but the only mineral product of note is amber, which is found in the peninsula of Samland in greater abundance than in any other part of the world. Manufactures are almost confined to the principal towns, though linen-weaving is practised as a domestic industry. Commerce is facilitated by canals connecting the Memel and Pregel and also the principal lakes, but is somewhat hampered by the heavy dues exacted at the Russian frontier. A brisk foreign trade is carried on through the seaports of Königsberg (140,909), the capital of the province, and Memel (19,660), the exports consisting mainly of timber and grain. In 1880 the population of East Prussia was 1,933,936, including 1,654,510 Protestants, 250,462 Roman Catholics, and 18,218 Jews. The Roman Catholics are mainly confined to the district of Ermland, in which the ordinary proportions of the confessions are completely reversed. The bulk of the inhabitants are of German blood, but there are 400,000 Protestant Poles (Masurians or Masovians) in the south part of the province, and 150,000 Lithuanians in the north. As in other provinces where the Polish element is strong, East Prussia is below the general average of the kingdom in education; in 1883 fully 5½ per cent of its recruits were unable to read or write. There is a university at Konigsberg.

WEST PRUSSIA (*Westpreussen*), with an area of 9850 square miles, is bounded by the Baltic, East Prussia, Poland, Posen, Brandenburg, and Pomerania. It resembles East Prussia in its physical characteristics, but its fertility is somewhat greater and its climate not quite so harsh. The Baltic plateau traverses the province from east to west, reaching its culminating point in the Thurmberg (1090 feet), near Dantsic. Near the middle of the province the range is interrupted by the valley of the Vistula, beyond which it trends to the north and approaches the coast. The lakes of West Prussia are nearly as numerous but not so large as those of the sister province. The natural products are similar, and the manufactures are also almost confined to the large towns. The cultivation of the common beet, for the production of sugar, has been introduced, and several sugar refineries have been erected. The valley of the Vistula, particularly the rich lowlands (*Werder*) of the delta, are very fertile, producing good crops of wheat and pasturing large herds of horses, cattle, and sheep. The population in 1880 was 1,405,898, consisting in almost equal proportions of Roman Catholics and Protestants; there were 26,547 Jews and 490,000 Poles. The percentage of illiterate recruits in 1882 was still higher than in East Prussia (7·97), but not so high as in Posen (9·75). The capital and principal town is Dantsic (108,551), while Elbing (35,842) and Thorn (20,617) also carry on a considerable trade.

PRUSSIA, RHENISH (German, *Rheinpreussen*, *Rheinprovinz*, *Rheinland*), the most westerly province of the kingdom of Prussia, is bounded on the N. by Holland, on the E. by Westphalia, Hesse-Nassau, and Hesse-Darmstadt, on the S.E. by the Rhenish Palatinate, on the S. and S.W. by Lorraine, and on the W. by Luxemburg, Belgium, and Holland. The small district of Wetzlar in the midst of the province of Hesse also belongs to Rhenish Prussia, which, on the other hand, surrounds the Oldenburg principality of Birkenfeld. The extent of the province is 10,420 square miles, or nearly twice that of the kingdom of Saxony; its extreme length, from north to south, is nearly 200 miles and its greatest breadth is just under 90. It includes about 200 miles of the course of the Rhine, which forms the eastern frontier of the province from Bingen to Coblentz and then flows through it in a north-westerly direction.

The southern and larger half of Rhenish Prussia, belonging geologically to the Devonian formations of the lower Rhine, is hilly. On the left bank are the elevated plateaus of the Hundsrück and the Eifel, separated from each other by the deep valley of the Moselle, while on the right bank are the spurs of the Westerwald and the Sauerland, the former reaching the river in the picturesque group known as the Seven Mountains. The highest hill in the province is the Walderbeskopf (2670 feet) in the Hochwald, and there are several other summits above 2000 feet on the left bank, while on the right there are few which attain a height of 1600 feet. Most of the hills are covered with trees, but the Eifel is a barren and bleak plateau, with numerous traces of volcanic agency, and is continued towards the north-west by the moorlands of the Hohe Venn. To the north of a line drawn from Aix-la-Chapelle to Bonn the province is flat, and marshy districts occur near the Dutch frontier. The climate varies considerably with the configuration of the surface. That of the northern lowlands and of the sheltered valleys is the mildest and most equable in Prussia, with a mean annual temperature of 50° Fahr., while on the hills of the Eifel the mean does not exceed 44°. The annual rainfall varies in the different districts from 18 to 32 inches. Almost the whole province belongs to the basin of the Rhine, but a small district in the north-west is drained by affluents of the Meuse. Of the numerous tributaries which join the Rhine within the province, the most important are the Nahe, the Moselle, and the Ahr on the left bank, and the Sieg, the Wupper, the Ruhr, and the Lippe on the right. The only lake of any size is the Laacher See, the largest of the "maare" or extinct crater lakes of the Eifel.

Of the total area of the Rhenish province about 46·5 per cent. is occupied by arable land, 17 per cent. by meadows and pastures, and 31 per cent. by forests. Little except oats and potatoes can be raised on the high-lying plateaus in the south of the province, but the river-valleys and the northern lowlands are extremely fertile. The great bulk of the soil is in the hands of small proprietors, and this is alleged to have had the effect of somewhat retarding the progress of scientific agriculture. The usual cereal crops are, however, all grown with success, and tobacco, hops, flax, rape, hemp, and beetroot (for sugar) are cultivated for commercial purposes. Large quantities of fruit are also produced. The vine-culture occupies a space of 30,000 acres, about half of which are in the valley of the Moselle, a third in that of the Rhine itself, and the rest mainly on the Nahe and the Ahr. The choicest varieties of Rhine wine, however, such as Johannisberger and Steinberger, are produced higher up the river, beyond the limits of the Rhenish province. In the hilly districts more than half the surface is sometimes occupied by forests, and large plantations of oak are formed for the use of the bark in tanning. Considerable herds of cattle are reared on the rich pastures of the lower Rhine, but the number of sheep in the province is comparatively small, and is, indeed, not greatly in excess of that of the goats. The wooded hills are well stocked with deer, and a stray wolf occasionally finds its way from the forests of the Ardennes into those of the Hundsrück. The salmon fishery of the Rhine is very productive and trout abound in the mountain streams. (Compare the agricultural tables under PRUSSIA, p. 14 *supra*.)

The great mineral wealth of the Rhenish province probably furnishes its most substantial claim to the title of the "richest jewel in the crown of Prussia." Besides parts of the Carboniferous measures of the Saar and the Ruhr, it also contains important deposits of coal near Aix-la-Chapelle. Iron occurs abundantly near Coblentz, the Bleiberg in the Eifel possesses an apparently inex haustible supply of lead, and zinc is found near Cologne and Aix-la-Chapelle. The mineral products of the district also include lignite, copper, manganese, vitriol, lime, gypsum, volcanic stones (used for mill-stones), and slates. In 1882 the total value of the minerals raised in the province was £5,460,000, or nearly one-third of the produce of Prussia; by far the most important item is coal, the output of which was upwards of 15,000,000 tons, valued at £4,400,000. Of the numerous mineral springs the best known are those of Aix-la-Chapelle and Kreuznach.

The mineral resources of Rhenish Prussia, coupled with its favourable situation and the facilities of transit afforded by its great waterway, have made it the most important manufacturing district in Germany. The industry is mainly concentrated round two chief centres, Aix-la-Chapelle and Düsseldorf (with the valley of the Wupper), while there are naturally few manufactures in the hilly districts of the south or the marshy flats of the north. In the forefront stand the metallic industries, the total produce of which was valued in 1882 at £5,200,000. The foundries produced upwards of a million tons of iron, besides zinc, lead, copper, and other metals. The largest iron and steel works are at Essen (including Krupp's cannon-foundry), Oberhausen, Duisburg, Düsseldorf, and Cologne, while cutlery and other small metallic wares are extensively made at Solingen, Remscheid, and Aix-la-Chapelle. The cloth of Aix-la-Chapelle and the silk of Crefeld form important articles of export. The chief industries of Elberfeld-Barmen and the valley of the Wupper are cotton-weaving, calico-printing, and the manufacture of turkey red and other dyes. Linen is largely made at Gladbach, leather at Malmedy, glass in the Saar district, and beet-root sugar near Cologne. Though the Rhineland is *par excellence* the country of the vine, no less than 52,000,000 gallons of beer were brewed in the province in 1882-83, equivalent to an annual consumption of fifty-one quarts per head of population; distilleries are also numerous, and large quantities of sparkling Moselle are made at Coblentz, chiefly for exportation to England. Commerce is greatly aided by the navigable rivers, a very extensive network of railways, and the excellent roads constructed during the French régime. The imports consist mainly of raw material for working up in the factories of the district, while the principal exports are coal, fruit, wine, dyes, cloth, silk, and other manufactured articles of various descriptions.

The population of Rhenish Prussia in 1880 was 4,074,000, including 2,944,186 Roman Catholics, 1,077,173 Protestants, and 43,694 Jews. The Roman Catholics muster strongest on the left bank, while on the right bank about half the population is Protestant. The distribution of the confessions is, however, somewhat sporadic, owing to the varied histories of the constituent parts of the province. The great bulk of the population is of Teutonic stock, and about a quarter of a million are of Flemish blood. On the north-west frontier reside about 12,000 Walloons, who speak French or Walloon as their native tongue. The Rhine province is the most thickly populated part of Prussia, the general average being 390 persons per square mile, while in the government district of Düsseldorf the proportion rises to 754. The province contains a greater number of large towns than any other province in Prussia, and 62·5 of the population is returned as urban. Upwards of half the population are supported by industrial and commercial pursuits, and barely a quarter by agriculture. There is a university of good standing at Bonn, and the success of the elementary education is borne witness to by the fact that in 1883 only 0·19 per cent. of the Rhenish recruits were unable to read and write. For purposes of administration the province is divided into the five districts of Coblentz, Düsseldorf, Cologne, Aix-la-Chapelle, and Treves; Coblentz is the official capital, though Cologne is the largest and most important town. In the greater part of the province the Code Napoléon, introduced under the French régime, is still in force. Being a frontier province the Rhineland is strongly garrisoned, and the Rhine is guarded by the four strong fortresses of Cologne with Deutz, Coblentz with Ehrenbreitstein, Wesel, and Saarlouis. In the Prussian parliament the province of the Rhine is represented by twenty-seven members in the upper house and eighty-two in the lower

History.—The present province of Rhenish Prussia was formed in 1815 out of the duchies of Cleves, Berg, Upper Guelders, and Jülich, the ecclesiastical principalities of Treves and Cologne, the free cities of Aix-la-Chapelle and Cologne, and nearly a hundred small independent lordships, knightships, and abbeys. It is therefore manifestly impracticable to give more than a broad general sketch of the historical development of a region of which the component parts have had so little of their past in common. At the earliest historical period we find the territories between the Ardennes and the Rhine occupied by the Treviri, Eburones, and other Celtic tribes, who, however, were all more or less modified and influenced by their Teutonic neighbours. On the right bank of the Rhine, between the Main and the Lahn, were the settlements of the Mattiaci, a branch of the Germanic Chatti, while farther to the north were the Usipetes and Tencteri. Julius Cæsar conquered the tribes on the left bank and Augustus established numerous fortified posts on the Rhine, but the Romans never succeeded in gaining a firm footing on the right bank. Under the Romans the districts to the west of the Rhine, forming parts of the provinces of Belgica Prima, Germania Superior, and Germania Inferior, enjoyed great prosperity and reached a high degree of civilization. Several Roman emperors resided and issued their edicts at Treves, the capital of Belgica Prima, and the important Roman remains in this city as well as in other parts of the province give an idea of the material benefits the territory derived from their dominion. As the power of the Roman empire declined the Franks pushed forward along both banks of the Rhine, and by the end of the 5th century had regained all the lands that had formerly been under Teutonic influence. The German conquerors of the Rhenish districts were singularly little affected by the culture of the provincials they subdued, and all traces of Roman civilization were submerged in a new flood of paganism. By the 8th century the Frankish dominion was firmly established in central Germany and northern Gaul; and under the Carlovingian monarchs the Rhineland, and especially Aix-la-Chapelle, plays a rôle of considerable prominence. On the division of the Carlovingian realm the part of the Rhenish province to the east of the river fell to the share of Germany, while that to the west remained with the evanescent middle kingdom of Lotharingia. By the time of Otho I. (936-973) both banks of the Rhine had become German, and the Rhenish territory was divided between the duchies of Upper and Lower Lorraine, the one on the Moselle and the other on the Meuse. Subsequently, as the central power of the German sovereign became weakened, the Rhineland followed the general tendency and split up into numerous small independent principalities, each with its separate vicissitudes and special chronicles. The old Lotharingian divisions passed wholly out of use, and the name of Lorraine became restricted to the district that still bears it. In spite of its dismembered condition, and the sufferings it underwent at the hands of its French neighbours in various periods of warfare, the Rhenish territory prospered greatly and stood in the foremost rank of German culture and progress. Aix-la-Chapelle was fixed upon as the place of coronation of the German emperors, and the ecclesiastical principalities of the Rhine bulk largely in German history. Prussia first set foot on the Rhine in 1609, when it acquired the duchy of Cleves; and about a century later Upper Guelders and Mörs also became Prussian. At the peace of Basel in 1795 the whole of the left bank of the Rhine was resigned to France, and in 1806 the Rhenish princes all joined the Confederation of the Rhine. The congress of Vienna assigned the whole of the lower Rhenish districts to Prussia, which had the tact to leave them in undisturbed possession of the liberal institutions they had become accustomed to under the republican rule of the French. (Compare Rhine.) (J. F. M.)

PRUSSIAN BLUE. See Prussic Acid (p. 24 *infra*).

PRUSSIC ACID, the familiar name for a dangerously poisonous, though chemically feeble, acid, known scientifically as "hydrocyanic acid," or "cyanide of hydrogen," is here taken as a convenient heading under which to treat of cyanides generally. This generic term (from κύανος, blue) is not meant to hint at any generic property; it is due simply to the fact that all cyanides, in an historical sense, are derivatives of a blue pigment which was discovered accidentally by Diesbach, a Berlin colourmaker, about the beginning of the 18th century.

The foundations of our present knowledge of cyanides were laid by Scheele (1783), whose discoveries were subsequently (from 1811) confirmed and supplemented, chiefly in the sense of quantitative determinations, by Gay-Lussac. Although we have no space for further historical notes, we must not omit to state that Gay-Lussac, as one result of his work, conceived and introduced into chemistry the notion of the "compound radical," having shown that prussic acid and its salts are related to the group NC in precisely the same way as chlorides are to chlorine, or sulphides to sulphur. This idea, in his own eyes and in those of his contemporaries, was greatly fortified by his success in even isolating his "cyanogène" as a substance.

In preparing cyanogen or cyanides in the laboratory the operator now always starts from prussiate of potash, with which, accordingly, we begin.

Prussiate of Potash, $(NC)_6Fe.K_4+3H_2O$ (syn. ferrocyanide of potassium; Germ. *Blutlaugensalz*).—This salt is being produced industrially from animal refuse (hide and horn clippings, old shoes, blood solids, &c.), carbonate of potash, and iron filings or borings as raw materials. The carbonate of potash is fused at a red heat in an iron pear-shaped vessel suspended within a furnace, or on the cupel-shaped sole of a reverberatory furnace, and the animal matter, which should be as dry as possible, is then introduced in instalments along with the iron. The fusion is continued as long as inflammable gases are going off; then the still fluid mass is ladled out and allowed to cool, when it hardens into a black stone-like body known to the manufacturer as "metal." When the broken-up metal is digested with water in an iron vessel prussiate of potash passes into solution, while a black residue of charcoal, metallic iron, sulphide of iron, &c., remains. The clarified solution, after sufficient concentration in the heat, deposits on cooling part of its prussiate in lemon-yellow quadratic crystals (generally truncated octahedra), which are purified by recrystallization. The last mother-liquors furnish an impure green salt, which is added to a fresh fuse and so utilized.

In former times it was believed that the prussiate was produced during the fusion process, and in the subsequent process of lixiviation simply passed into solution, until Liebig showed that this view was untenable. The fuse cannot contain ready-formed prussiate, because this salt at a red heat breaks up with formation of a residue of carbide of iron and cyanide of potassium. The metal in fact when treated with dilute alcohol gives up to it plain cyanide of potassium, and the fully exhausted residue yields no prussiate on treatment with water. The prussiate accordingly must be produced during the process of lixiviation by the action of the cyanide of potassium on some ferrous compound in the metal. Liebig thought that it was partly the metallic iron, partly the sulphide of iron present in the metal, which effected the conversion. According to more recent researches a double sulphide, $K_2S+Fe_2S_3$, which is always produced during the fusion (from the reagents proper and the sulphur of the organic matter and that of the sulphate of potash present in the carbonate as an impurity), plays this important part. The double sulphide by the action of water breaks up into alkaline sulphide, sulphide of iron (FeS), and sulphur. This sulphide of iron is of a peculiar kind; it does what *ordinary* FeS does not effect, readily at least: it converts the cyanide into prussiate, thus, $6NC.K+FeS=K_2S+(NC)_6Fe.K_4$, while the eliminated sulphur of the original Fe_2S_3 unites with another part of the cyanide of potassium into sulphocyanate, $S+NCK=SNC.K$, which latter salt is thus unavoidably produced as a (rather inconvenient) bye-product. Pure prussiate of potash has the specific gravity 1·83; it is permanent in the air. It loses its water, part at 60° C., the rest at 100° C., but very slowly. The anhydrous salt is a white powder. The crystals dissolve in four parts of cold and in two parts of boiling water. It is insoluble in, and not dehydrated by, alcohol.

Prussiate of potash has the composition of a double salt, $Fe(NC)_2+4KNC$, but the idea that it contains these two binary cyanides is entirely at variance with its reactions. Cyanide of potassium is readily decomposed by even the feeblest acids, and to some extent even by water, with elimination of hydrocyanic acid, and on this account perhaps is intensely poisonous. A solution of the prussiate remains absolutely unchanged on evaporation, and the action on it even of strong acids in the cold results in the formation of the hydrogen salt, $(NC)_6FeH_4$, which is decomposed, it is true, but only when the mixture is heated, with evolution of hydrocyanic acid. It is not poisonous. Its solution when mixed with nitrate of silver does not give a precipitate of cyanide of silver, NC.Ag, and a solution of the two nitrates, but yields a unitary precipitate of the composition $(NC)_6Fe:Ag_4$, which contains all the iron; only nitrate of potassium passes into solution. Other heavy metallic salts behave similarly. On the strength of these considerations chemists, following the lead of Liebig, view prussiate as a binary compound of potassium, K_4, with a complex radical, N_6C_6Fe, "ferrocyanogen."

Hydrocyanic Acid, NC.H.—This acid is prepared most conveniently from prussiate of potash. Wöhler recommends the following method. Ten parts of powdered prussiate are placed in a retort, the neck of which is turned upwards, and a (cooled down) mixture of seven parts of oil of vitriol and fourteen parts of water is then added. If the aqueous acid is wanted, the exit-end of the retort is joined on direct to a Liebig's condenser, which must be kept very cool by a current of cold water. If the anhydrous acid is desired, two wide-necked bottles (or two large U-tubes) charged with fused chloride of calcium and kept at 30° C. by immersion in a water bath of this temperature, must be inserted between the retort and condenser. In this case more particularly it is indispensable to provide for a most efficient condensation of the vapours; the exit-end of the condenser should be provided with an adapter going down to near the bottom of the receiver, which must be surrounded by a freezing mixture. The temperature of the latter, of course, must not be allowed to fall to the freezing-point of the distillate. The retort is heated by means of a sand bath and a brisk distillation maintained until the residue begins to dry up. The result of the reaction is in accordance with the assumption that the dilute vitriol, in the first instance, converts the prussiate, one-half into $(NC)_6Fe.H_4$, the other into $(NC)_6Fe.K_2H_2$, and that through the effect of the heat these two bodies decompose each other into $\{(NC)_6Fe\}K_2Fe$, which remains in the residue as a precipitate, and $(NC)_6H_6=6NCH$, which distils over. Real NCH is a colourless liquid of 0·6967 specific gravity at 18° C., which freezes at −15° C. (Gay-Lussac) into a white fibrous solid. According to Schulz the acid, if really pure, remains liquid at −37° C. It boils at 26°·5 C.; at 4°·5 its vapour-tension already amounts to half an atmosphere. The vapour is inflammable and burns into carbonic acid, water, and nitrogen. The acid mixes with water in all proportions, with contraction and yet absorption of heat. The solution behaves on distillation like a mere mechanical mixture of its two components. Prussic acid has a very peculiar powerful smell; more characteristic still is a kind of choking action which even the highly attenuated vapour exerts on the larynx. Prussic acid is fearfully poisonous; a few drops of even the ordinary pharmaceutical preparation (of 2 per cent.) are sufficient to kill a large dog. It acts with characteristic promptitude, especially when inhaled as a vapour. Even a relatively large dose, if it has once found its way into the stomach without producing a fatal effect, is said to do relatively little harm there.[1]

Prussic acid is characteristically prone to suffer "spontaneous decomposition." Whether the *pure* anhydrous acid really is, in the strictest sense of the word, still requires to be found out; the ordinary preparation, when kept in a close bottle, soon turns brown and turbid from "azulmic" acid, a substance of complex constitution. Other things are formed at the same time. The *pure* aqueous acid is liable to similar changes; in its case formiate of ammonia always forms the predominant product. This change is easily understood—

$$NC.H+2H_2O=\underset{\text{Ammonia.}}{NH_3}+\underset{\text{Formic acid.}}{H.COOH.}$$

A strong aqueous prussic acid, when mixed with fuming hydrochloric acid, is soon converted into a magma of crystals of sal-ammoniac, with formation of formic acid, which remains dissolved. And yet, most singularly, the addition to the preparation of a small proportion of hydrochloric or sulphuric acid is the best means for preventing, or at least greatly retarding, its spontaneous change in the very same direction. Aqueous prussic acid acts only very feebly (if at all) on blue litmus; it combines with aqueous caustic alkalis but does not decompose their carbonates; nor does it act upon the generality of insoluble basic metallic oxides or hydrates; mercuric oxide and oxide of silver form noteworthy exceptions to this rule.

Cyanogen, $(NC)_2$.—When dry mercuric cyanide is heated it breaks up, below redness, into mercury and cyanogen gas; part of the latter, however, always suffers polymerization into a solid called "paracyanogen," and presumed to consist of molecules $(NC)_3$. Cyanogen gas is colourless; it has the specific gravity demanded by its formula. It possesses a peculiar odour and has a characteristic irritating effect on the eyes and mucous membranes of the nose. It is poisonous. By strong pressure it is condensible into a liquid which freezes at $-34°\cdot4$ C., and has the following vapour-tensions P at the temperatures t stated—

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[1] The *British Pharmacopœia* prescribes for the medicinal acid a strength of 2 per cent. of real NCH. The two medicinal preparations known as *aqua amygdalarum amararum* and as *aqua laurocerasi* respectively contain prussic acid in combination with hydride of benzoyl, $C_6H_5.COH$. In neither case does the prussic acid pre-exist in the vegetable materials, but is produced during the mashing process which precedes the distillation, by a fermentative decomposition of the amygdalin which they contain. (See FERMENTATION, vol. ix. p. 96.)

$t =$	$-20°\cdot7$	$-10°$	$0°$	$+10°$	$+20°$ C.
$P =$	1	1·85	2·7	3·8	5 atmos.

At ordinary temperatures water dissolves about 4·5 times, alcohol about 23 times its volume of the gas. The solutions are liable to (very complex) spontaneous decomposition. The list of products includes oxalate of ammonia and urea. Cyanogen burns with a characteristically beautiful peach-blossom coloured flame into carbonic acid and nitrogen. This gas cyanogen, as already stated, is to cyanides what chlorine gas Cl_2 is to chlorides, but it is well to remember that the analogy, though perfect in regard to the corresponding formulæ, does *not*, as a rule, extend to the conditions of formation of the bodies represented. Thus cyanogen does not unite with hydrogen into prussic acid, nor does it combine with ordinary metals in the chlorine fashion. When passed over heated potassium, it is true, it combines with it into cyanide; and caustic potash-ley absorbs it with formation of cyanide and cyanate (NCO.K), just as chlorine yields chloride and hypochlorite KClO; but this is about the sum-total of the analogies in action. Yet metallic cyanides of all kinds can be produced indirectly.

Cyanide of Potassium, NC.K.—An aqueous mixture of the quantities NCH and KHO no doubt contains this salt, but it smells of the acid, and on evaporation behaves more like a mixture of the two congeners than in any other way. An exhaustive union can be brought about by passing NCH vapour into an alcoholic solution of KHO; the salt NC.K then comes down as a crystalline precipitate, which must be washed with alcohol and dried, cold, over vitriol. A more convenient method is to dehydrate yellow prussiate and then decompose it by heating it to redness in an iron crucible. The $Fe(NC)_2$ part of the salt breaks up into cyanogen and nitrogen, which go off, and a carboniferous finely-divided iron, which remains, with cyanide of potassium, which at that temperature is a thin fluid. Yet the iron sometimes refuses to settle with sufficient promptitude to enable one to decant off the bulk even of the fused cyanide According to private information received by the writer a French manufacturer uses a certain kind of very porous fireclay as an efficient filtering medium.

The ordinary "cyanide of potassium" of trade is not strictly that at all, but at best a mixture of the real salt with cyanate. It is produced by fusing a mixture of eight parts of anhydrous prussiate and three parts of anhydrous carbonate of potash, allowing the reaction

$$(NC)_6Fe.K_4 + K_2CO_3 = CO_2 + Fe + 5NCK + \underset{\text{Cyanate.}}{K.NCO}$$

to complete itself and the iron to settle, and decanting off the clear fuse. The product goes by the name of "Liebig's cyanide," but the process was really invented by Rodgers.

Fused cyanide of potassium assumes on cooling the form of a milky white stone-like solid. It fuses readily at a red heat, and at a white heat volatilizes without decomposition, provided that it is under the influence of heat alone; in the presence of air it gradually passes into cyanate; when heated in steam it is converted into carbonate of potash with evolution of ammonia, carbonic oxide, and hydrogen. When heated to redness with any of the more easily reducible metallic oxides it reduces them to the metallic state, while it passes itself into cyanate. It also reduces the corresponding sulphides with formation of sulphocyanate; for example, $Pb(S \text{ or } O) + NCK = Pb + NC(O \text{ or } S)K$. Hence its frequent application in blowpipe analysis. When heated with chlorates or nitrates it reduces them with violent explosion. The aqueous solution of the salt has a strongly alkaline reaction; it smells of hydrocyanic acid and is readily decomposed by even such feeble acids as acetic or carbonic. It readily dissolves precipitated chloride, bromide, and iodide of silver; this is the basis of its application in photography. Large quantities of the salt are used in electroplating.

Other Binary Cyanides.—Of these only a few can be noticed here. (1) *Cyanide of sodium* is very similar to the potassium salt. The same remark, in a more limited sense, holds for the cyanides of barium, strontium, and calcium. (2) *Cyanide of ammonium* ($NC.NH_4$) forms crystals volatile at 36° C. and smelling of ammonia and hydrocyanic acid. The solution in water decomposes spontaneously, pretty much like that of the free acid. But the anhydrous vapour by itself stands a high temperature, as is proved by the fact that it is produced largely when ammonia is passed over red-hot charcoal, $C + 2NH_3 = H_2 + NCH.NH_3$. (3) *Mercuric cyanide*, $Hg(NC)_2$, forms very readily when mercuric oxide is dissolved in aqueous prussic acid. The solution on evaporation and cooling deposits crystals soluble in eight parts of cold water. This salt is not at all decomposed, even when heated, by water, nor appreciably by dilute sulphuric or nitric acid; boiling hydrochloric acid eliminates the NC as hydrocyanic acid; sulphuretted hydrogen acts similarly in the cold. It gives no precipitate with nitrate of silver, nor is it changed visibly by caustic alkalis It readily unites not only with other cyanides but also with a multitude of other salts into crystallizable double salts. Mercurous cyanide, $Hg_2(NC)_2$, seems to have no existence. When it is attempted to produce it by double decompositions, the mixture $Hg + (NC)_2Hg$ comes forth instead of the compound $Hg_2(NC)_2$. (4) Heavy metallic cyanides are mostly insoluble in water, and the general method for their preparation is to decompose a solution of the respective sulphate, chloride, &c., with one of cyanide of potassium. The most important general property of these bodies is that they readily dissolve in solution of cyanide of potassium with formation of double cyanides, which in their capacity as double salts all exhibit, in a higher or lower degree, those anomalies which were fully explained above (see "prussiate of potash"). These "metallo-cyanides," as we will call them, being all, unlike plain cyanide of potassium, very stable in opposition to water and aqueous alkalis, are readily produced from almost any compound of the respective metallic radical—some from the metal itself—by treatment with solution of cyanide of potassium. In all we have said "potassium" may be taken as including sodium and in a limited sense ammonium, but the potassium compounds are best known, and we accordingly in the following section confine ourselves to these.

Metallo-cyanides.—(1) *Silver.*—Cyanide of silver, Ag.NC, is produced as a precipitate by addition of hydrocyanic acid or cyanide of potassium to solution of nitrate of silver. The precipitate is similar in appearance to chloride of silver and, like it, insoluble in cold dilute mineral acids, but soluble in ammonia. At a red heat it is decomposed with formation of a residue of carboniferous metallic silver. Precipitated cyanide of silver, though insoluble in hydrocyanic acid, dissolves readily in cyanide of potassium with formation of argento-cyanide, $AgK.(NC)_2$, which is easily obtained in crystals, permanent in the air and soluble in eight parts of cold water. Chloride of silver dissolves in cyanide of potassium solution as readily as the cyanide does and with formation of the same double salt—$AgCl + 2KNC = KCl + AgK(NC)_2$. This salt is used very largely in electro-plating. (2) *Lead.*—From a solution of the acetate cyanide of lead is precipitated by addition of hydrocyanic acid or cyanide of potassium. The precipitate, $Pb(NC)_2$, has the exceptional property of being insoluble in cyanide of potassium. (3) *Zinc.*—Cyanide of zinc, $Zn(NC)_2$, is obtained by addition of hydrocyanic acid to a solution of the acetate, as a white precipitate readily soluble in cyanide of potassium with formation of a double salt, $ZnK_2(NC)_4$, which forms well-defined crystals. (4) *Nickel.*—The cyanide, $Ni(NC)_2$, is an apple-green precipitate, which is obtained by methods similar to those given under "zinc." It readily dissolves in cyanide of potassium with formation of a crystallizable salt, $NiK_2(NC)_4 + H_2O$, the solution of which is stable in air and not convertible into one of a nickelic (Ni‴) compound by chlorine (compare "cobalt" *infra*) The potassio-cyanides of silver, zinc, and nickel as solutions are not changed visibly by caustic alkalis, but their heavy metals can be precipitated by sulphuretted hydrogen or sulphide of ammonium, as from solutions of, for instance, the chlorides Aqueous mineral acids (in the heat at least) decompose them exhaustively with elimination of all the NC as NCH. (5) *Copper.*—When cyanide of potassium solution is added to one of sulphate of copper, a yellow precipitate of cupric cyanide, $Cu(NC)_2$, comes down; but on boiling this precipitate loses cyanogen and is converted into a white precipitate of the cuprous salt Cu(NC). This white precipitate dissolves in cyanide of potassium with formation chiefly of two crystalline double salts, viz., CuNC + 6NCK, easily soluble in water, and CuNC + NCK. The latter is decomposed by water with elimination of Cu.NC. The solution of the 6NC.K salt is *not* precipitated by sulphuretted hydrogen. Solutions of potassio-cyanides of cuprosum are used in electro-plating. (6) *Gold.*—Metallic gold dissolves in cyanide of potassium solution in the presence of air, thus—

$$Au + 2KNC + \tfrac{1}{2}O = \tfrac{1}{2}K_2O + AuK.(NC)_2.$$

This auro-cyanide of potassium is used largely for electro-gilding, for which purpose it is conveniently prepared as follows. Six parts of gold are dissolved in aqua regia and the solution is precipitated by ammonia. The precipitate (an explosive compound known as "fulminating gold") is dissolved in a solution of six parts of cyanide of potassium, when the double salt is formed with evolution of ammonia. The salt crystallizes in rhombic octahedra, soluble in seven parts of cold water.

In the following potassio-cyanides the heavy metals cannot be detected by means of their ordinary precipitants; these salts all behave like the potassium salts of complex radicals composed of the heavy metal and all the cyanogen. (7) *Cobalt.*—Cyanide of potassium when added to a solution of a cobaltous salt ($CoCl_2$, &c.) gives a precipitate soluble in excess of reagent. The solution presumably contains a cobalto-cyanide, $Co(NC)_2.xKNC$, but on exposure to air eagerly absorbs oxygen with formation of cobalti-cyanide, thus—

$$Co(NC)_2 + 4KNC + \tfrac{1}{2}O = \tfrac{1}{2}K_2O + Co'''(NC)_3.3KNC.$$

Chlorine (Cl instead of ½O) acts more promptly with a similar effect. If the alkaline solution is acidified and boiled, the same cobalti-cyanide is produced with evolution of hydrogen—

$$Co(NC)_2 + 4KNC + HCl = KCl + \tfrac{1}{2}H_2 + Co'''(NC)_3.3KNC$$

Cobalti-cyanide of potassium, $(NC)_6Co'''.K_3$, forms yellow crystals isomorphous with those of red prussiate (see *infra*). It is a remarkably stable salt. In its behaviour to reagents it exhibits none of the characters of a cobalt salt or of a simple cyanide. Aqueous mineral acids convert it into the hydrogen salt $(NC)_6Co'''H_3$, which remains undecomposed on boiling. Heavy metallic salts produce precipitates of cobalti-cyanides; for example, $(NC)_6Co'''.Ag_3$. (8) *Ferrosum.*—See "prussiate of potash" above. (9) *Ferricum.*—Ferric hydrate and ferric compounds generally do not act upon cyanide of potassium in a manner analogous to that of ferrous compounds; but a ferri-cyanide analogous to the cobalti-salt referred to in (7) is readily produced by passing chlorine into a cold solution of ordinary prussiate, $(NC)_6Fe''.K_4 + Cl = KCl + (NC)_6fe'''.K_3$.[1] In preparing the salt an excess of chlorine and elevation of temperature must be avoided, or else part of the salt is decomposed with formation of a green precipitate. The solution on evaporation and cooling yields splendid dark red crystals, soluble in 2·54 parts of water of 15°·6 C. (Wallace), forming a most intensely yellow solution. (Ordinary prussiate solution is only pale yellow even when saturated in the cold.) This salt (discovered by L. Gmelin in 1822) is now being manufactured industrially and is known in commerce as "red prussiate." In its reactions it is analogous to ordinary yellow prussiate. The same group, $(NC)_6Fe$, which in the latter acts as a four-valent, in the red salt plays the part of a tri-valent radical, $(NC)_6fe$. But the radical thus modified has a great tendency to assume the four-valent form; hence an *alkaline* solution of red prussiate is a powerful oxidizing agent, $(NC)_6fe.K_3 + KHO = (NC)_6Fe.K_4 + HO$. The HO goes to the reducing agent. Like the yellow salt, red prussiate is not poisonous, at least when pure.

Ferro- and Ferri-cyanides of Iron.—The two prussiates are constantly being used in the laboratory as very delicate reagents for the detection of iron salt, and for the discrimination of ferrous and ferric compounds in solutions,—(1) ferro-cyanide and ferrous salt, white precipitate; (2) ferri-cyanide and ferric salt, intensely brown coloration; (3) ferro-cyanide and ferric salt, blue precipitate; (4) ferri-cyanide and ferrous salt, blue precipitate. These blue precipitates are being produced industrially and used as pigments, under the names of "prussian blue" and "Turnbull's blue" for (3) and (4) respectively. The latter has been thus known for now half a century; yet the constitution of the precipitates and the true rationale of their formation have been fully cleared up only during the last few years. The main results of the researches referred to are included in the following paragraphs.

(1) *Ferro-cyanide of Hydrogen*, $(NC)_6Fe.H_4$, is obtained as a white crystalline precipitate when air-free concentrated solution of yellow precipitate is mixed with hydrochloric acid and ether. It is easily soluble in water and in alcohol. An aqueous solution of it is prepared for technical purposes by mixing a strong solution of yellow prussiate with enough tartaric acid to bring down the potassium as cream of tartar. When the solution of this ferro-hydrocyanic acid is boiled half the cyanogen goes off as NCH, while the other remains as part of a white, rather unstable, precipitate, $(NC)_6Fe\,.\substack{Fe \\ H_2}$. When the solution is exposed to the air, especially at higher temperatures, part of the cyanogen goes off as NCH, another part suffers oxidation into $H_2O + NC$, and this latter combines with the $Fe(NC)_2$ of the original compound into blue bodies similar in their general properties to prussian blue. This latter change is utilized in calico-printing for producing patterns of, or dyeing with, prussian blue. The white precipitate $(NC)_6Fe\,.\substack{Fe \\ H_2}$ may be looked upon as an acid of which

(2) *Everett's Salt*, $(NC)_6Fe\,.\substack{Fe \\ K_2}$, is the potash salt. This salt is produced in the ordinary process for making prussic acid (see above). It is probably identical with the white precipitate produced when ferrous salt is decomposed by prussiate of potash. Everett's salt when exposed to the air quickly absorbs oxygen and becomes blue; the reaction, as Williamson showed, assumes a simple form when the precipitate is boiled with nitric acid. One-half of the potassium is then oxidized away, and a blue double ferri-cyanide of potassium and ferrosum takes the place of the original precipitate:—

$$(NC)_6Fe\,.\,K_2Fe = \tfrac{1}{2}(K_2O \text{ as nitrate}) + \underbrace{\{(NC)_6fe\}'''Fe''K'}_{\text{Williamson's blue.}}$$

This blue when boiled with ferro-cyanide of potassium is reconverted into the original Everett's salt with formation of a solution of red prussiate—

$$(NC)_6fe\,.\,KFe^{*} + K_2{}^{*}K_2\,.\,Fe(NC)_6 = \underbrace{(NC)_6fe\,.\,K_3}_{\text{Red prussiate.}} + \underbrace{Fe(NC)_6\,.\,FeK_2}_{\text{Everett's salt.}},$$

the asterisked radicals changing places.

(3) *Soluble Prussian Blue* is *isomeric* with Williamson's blue. It is produced by mixing a solution of ferric salt with *excess* of yellow prussiate, which, however, is an old process; what has been ascertained lately is that the very same precipitate is produced by addition to a ferrous salt of an excess of red prussiate.

$$\text{I. } (NC)_6fe.K_3 + FeCl_2 = 2KCl + (NC)_6fe.KFe = B'.$$
$$\text{II. } (NC)_6Fe.K_4 + feCl_3 = 3KCl + (NC)_6Fe.Kfe = B''.$$

B′ and B″ in the formulæ look different, but the difference is only apparent; in either case the group $(NC)_6$ is combined with 1Fe and 1fe and 1K; the bodies are identical (Skraup; Reindel). The precipitate B, though insoluble in salt solutions, is soluble in pure water, forming an intensely blue solution; hence the name.

Now the potassium in soluble prussian blue can be displaced by iron in two ways, namely, by digestion with solutions of ferrous or ferric salts. In the former case $(NC)_6feFeK$ becomes $(NC)_6feFe_{\frac{3}{2}}$, or empirically $(NC)_{12}Fe_5$; this is Gmelin's ("Turnbull's") blue. In the latter case $(NC)_6FefeK$ becomes $(NC)_6Fefe_{\frac{4}{3}}$, or empirically $(NC)_{18}Fe_7$; this is prussian blue as discovered by Diesbach. Contrasting this latter formula with that of Gmelin's blue $(NC)_{18}Fe_{7\frac{1}{2}}$, we see that the latter needs only lose ½Fe to become prussian blue; this surplus iron in fact can be withdrawn by means of nitric acid.

In the manufacture of prussian blue the general process is to first precipitate ferrous sulphate with yellow prussiate and then to fully oxidize the precipitate by means of nitric acid or chlorine as far as the oxygen of the air does not do it. The following receipt is recommended amongst others. Six parts each of green vitriol and yellow prussiate are dissolved separately, each in fifteen parts of water, and the solutions mixed. One part of concentrated sulphuric acid and twenty-four parts of fuming muriatic acid are then added, and after standing some hours also a solution of bleaching powder in instalments until the blue colour is fully developed. "Turnbull's" blue is made by precipitating red prussiate of potash with excess of ferrous salt; but it is easily seen from what was said above that the use of this relatively expensive double cyanide might be dispensed with. The properties of the two pigments are pretty much the same. They are sold in the form of solid cakes or lumps, which, in addition to their blue colour, present a coppery lustre on fracture. They are stable against acids, but sensibly affected (bleached) on prolonged exposure to sunlight; and, although they stand neutral soap fairly well, they are decomposed promptly by solutions of even the carbonates of the alkalis with formation of hydrated oxides of iron. The cheaper commercial varieties are more or less largely diluted with clay, sulphate of baryta, &c. Pure prussian blue dissolves readily in a dilute solution of oxalic acid; the intensely blue solution used to serve as a blue ink, but has come to be superseded by the several more brilliant blues of the coal-tar series. These tar-blues have displaced prussian blue also in other applications, and as a commercial pigment it has besides to struggle against ultramarine. In short, it has gone very much out of use, and as a consequence the manufacture of yellow prussiate is no longer so remunerative as it used to be.

Analysis of Cyanides.—As hydrocyanic acid and cyanide of potassium are dangerously poisonous, and the latter at least is easily procured in commerce, the detection of cyanogen in this state of combination is one of the problems of forensic chemistry. To detect such cyanogen in, say, the contents of a stomach the first step is to distil the mass after acidification with tartaric acid, which decomposes cyanide of potassium but does not liberate prussic acid from prussian blue (or even prussiate of potash?). If the distillate gives *no* precipitate with nitrate of silver hydrocyanic acid is absent, if it does the precipitate may have been produced by hydrochloric acid, which may then be eliminated by redistillation with borax or sulphate of soda, neither of which affects NCH. But even in the presence of chlorides the following two tests give perfect certainty. (1) A solution of hydrocyanic acid, when alkalinized with caustic potash and then mixed with, first ferroso-ferric salt and then excess of hydrochloric acid, gives a precipitate, or at least a green suspension, of prussian blue. (2) A solution of NCH, when mixed with ammonia and yellow sulphide of ammonium, is changed into one of sulphocyanate of ammonium, which, after removal of the excess of reagents by evaporation at a gentle heat, strikes an intense and very characteristic red colour with ferric salts, which colour does *not* vanish (as that of ferric acetate does) on even strong acidification with mineral acid (Liebig's test). The *quantitative* determination of cyanogen given as an aqueous solution of hydrocyanic acid or cyanide of potassium can (if haloids are absent) be effected by adding excess of nitrate of silver, then acidifying, if necessary, with nitric acid, filtering off, washing, drying, and weighing the cyanide of silver produced. AgNC = 134 corresponds to NCH = 27 parts. A more expeditious method has been invented by Liebig. A known quantity of the given prussic acid is alkalinized strongly with caustic potash and then diluted freely with water. The caustic alkali usually contains plenty of chloride as an impurity, else a little alkaline chloride must be added. A standard solution of nitrate of silver (conveniently adjusted so as to contain 6·30 grammes of fused nitrate per 1000 cubic centimètres, equivalent to 2 grammes of NCH) is now dropped in from a burette until the cloud of chloride of silver which appears locally from the first just fails to disappear on stirring, *i.e.*, until the reaction $2KNC + AgNO_3 = KAg.(NC)_2 + KNO_3$

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[1] Here we use the symbol "fe" as designating 56 parts of ferric iron,—"Fe" meaning the same quantity of ferrosum.

has just been completed. One cub. cent. of silver solution used indicates 2 milligrammes of NCH. Liebig's method lends itself particularly well for the assaying of the medicinal acid and of cyanide of potassium. The two tests for hydrocyanic acid given above apply as they stand to solutions of the cyanides of alkali and alkaline-earth metals, but *not* to mercuric cyanide. In regard to all other cyanides we have only space to say that from a certain set (which includes the cobalti-cyanides and the platinum cyanides) cyanogen cannot be extracted at all as NCH (or AgNC) by any known methods. Such bodies must be identified by their own specific reactions or by elementary analysis. All cyanides are decomposed by *hot* concentrated sulphuric acid; the carbon goes off as CO, the nitrogen remains as sulphate of ammonia and the metals as sulphates, which brings them within the range of the routine methods of analysis.

Cyanates.—These were discovered by Wöhler. The potassium salt NCO.K is produced by the oxidation of fused cyanide, for preparative purposes most conveniently by Wöhler's method. An intimate mixture of two parts of absolutely anhydrous prussiate of potash and one part of equally dry binoxide of manganese is heated on an iron tray until the mass has become brownish black and just begun to fuse. It is now allowed to cool and exhausted by boiling 80 per cent. alcohol. The filtrate on cooling deposits crystals of the salt NCO.K. If only an aqueous solution of this salt is wanted for immediate use, the fuse may be extracted by *cold* water. From this solution the cyanate of silver, NCO.Ag, or lead, $(NCO)_2Pb$, can be prepared by precipitation with solutions of the respective nitrates or acetates. *Hot* water decomposes cyanate of potash promptly with formation of carbonates of potash and ammonia, $KNCO + 2H_2O = NH_3 + KHO + CO_2$. On addition of mineral acid to even the cold solution only a very little of the cyanic acid is liberated as such; the bulk breaks up at once with effervescence, thus, $NCO.H + 2H_2O = NH_3 + CO_2 + H_2O$. Very interesting is the action of the solution of cyanate of potash on sulphate of ammonia; its direct effect is the formation of cyanate of ammonia, $NCO.NH_4$, but this salt almost immediately passes spontaneously into its isomer urea, which is not a cyanate at all but the amide of carbonic acid, *i.e.*, $CO(OH)_2 - 2(OH) + 2NH_2 = CO^{NH_2}_{NH_2}$. This reaction was discovered by Wöhler, who thus for the first time produced an organic substance from inorganic materials, or virtually from its elements. Singularly, it is this pseudo-cyanate urea which serves as a material for making cyanic acid. When hydrochlorate of urea, $HCl.CON_2H_4$, is heated to 145° C. the latter behaves as if it were cyanate of ammonia: the ammonia unites with the hydrochloric acid into sal-ammoniac and the cyanic acid is set free, but immediately suffers polymerization into cyanuric acid, a solid tri-basic acid of the composition $N_3C_3O_3H_3$, which, being difficultly soluble, can be freed from the sal-ammoniac by being washed with cold water. If perfectly anhydrous cyanuric acid be subjected to dry distillation it furnishes a distillate of (liquid) cyanic acid NCO.H, which must be condensed in a vessel surrounded by a freezing mixture.

Cyanic acid has a very appreciable vapour-tension even at ordinary temperatures, and the least trace of its vapour makes itself felt by a characteristically violent and dangerous action on the respiratory organs. With dry ammonia gas it unites into true cyanate of ammonia. We do not know much of its own properties, because as soon as it comes out of the freezing mixture it begins to suffer polymerization into "cyamelid" with great evolution of heat. This cyamelid is a porcelain-like mass, insoluble in all ordinary solvents and devoid of acid properties. Dry distillation reconverts it into cyanic acid.

Thiocyanates.—This term means bodies like cyanates, but containing sulphur instead of the oxygen of the latter. Thiocyanates are better known, however, as sulphocyanates or sulphocyanides. (1) The potassium salt NCS.K is formed when cyanide of potassium is fused with sulphur or certain metallic sulphides, *e.g.*, PbS. The usual method of preparation is to fuse together forty-six parts of dehydrated yellow prussiate of potash, seventeen of dry carbonate of potash, and thirty-two of sulphur. The fuse is exhausted with boiling alcohol and the filtered solution allowed to cool, when crystals of the salt separate out. The salt is very soluble in water with characteristically large absorption of heat. (2) The ammonium salt $NCS.NH_4$ can be prepared by allowing a mixture of alcohol, strong aqueous ammonia, and bisulphide of carbon to stand for a time and then warming it. Thiocarbonate of ammonium, $CS_2.(NH_4)_2S$, is produced first, but subsequently it gives up $2H_2S$ to the ammonia and becomes $NCS.NH_4$, which is easily obtained in crystals. The tar water obtained in the manufacture of coal-gas sometimes contains sufficient quantities of this salt to make it worth while to recover it. Both the potassium and the ammonium salt are much used as reagents, and more especially as precipitants for copper and silver. Solutions of cupric salt when mixed with sulphocyanate assume the dark-brown colour of the cupric salt $Cu(NCS)_2$, but on addition of sulphurous acid the colour disappears and a white precipitate of cuprous sulphocyanide, NCS.Cu, comes down, which, if enough of reagent was used, contains all the copper. If sulphocyanate is added to nitrate of silver, all the silver is precipitated as Ag.NCS, similar in appearance to the chloride and, like it, insoluble in water and in nitric acid. Upon this and the fact that sulphocyanates strike a deep red colour with ferric salts Volhard has based an excellent titrimetric method for the determination of silver. (See SILVER.)

Syntheses of Cyanogen Compounds.—Synthetical organic chemistry dates from Wöhler's discovery of the artificial formation of urea, and in the further development of this branch of the science cyanogen has played a prominent part. (For illustrations we may refer to certain passages in the present article and in those on METHYL and on NITROGEN.) Hence it is worth while to enumerate briefly the synthetical method for the making of cyanogen itself. (1) Hydrocyanic acid is produced when a current of electric sparks is made to cross a mixture of acetylene, C_2H_2, and nitrogen. (2) Cyanide of ammonium is formed when ammonia is passed over red-hot charcoal (see *supra*). (3) Metallic cyanides are produced when dry nitrogen gas is passed over a dry mixture of carbonate of potash or baryta and charcoal at a white heat. A similar reaction goes on spontaneously in the iron-smelting furnaces and gives rise to the formation of vapour of cyanide of potassium. (4) Sulphocyanide of ammonium is produced from bisulphide of carbon and ammonia, as explained above. (W. D.)

PRYNNE, WILLIAM (1600-1669), was born at Swainswick near Bath in 1600. He was educated at Bath grammar-school, and became a commoner of Oriel College, Oxford, in 1616, taking his B.A. in 1621; he was admitted a student of Lincoln's Inn in the same year, and in due time became a barrister. His studies led him deeply into legal and constitutional lore, and no less deeply into ecclesiastical antiquities. He was Puritan to the core, with a tenacious memory, a strength of will bordering upon obstinacy, and a want of sympathy with human nature in its manifold variety. His first book, *The Perpetuity of a Regenerate Man's Estate*, 1627, was devoted to a defence of one of the main Calvinistic positions, and *The Unloveliness of Love-locks* and *Health's Sickness*, 1628, were devoted to attacks upon prevailing fashions, conducted without any sense of proportion, and treating follies on the same footing as scandalous vices.

After the dissolution of parliament in 1629 Prynne came forward as the assailant of Arminianism in doctrine and of ceremonialism in practice, and thus drew down upon himself the anger of Laud. *Histrio-mastix*, published in 1633, was a violent attack, not upon the special immoralities of the stage of Prynne's day but upon stage-plays in general, in which the author laid himself open to the charge of assailing persons in high position, in the first place by pointing out that kings and emperors who had favoured the drama had been carried off by violent deaths, which assertion might easily be interpreted as a warning to the king, and in the second place by applying a disgraceful epithet to actresses, which, as Henrietta Maria was taking part in the rehearsal of a ballet just as the sheet containing the offensive words was passing through the press, was supposed to apply to the queen. On 17th February 1634 Prynne was sentenced by the Star Chamber to be imprisoned and also to be fined £5000, expelled from Lincoln's Inn, rendered incapable of returning to his profession, degraded from his degree in the university of Oxford, and set in the pillory, where he was to lose both his ears. On 7th May Prynne was placed in the pillory and lost his ears. The rest of the sentence, with the exception of the clause relating to the payment of the fine, was carried out. A sharp letter written by him to Laud criticizing his arguments at the trial was made the foundation of a fresh charge. Prynne, however, got the letter into his hands and tore it up. Though he was again brought before the Star Chamber, on 11th June, no additional penalty was inflicted on him. There is no reason to suppose that his punishment was unpopular. In 1637 he was once more in the Star Chamber, together with Bastwick and Burton. In *A Divine Tragedy lately acted* he had attacked the Declaration of Sports, and in *News from Ipswich* he had attacked Wren and the bishops generally. On 30th June a fresh sentence, that had been delivered on the 14th, was executed. The stumps of Prynne's ears were shorn off in the pillory. When on 27th July he was sent to what was intended to be perpetual imprisonment at Lancaster his journey was a triumphal progress,—the imposition of ship-money and the metropolitical visitation having rendered the minds of Englishmen far more hostile to the Government than they had been in 1634. Before long Prynne was removed to Mont Orgeuil Castle in Jersey, where it was hoped that he could be so entirely isolated that no word of his would reach the outer world again.

Immediately upon the meeting of the Long Parliament in 1640 Prynne was liberated. On 28th November he entered London in triumph, and on 2d March 1641 reparation was voted by the Commons, to be made to him at the expense of his persecutors. As might have been expected, Prynne after his release took the side of the Parliament strongly against the king, especially attacking in his writings his old enemies the bishops, and accusing Charles of showing undue favour to the Roman Catholics. He commented on the words of Psalm cv., "Touch not mine anointed," by arguing that they inhibited kings from injuring God's servants who happened to be their subjects, and in a lengthy work entitled *The Sovereign Power of Parliaments and Kingdoms* he maintained that the taking arms by parliament in a necessarily defensive war was no treason either in law or in conscience.

Prynne's sufferings had not served to render him compassionate to others. In 1643 he took an active part in the proceedings against Nathaniel Fiennes for the surrender of Bristol. During this and the following year, however, his chief energies as a prosecutor were directed against Archbishop Laud The cessation of hostilities with the Irish insurgents agreed to on 15th September 1643 brought Charles's relations with the Catholics into increased disrepute, and Prynne attacked Laud as the soul of a great Popish plot by publishing both before and after his execution various collections of documents, one of which at least was garbled to render it more telling. Even before the execution of Laud Prynne found a new enemy in the Independents. In 1644 he published *Twelve Considerable Serious Questions touching Church Government*, in which he upheld the right of the state to form a national church in accordance with the word of God, and reviled the Independents, partly as advocating an unscriptural discipline, partly as introducing heresy and division, and maintaining that all religions ought to be tolerated. To the principle of individual liberty Prynne was from the beginning to the end irreconcilably hostile. For some time to come he poured forth pamphlet after pamphlet in vindication of his assertions. Flowing out of this controversy came another, beginning in 1645 with *Four Short Questions*, privately circulated, and followed by *A Vindication of Four Serious Questions of Great Importance*, in which he denied the right of the clergy to excommunicate or to suspend from the reception of the sacrament otherwise than by law. Prynne, in short, maintained the supremacy of the state over the church, whilst he argued that the state ought to protect the church from the rivalry of sectarian associations.

Early in 1648 Prynne broke new ground. *The Levellers Levelled* was directed against the dangerous opinion that the Lords should be brought down into the House of Commons, there to sit and vote. As usual, he argued his case on purely antiquarian and technical grounds, without any intellectual grasp of his subject.

On 7th November 1648 Prynne at last obtained a seat in the House of Commons. He at once took part against those who called for the king's execution, and on 5th December delivered a speech of enormous length in favour of conciliating the king, who had inflicted the most grievous injuries upon him and whose misgovernment he had bitterly denounced. The result was his inclusion in Pride's "purge" on the morning of the 6th, when, having attempted resistance to military violence, he was subjected to imprisonment. A fresh protest, published on 1st January 1649 under the title of *A Brief Memento to the Present Unparliamentary Junto*, coupled with his contemptuous refusal to avow his authorship, brought about a fresh order of imprisonment on 10th January from the House of Commons itself, which, however, does not seem to have been carried out. After recovering his liberty Prynne retired to Swainswick. On 7th June 1649 he was assessed to the monthly contribution laid on the country by Parliament. He not only refused to pay but published *A Legal Vindication of the Liberties of England* on the ground that no tax could be raised without the consent of the two Houses. In the same year he commenced a long historical account of ancient parliaments, which was evidently intended to reflect on the one in existence. In 1650 his labours were cut short by a warrant from President Bradshaw, dated 1st July, and ordering his arrest. For the remainder of the year he was imprisoned in Dunster Castle, whence he was removed in January 1651 to Taunton, and in July to Pendennis Castle. On 1st February 1652 the council of state ordered his discharge on giving a bond of £1000 to do nothing to the prejudice of the Commonwealth. On his resolute refusal to accept the condition an absolute order for his release was given on 18th February. From his release till the death of Cromwell Prynne refrained from making any further assault on the existing Government. His strong conservatism, however, found expression in an argument in defence of advowsons and patronages and an attack on the Quakers, both published in the same year, as well as in an argument against the admission of the Jews to England issued in the beginning of 1655.

It was not until the restoration of the Rump Parliament by the army on 7th May 1659 that Prynne again came into prominent notice, though he had in the previous year issued *A Plea for the Lords and House of Peers* and *A New Discovery*, viz., that Quakers were Jesuits in disguise. On that day, in addition to the Rump, fourteen of the secluded members, with Prynne among them, claimed admittance. The claim was of course refused, but on a second attempt on the 9th, through the inadvertence of the doorkeepers, Prynne, Annesly, and Hungerford succeeded in taking their seats. When they were observed, however, no business was done, and the House purposely adjourned for dinner. At the return of members in the afternoon the doors were found guarded; the secluded members were not permitted to pass, and a vote was at once taken that they should not again be allowed to enter the House. Wrathful at the failure of his protest and at the continuance of the republican form of government, Prynne attacked his adversaries fiercely in print. In *England's Confusion*, published 30th May 1659, in the *True and Full Narrative*, and in *The Brief Necessary Vindication* he gave long accounts of the attempt to enter the House and of his ejection, while in the *Curtaine Drawne* he held up the claims of the Rump to derision. In *Mola Asinaria* the ruling powers are described as "a new-fangled Government, compacted of Treason, Usurpation, Tyranny, Theft, and Murder." Wood, however, denies that this was by Prynne. In *Shuffling, Cutting, and Dealing*, 26th May, he rejoiced at the quarrels which he sees arising, for "if you all complain I hope I shall win at last." *Concordia Discors* pointed out the absurdity of the constant tendency to multiply oaths, while "remonstrances," "narratives," "queries," "prescriptions," "vindications," "declarations," and "statements" were scattered broadcast. Upon the cry of the "good old cause" he is especially sarcastic and severe in *The True Good Old Cause rightly stated* and other pamphlets. *Loyalty Banished* explains itself. His activity and fearlessness in attacking those in power during this eventful year were remarkable, and an ironical petition was circulated in Westminster Hall and the London streets complaining of his indefatigable scribbling. On 12th October the Rump was again expelled by Lambert, and on 24th December once more restored. On 26th December Prynne made another fruitless attempt to take his seat. In obedience to the popular voice, however, the ejected members of 1648, with Prynne among them, wearing a basket-hilt sword, re-entered the House and resumed their old seats on 21st February 1660. He boldly declared that if Charles was to come back it were best done by the votes of those who had made war on his father, and was admonished for his language by Monk and the privy council. This parliament recalled Charles and dissolved itself immediately,—Prynne bringing in the Bill for the dissolution on 24th February. On 13th March he appears as one of three appointed to carry out the resolution of the House expunging the Engagement.

The Convention Parliament, which met on 25th April 1660, contained a large number of Presbyterians. Prynne, who was returned for two places, Ludgershall and Bath, elected to sit for the latter, and on 16th June presented to the king an address from the corporation, evidently drawn up by himself, under the title of *Bathonia Rediviva.* On 1st May he was nominated on the committee appointed "to peruse the Journals and Records, and to examine what pretended Acts or orders have passed, inconsistent with the government by King, Lords, and Commons, and report them, with their opinion thereon, to this House," and to secure the steady administration of the law, and the confirmation of the legal judgments of the past years. On 9th May he went to the Lords with various loyal votes of the Commons, and again on 18th May and on 9th June. On 3d June he "fell upon" Ashley Cooper for putting his hand to the "instrument" to settle the Protector in power. On the 13th he moved that Colonel Fleetwood, Richard Cromwell, John Goodwin, Thorpe, and Whitelock should be excepted from the Act of general pardon and oblivion, the speedy passing of which he strongly urged upon the House. It is said that at the Restoration he applied to be made one of the barons of the exchequer, and that it was in default of this, and to keep so active a man in good temper, that he was appointed chief keeper of the records in the Tower with a salary of £500 a year by Charles, "of his owne meere motion for my services and sufferings for him under the late usurpers, and strenuous endeavours by printing and otherwise to restore His Majesty." On 2d July he supported a proposal that all officers who had served during the Protectorate should now refund their salaries, and declared that he knew that those persons had received above £250,000 for their iniquitous doings and to keep out the king, a charge he had previously made on 12th May. In all the debates he was for severity upon any one who had held office under Cromwell. On 9th July he spoke "very honestly and passionately" from the Presbyterian point of view in the first great debate on religion, and on the 16th declared he "would not be for bishops unless they would derive their power from the king and not vaunt themselves to be *jure divino.*" In the debate of the 27th upon the Lords' delay in passing the Act of Indemnity Prynne found an opportunity for expressing his hatred of priests and Jesuits; and on the 30th, in the debate on the Ministers' Bill, he urged a settlement on the principle that the ministers should be compelled to take the oath, but that "all presentations should be good throughout, though not by the right patrons, in time of trouble." On 17th August he spoke passionately against any leniency whatsoever being extended to any of the king's judges. It is curious, however, to find that the House appointed him to carry the petition to the king in favour of Lambert or Vane. When the question of disbanding came up, for the carrying out of which he was in October made one of the commissioners, Prynne moved that no arrears should be paid to those who had acted with Lambert and did not submit. On 7th November he supported the Bill for the attainder of Cromwell and others who had participated in the king's execution, and were since dead, and particularly desired that the House would take the first and second reading at the same sitting, as was done in the case of the king's trial. At some time in this year (1660) he wrote a letter on the evil custom of drinking healths, a subject discussed in the House on 10th November. There was indeed scarcely any debate in which Prynne's voice was not heard; he spoke against laying the cost of the abolition of the court of wards upon the excise, having been in August appointed on the commission for appeals and regulating the excise, and in favour of Bills against the profanation of the Lord's Day (in which his knowledge of ecclesiastical controversy again appeared) and against swearing. He appears at this time to have been officially connected with the Admiralty. He supported on 27th November the abortive attempt to turn the king's declaration concerning ecclesiastical affairs into a Bill, and moved against the payment of the debts of the attainted regicides. In December he wrote against the bishops to the king, thus "blemishing his late services." During this year was published *A Seasonable Vindication of the Supream Authority and Jurisdiction of Christian Kings, Lords, Parliaments, as well over the Possessions as Persons of Delinquents, Prelates, and Churchmen.*

At the elections for the Pensionary Parliament, which met on 8th May 1661, Prynne was again returned as member for Bath in spite of the vehement efforts of the Royalists headed by Sir T. Bridge. This parliament was bent upon the humiliation of the Presbyterians, and Prynne appears in his familiar character of protester. On 30th May, when the members took the sacrament together at St Margaret's, "Mr Prynne and some few others refused to take it kneeling The parson with the bread passed on and refused to give it, but he with the wine, not noticing, gave the wine." With Secretary Morris Prynne opposed the motion that Dr Gunning should receive the thanks of the House and be desired to print his sermon. On the 18th of this month he had moved that the Engagement, with the Solemn League and Covenant, should be burned by the hangman. On 13th July he was the subject of attack, as being in a way the representative of Presbyterianism; the House in its vehement Anglicanism declared that his paper lately published, *Sundry Reasons against the new intended Bill for governing and reforming Corporations*, was illegal, false, scandalous, and seditious. Prynne was censured, and so strong was the feeling that he deemed it best to express his sorrow, upon which the offence was remitted. The continued attacks upon the Presbyterians led him to publish his *Short, Sober, Pacific Examination of Exuberances in the Common Prayer*, as well as the *Apology for Tender Consciences touching Not Bowing at the Name of Jesus.* In 1662 there appeared also the *Brevia Parliamentaria Rediviva*, possibly a portion of the *Register of Parliamentary Writs*, of which the fourth and concluding volume was published in 1664. During 1663 he served constantly on committees, and was chairman of the committee of supply in July, and again in April 1664.

In the third session Prynne was once more, 13th May 1664, censured for altering the draft of a Bill relating to public-houses after commitment, but the House again, upon his submission, while taking severe notice of an irregularity committed by "so ancient and knowing a member," remitted the offence, and he again appears on the committee of privileges in November and afterwards. In 1665 and 1666 he published the second and first volumes respectively of the *Exact Chronological Vindication and Historical Demonstration* of the supreme ecclesiastical jurisdiction exercised by the English kings from the original planting of Christianity to the death of Richard I. In the latter year especially he was very busy with his pen against the Jesuits. In January 1667 he was one of three appointed to manage the evidence at the hearing of the impeachment of Lord Mordaunt, and in November of the same year spoke in defence of Clarendon, so far as the sale of Dunkirk was concerned; and this appears to have been the last time that he addressed the House. In 1668 was published his *Aurum Reginæ* or *Records concerning Queen-gold*, the *Brief Animadversions on Coke's Institutes* in 1669, and the *History of King John, Henry III., and Edward I.*, in which the power of the crown over ecclesiastics was maintained, in 1670. The date of the *Abridgment of the Records of the Tower of London* is doubtful, though the preface is dated 1656/57. Prynne died in his lodgings at Lincoln's Inn, 24th October 1669, and was buried in the walk under the chapel there, which stands upon pillars. His will, by which he gave one portion of his books to Lincoln's Inn and another to Oriel College, is dated 11th August 1669. Prynne was never married.

The following curious account of his habits is given by Wood. "His custom when he studied was to put on a long quilted cap which came an inch over his eyes, serving as an umbrella to defend them from too much light; and, seldom eating a dinner, would every three hours or more be munching a roll of bread, and now and then refresh his exhausted spirits with ale brought to him by his servant." There is a portrait of him in Oriel College, Oxford, and Wood mentions one by Hollar, and an engraving by Stent, as the best extant. (S. R. G.—O. A.)

PRYTANIS (pl. *prytaneis*) was the title of certain officials in Greek states. They appear to have succeeded the kings at the time when the monarchical form of government was abolished throughout Greece. At Rhodes they continued to be the chief magistrates as late as the 1st century B.C., but in other states their functions dwindled. Though they were not priests, they had the charge of certain public sacrifices. Their headquarters were in the "prytaneum" or town-hall, the central point of a Greek state, where a fire was kept perpetually burning on the public hearth. When a colony was founded the fire in the prytaneum of the new city was kindled from the fire in the prytaneum of the mother-city, and if this colonial fire ever happened to be extinguished it was rekindled from the same source. At Athens in classical times the prytaneis were those fifty members of the council of five hundred who presided at the council meetings as well as at the popular assemblies. They consisted of the fifty members who represented one of the ten tribes on the council. The office was held for a tenth of a year and passed in rotation to the representatives of each of the ten tribes. During their term of office the prytaneis were maintained at the public expense in the tholos or rotunda (not, as is sometimes stated, in the prytaneum) As the highest mark of honour, distinguished citizens and their descendants were sometimes maintained for life in the prytaneum. Here, too, ambassadors were entertained. There was further a court of justice at Athens called the "court in the prytaneum"; it tried murderers who were not to be found, and also lifeless instruments which had been the cause of death,—an institution probably existing from a very remote antiquity.

PRZEMYSL, one of the principal towns of Galicia, Austria, and the seat of a Roman Catholic and of a Greek bishop, is picturesquely situated on the river San, about 140 miles to the east of Cracow. It contains several churches, of which the two cathedrals are the most interesting, and numerous convents, schools, and seminaries. Among its manufactures are wooden wares, linen, leather, and liqueur, and a brisk trade is carried on in these articles and in agricultural produce The trade is mostly in the hands of Jews, who form fully a third of the population. On the hill above the town are the ruins of an old castle, said to have been founded by Casimir the Great. Since 1874 Przemysl has been strongly fortified. The population of the town proper in 1880 was 9244, of the commune 20,040.

Przemysl, one of the oldest towns in Galicia, claims to have been founded in the 8th century, and was at one time capital of a large independent principality. Casimir the Great and other Polish princes endowed it with privileges similar to those of Cracow, and it attained a high degree of prosperity. In the 17th century its importance was destroyed by inroads of Tatars, Cossacks, and Swedes.

PSALMANAZAR, George (c. 1679-1763), the assumed name of a pretended native of Formosa, who was in reality a Frenchman, and was born about 1679, probably in Languedoc. According to his own account he was sent in his seventh year to a free school taught by two Franciscan monks, after which he was educated in a Jesuit college "in an archiepiscopal city." On leaving college he was recommended as tutor to a young gentleman, but soon fell into a lazy and idle life and became involved in pecuniary difficulties. This induced him to assume various personations in order to obtain a supply of ready money, his first being that of a pilgrim on the journey to Rome. Afterwards he travelled through Germany, Brabant, and Flanders in the character of a Japanese convert. At Liége he enlisted in the Dutch service, shortly after which he altered his character to that of an unconverted Japanese. At Sluys he made the acquaintance of a Scotch chaplain, by whom he was brought over to England and introduced to the bishop of London. Having undergone conversion to Christianity, he was employed by the bishop to translate the church catechism into what was supposed to be the Formosan language. In 1704 he published a fictitious *Historical and Geographical Description of Formosa*, and was shortly afterwards sent to complete his studies at the university of Oxford. The work of course was founded on previous publications, but the compilation was done with great cleverness, in addition to which he printed a so-called Formosan alphabet, and specimens of the language accompanied with translations. In 1707 he published *Dialogue between a Japanese and a Formosan*. There also appeared without date *An Inquiry into the Objections against George Psalmanazar of Formosa, with George Psalmanazar's Answer*. To add to his income he also joined another person in promoting the sale of a sort of white japan, the art of painting which he professed to have brought from Formosa. His pretensions were from the beginning doubted by many, and when exposure was inevitable he made a full confession of his guilt. Throughout the rest of his life he not only exhibited a seemingly conscientious regard for truth but according to Dr Samuel Johnson, as reported by Mrs Piozzi, "a piety, penitence, and virtue exceeding almost what we read as wonderful in the lives of the saints." Dr Johnson used to discuss theological and literary matters with him in an alehouse in the city, and cherished so high an opinion of his character and talents that he asserted he would "as soon think of contradicting a bishop." Psalmanazar obtained a comfortable living by writing for the booksellers. He published

Essays on Scriptural Subjects (1753), contributed various articles to the *Ancient Universal History*, and completed Palmer's *History of Printing*. He died in Ironmonger Row, Old Street, London, 3d May 1763. His memoirs appeared in 1764 under the title *Memoirs of * * * commonly known by the Name of George Psalmanazar*, but do not disclose his real name or the place of his birth.

PSALMS, Book of, or Psalter, the first book of the Hagiographa in the Hebrew Bible.

Title and Traditional Authorship.—The Hebrew title of the book is תְּהִלִּים, *tĕhillīm*, or סֵפֶר תְּהִלִּים, "the book of hymns" or rather "songs of praise."[1] The singular תהלה is properly the infinitive or *nomen verbi* of הלל, a verb employed in the technical language of the temple service for the execution of a jubilant song of praise to the accompaniment of music and the blare of the priestly trumpets (1 Chron. xvi. 4 *sq.*, xxv. 3; 2 Chron. v. 12 *sq.*). The name is not therefore equally applicable to all psalms, and in the later Jewish ritual the synonym *hallel* specially designates two series of psalms, cxiii.-cxviii. and cxlv.-cl., of which the former was sung at the three great feasts, the encænia, and the new moon, and the latter at the daily morning prayer. That the whole book is named "praises" is clearly due to the fact that it was the manual of the temple service of song, in which praise was the leading feature. But for an individual psalm the usual name is מִזְמוֹר (in the Bible only in titles of psalms), which is applicable to any piece designed to be sung to a musical accompaniment. Of this word ψαλμός, "psalm," is a translation, and in the Greek Bible the whole book is called ψαλμοί or ψαλτήριον.[2] The title ψαλμοί or βίβλος ψαλμῶν is used in the New Testament (Luke xx. 42, xxiv. 44; Acts i. 20), but in Heb. iv. 7 we find another title, namely "David." Hippolytus tells us that in his time most Christians said "the Psalms of David," and believed the whole book to be his; but this title and belief are both of Jewish origin, for in 2 Mac. ii. 13 τὰ τοῦ Δαυίδ means the Psalter, and the title of the apocryphal "Psalter of Solomon" implies that the previously existing Psalter was ascribed to David. Jewish tradition does not make David the author of all the psalms; but as he was regarded as the founder and legislator of the temple psalmody (1 Chron., *ut sup.*; Ezra iii. 10; Neh. xii. 36, 45 *sq.*; Ecclus. xlvii. 8 *sq.*), so also he was held to have completed and arranged the whole book, though according to Talmudic tradition[3] he incorporated psalms by ten other authors, Adam, Melchizedek, Abraham, Moses, Heman, Jeduthun, Asaph, and the three sons of Korah. With this it agrees that the titles of the psalms name no one later than Solomon, and even he is not recognized as a psalmodist by the most ancient tradition, that of the LXX., which omits him from the title of Ps. cxxvii. and makes Ps. lxxii. be written not by but of him. The details of the tradition of authorship show considerable variation; according to the Talmudic view Adam is author of the Sabbath psalm, xcii., and Melchizedek of Ps. cx., while Abraham is identified with Ethan the Ezrahite (Ps. lxxxix.). But, according to older Jewish tradition attested by Origen,[4] Ps. xcii. is by Moses, to whom are assigned Pss. xc.-c. inclusive, according to a general rule that all anonymous pieces are by the same hand with the nearest preceding psalm whose author is named; and Ps. cx., which by its title is Davidic, seems to have been given to Melchizedek to avoid the dilemma of Matt. xxii. 41 *sq.* Origen's rule accounts for all the psalms except i. and ii., which were sometimes reckoned as one poem (Acts xiii. 33 in the Western text; Origen; *B. Berakhoth*, f. 9b), and appear to have been ascribed to David (Acts iv. 25).

The opinion of Jerome (*Præf. in Ps. Heb.*) and other Christian writers that the collector of the Psalter was Ezra does not seem to rest on Jewish tradition.

Nature and Origin of the Collection.—Whatever may be the value of the titles to individual psalms, there can be no question that the tradition that the Psalter was collected by David is not historical; for no one doubts that some of the psalms date from after the Babylonian exile. The truth that underlies the tradition is that the collection is essentially the hymn-book of the second temple, and it was therefore ascribed to David, because it was assumed, as we see clearly from Chronicles, that the order of worship in the second temple was the same as in the first, and had David as its father: as Moses completed the law of Israel for all time before the people entered Canaan, so David completed the theory and contents of the temple psalmody before the temple itself was built. When we thus understand its origin, the tradition becomes really instructive, and may be translated into a statement which throws light on a number of points connected with the book, namely, that the Psalter was (finally, at least) collected with a liturgical purpose. Thus, though the Psalms represent a great range of individual religious experience, they avoid such situations and expressions as are too unique to be used in acts of public devotion. Many of the psalms are doxologies or the like, expressly written for the temple; others are made up of extracts from older poems in a way perfectly natural in a hymn-book, but otherwise hardly intelligible. Such ancient hymns as Exod. xv. 1 *sq.*, Judges v., 1 Sam. ii. 1 *sq.*, are not included in the collection, though motives borrowed from them are embodied in more modern psalms; the interest of the collector, we see, was not historical but liturgical. Again, the temple, Zion, the solemn feasts, are constantly kept in the foreground. All these points go to show that the collection was not only used but actually formed for use in the temple.

The question now arises, Was the collection a single act or is the Psalter made up of several older collections? And here we have first to observe that in the Hebrew text the Psalter is divided into five books, each of which closes with a doxology. The scheme of the whole is as follows:—

Book I., Pss. i.-xli.: all these are ascribed to David except i., ii., x. (which is really part of ix.), xxxiii. (ascribed to David in LXX.); *doxology*, xli. 13. Book II., Pss. xlii.-lxxii.: of these xlii.-xlix. are ascribed to the Korahites (xliii. being part of xlii.), l. to Asaph, li.-lxxi. to David (except lxvi., lxvii., lxxi. anonymous; in LXX. the last two bear David's name), lxxii. to Solomon; *doxology*, lxxii. 18, 19 followed by the subscription "The prayers of David the son of Jesse are ended." Book III., Pss. lxxiii.-lxxxix.: here lxxiii.-lxxxiii. bear the name of Asaph, lxxxiv., lxxxv., lxxxvii., lxxxviii. that of the Korahites, lxxxvi. of David, lxxxviii. of Heman, lxxxix. of Ethan; *doxology*, lxxxix. 52. Book IV., Pss. xc.-cvi.: all are anonymous except xc. (Moses), ci., ciii. (David),—LXX. gives also civ. to David; here the doxology is peculiar, "Blessed be Jehovah God of Israel from everlasting and to everlasting. *And let all the people say* Amen, Hallelujah." Book V., Pss. cvii.-cl.: of these cviii.-cx., cxxii., cxxiv., cxxxi., cxxxiii., cxxxviii.-cxlv. are ascribed to David, and cxxvii. to Solomon, and cxx.-cxxxiv. are pilgrimage psalms; LXX. varies considerably from the Hebrew as to the psalms to be ascribed to David; the book closes with a group of doxological psalms.

The division into five books was known to Hippolytus, but a closer examination of the doxologies shows that it does not represent the original scheme of the Psalter; for, while the doxologies to the first three books are no part of the psalms to which they are attached, but really mark the end of a book in a pious fashion not uncommon in Eastern literature, that to book iv. with its rubric addressed to the people plainly belongs to the psalm, or rather to its liturgical execution, and does not therefore really mark the close of a collection once separate. In point of fact books iv. and v. have so many common characters that there is every reason to regard them as a single great group. Again, the main part of books ii. and iii. (Pss. xlii.-lxxxiii.) is distinguished from the rest of the Psalter by habitually avoiding the name Jehovah (the Lord) and using Elohim (God) instead, even in cases like Ps. l. 7, where "I am Jehovah thy God" of Exod. xx. 2 is quoted but changed very awkwardly to "I am God thy God." This is not due to the authors of the individual psalms, but to an editor; for Ps. liii. is only another recension of Ps. xiv., and Ps. lxx. repeats part of Ps. xl., and here Jehovah is six times changed to Elohim, while the opposite change happens but once. The Elohim psalms, then, have undergone a common editorial treatment distinguishing them from the rest of the Psalter. And they make up the mass of books ii. and iii., the remaining psalms, lxxxiv.-lxxxix., appearing to be a sort of appendix. But when we look at the Elohim psalms more nearly we see that they contain two distinct elements, Davidic psalms and psalms ascribed to the Levitical choirs (sons of Korah, Asaph). The Davidic collection as we have it splits the Levitical psalms into two groups and actually divides the Asaphic Ps. l. from the main Asaphic collection, lxxiii.-lxxxiii. This order can hardly be original, especially as the Davidic Elohim psalms have a separate subscription (Ps. lxxii. 20). But if we remove them we get a continuous body of Levitical Elohim psalms, or rather two collections, the first Korahitic and the second Asaphic, to which there have been added by way of appendix by a non-Elohistic editor a supplementary group of Korahite psalms and one psalm (certainly late) ascribed to David. The formation of books iv. and v. is certainly later than the Elohistic redaction of books ii. and iii., for Ps. cviii. is made up of two Elohim psalms (lvii. 7-11, lx. 5-12) *in the Elohistic form*, though the last two books of the Psalter are generally Jehovistic. We can thus distinguish the following steps in the redaction:—(*a*) the formation of a Davidic collection (book i.) with a closing doxology; (*b*) a second Davidic collection (li.-lxii.) with doxology and subscription; (*c*) a twofold Levitical collection (xlii.-xlix.; l., lxxiii.-lxxxiii.); (*d*) an Elohistic redaction and combination of (*b*) and (*c*); (*e*) the addition of a non-Elohistic supplement to (*d*) with a doxology; (*f*) a collection later than (*d*), consisting of books iv., v. And finally the anonymous psalms i., ii., which as anonymous were hardly an original part of book i., may have been prefixed after the whole Psalter was completed. We see too that it is only in the latest collection (books iv., v.) that anonymity is the rule, and titles, especially titles with names, occur only sporadically. Elsewhere the titles run in series and correspond to the limits of older collections.

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[1] Hippol., ed. Lag., p. 188; Euseb., *H.E.*, vi. 25, 2; Epiph., *Mens. et Pond.*, § 23; Jerome's preface to *Psalt. juxta Hebræos.*

[2] Similarly in the Syriac Bible the title is "mazmōrē."

[3] The passages are collected in Kimḥi's preface to his commentary on the Psalms, ed. Schiller-Szinessy, Cambridge, 1883.

[4] *Opp.*, ii. 514 *sq.*, ed. Rue; cp. Hippol., *ut supra*; Jerome, *Ep. CXL.* (*ad Cypr.*), and *Præf. in Matt.*

Date of the Collection.—A process of collection which involves so many stages must plainly have taken a considerable time, and the question arises whether we can fix a limit for its beginning and end or even assign a date for any one stage of the process. An inferior limit for the final collection is given by the Septuagint translation. But this translation itself was not written all at once, and its history is obscure; we only know from the prologue to Ecclesiasticus that the Hagiographa, and doubtless therefore the Psalter, were read in Greek in Egypt about 130 B.C. or somewhat later.[1] And the Greek Psalter, though it contains one apocryphal psalm at the close, is essentially the same as the Hebrew; there is nothing to suggest that the Greek was first translated from a less complete Psalter and afterwards extended to agree with the extant Hebrew. It is therefore reasonable to hold that the Hebrew Psalter was completed and recognized as an authoritative collection long enough before 130 B.C. to allow of its passing to the Greek-speaking Jews in Alexandria. Beyond this the external evidence for the completion of the collection does not carry us. It appears indeed from 1 Chron. xvi., 2 Chron. vi. 41, 42, that various psalms belonging to books iv. and v. were current in the time of the Chronicler,—that is, towards the close of the Persian or more probably in the earlier part of the Greek period. But it is not certain that the psalms he quotes (xcvi., cv., cvi., cxxxii.) already existed in their place in our Psalter, or that Ps. cvi. even existed in its present form. Turning now to internal evidence, we find the surest starting-point in the Levitical psalms of the Elohistic collection. These, as we have seen, form two groups, referred to the sons of Korah and to Asaph. At the beginning of the Greek period or somewhat later Asaph was taken to be a contemporary of David and chief of the singers of his time (Neh. xii. 46), or one of the three chief singers belonging to the three great Levitical houses (1 Chron. xxv. 1 *sq.*). But the older history knows nothing of an individual Asaph; at the time of the return from Babylon the guild of singers as a whole was called Bnē Asaph (Ezra ii. 41), and so apparently it was in the time of Nehemiah (Neh. xi. 22, Heb.).[2] The singers or Asaphites are at this time still distinguished from the Levites; the oldest attempt to incorporate them with that tribe appears in Exod. vi. 24, where Abiasaph—that is, the eponym of the guild of Asaphites—is made one of the three sons of Korah. But when singers and Levites were fused the Asaphites ceased to be the only singers, and ultimately, as we see in Chronicles, they were distinguished from the Korahites and reckoned to Gershom (1 Chron. vi.), while the head of the Korahites is Heman, as in the title of Ps. lxxxviii. It is only in the appendix to the Elohistic psalm-book that we find Heman and Ethan side by side with Asaph, as in the Chronicles, but the body of the collection distinguishes between two guilds of singers, Korahites and Asaphites, and is therefore as a collection younger than Nehemiah, but presumably older than Chronicles with its three guilds.

The contents of the Korahite and Asaphic psalms give no reason to doubt that they really were collected by or for these two guilds. Both groups are remarkable by the fact that they hardly contain any recognition of present sin on the part of the community of Jewish faith—though they do confess the sin of Israel in the past—but are exercised with the observation that prosperity does not follow righteousness either in the case of the individual (xlix., lxxiii.) or in that of the nation, which suffers notwithstanding its loyalty to God, or even on account thereof (xliv., lxxix.). Now the rise of the problems of individual faith is the mark of the age that followed Jeremiah, while the confident assertion of national righteousness under misfortune is a characteristic mark of pious Judaism after Ezra, in the period of the law but not earlier. Malachi, Ezra, and Nehemiah, like Haggai and Zechariah, are still very far from holding that the sin of Israel lies all in the past. Again, a considerable number of these psalms (xliv., lxxiv., lxxix., lxxx.) point to an historical situation which can be very definitely realized. They are post-exile in their whole tone and belong to a time when prophecy had ceased and the synagogue worship was fully established (lxxiv. 8, 9). But the Jews are no longer the obedient slaves of Persia; there has been a national rising and armies have gone forth to battle. Yet God has not gone forth with them: the heathen have been victorious, blood has flowed like water round Jerusalem, the temple has been defiled, and these disasters assume the character of a religious persecution. These details would fit the time of religious persecution under Antiochus Epiphanes, to which indeed Ps. lxxiv. is referred (as a prophecy) in 1 Mac. vii. 16. But against this reference there is the objection that these psalms are written in a time of the deepest dejection and yet are psalms of the temple choirs. Now when the temple was reopened for worship after its profanation by Antiochus the Jews were victorious and a much more joyous tone was appropriate. Besides, if the psalms are of the Maccabee period, they can have been no original part of the Elohistic psalm-book, which certainly was not collected so late. But there is one and only one time in the Persian period to which they can be referred, viz., that of the great civil wars under Artaxerxes III. Ochus (middle of 4th century B.C.). See PERSIA, vol. xviii. p. 580, and PHŒNICIA, *ib.* p. 809. The Jews were involved in these and were severely chastised, and we know from Josephus that the temple was defiled by the Persians and humiliating conditions attached to the worship there. It would appear that to the Jews the struggle took a theocratic aspect, and it is not impossible that the hopeful beginnings of a national movement, which proved in the issue so disastrous, are reflected in some of the other pieces of the collection.[1] All this carries the collection of the Elohistic psalm-book down to quite the last years of the Persian period at the earliest, and with this it agrees—to name but one other point—that the view of Israel's past history taken in Ps. lxxviii., where the final rejection of the house of Joseph is co-ordinated with the fall of Shiloh and the rise of Zion and the Davidic kingdom, indicates a standpoint very near to that of Chronicles. The fusion of the separate Korahite and Asaphic psalm-books in a single collection along with the second group of Davidic psalms may very probably be connected with the remodelling of the singers in three choirs which Chronicles presupposes

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[1] The text of the passage is obscure and in part corrupt, but the latin "cum multum temporis ibi fuissem" probably expresses the author's meaning A friend has suggested to the writer that for συγχρονίσας we ought perhaps to read *συχνὸν ἐγχρονίσας*

[2] The threefold division of the singers appears in the same list according to the Hebrew text of ver. 17, but the occurrence of Jeduthun as a proper name instead of a musical note is suspicious, and makes the text of LXX. preferable. The first clear trace of the triple choir is therefore in Neh. xii. 24, *i.e.*, not earlier than Alexander the Great, with whom Jaddua (ver. 22) was contemporary.

Now books iv. and v. are, as we have seen, later than the Elohistic redaction of books ii. and iii., so that the collection of the last part of the Psalter must, if our argument up to this point is sound, be thrown into the Greek period, and probably not the earliest part thereof. And this conclusion is borne out by a variety of indications. First of all, the language of some of these psalms clearly points to a very late date indeed.[2] The Jews had even in the time of Nehemiah (Neh. xiii. 24) been in danger of forgetting their own tongue and adopting a jargon compounded with neighbouring idioms; but the restorers of the law fought against this tendency with vigour and with so much success that very tolerable Hebrew was written for at least a century longer. But in such a psalm as cxxxix. the language is a real jargon, a mixture of Hebrew and Aramaic, which, in a hymn accepted for use in the temple, shows the Hebrew speech to have reached the last stage of decay. Again, though no part of the Psalter shows clearer marks of a liturgical purpose, we find that in books iv. and v. the musical titles have entirely disappeared. The technical terms, that is, of the temple music which are still recognized by the Chronicler have gone out of use, presumably because they were already become unintelligible, as they were when the Septuagint version was made. This implies a revolution in the national music which we can hardly explain in any other way than by the influence of that Hellenic culture which, from the time of the Macedonian conquest, began to work such changes on the whole civilization and art of the East. Once more the general tone of large parts of this collection is much more cheerful than that of the Elohistic psalm-book. It begins with a psalm (xc.) ascribed in the title to Moses, and seemingly designed to express feelings appropriate to a situation analogous to that of the Israelites when, after the weary march through the wilderness, they stood on the borders of the promised land. It looks back on a time of great trouble and forward to a brighter future. In some of the following psalms there are still references to deeds of oppression and violence, but more generally Israel appears as happy under the law with such a happiness as it did enjoy under the Ptolemies during the 3d century B.C. The problems of divine justice are no longer burning questions; the righteousness of God is seen in the peaceful felicity of the pious (xci., xcii., &c.). Israel, indeed, is still scattered and not triumphant over the heathen, but even in the dispersion the Jews are under a mild rule (cvi. 46), and the commercial activity of the nation has begun to develop beyond the seas (cvii. 26 *sq.*). The whole situation and vein of piety here are strikingly parallel to those shown in Ecclesiasticus, which dates from the close of the Ptolemaic sovereignty in Palestine. But some of the psalms carry us beyond this peaceful period to a time of struggle and victory. In Ps. cxviii. Israel, led by the house of Aaron—this is a notable point—has emerged triumphant from a desperate conflict and celebrates at the temple a great day of rejoicing for the unhoped-for victory; in Ps. cxlix. the saints are pictured with the praises of God in their throat and a sharp sword in their hands to take vengeance on the heathen, to bind their kings and nobles, and exercise against them the judgment written in prophecy. Such an enthusiasm of militant piety, plainly based on actual successes of Israel and the house of Aaron, can only be referred to the first victories of the Maccabees, culminating in the purification of the temple in 165 B.C. This restoration of the worship of the national sanctuary under circumstances that inspired religious feelings very different from those of any other generation since the return from Babylon might most naturally be followed by an extension of the temple psalmody; it certainly was followed by some liturgical innovations, for the solemn service of dedication on the twenty-fifth day of Chisleu was made the pattern of a new annual feast (that mentioned in John x. 22). Now in 1 Mac. iv. 54 we learn that the dedication was celebrated with hymns and music. In later times the psalms for the encænia or feast of dedication embraced Ps. xxx. and the *hallel* Pss. cxiii.-cxviii. There is no reason to doubt that these were the very psalms sung in 165 B.C., for in the title of Ps. xxx. the words "the song for the dedication of the house," which are a somewhat awkward insertion in the original title, are found also in the LXX., and therefore are probable evidence of the liturgical use of the psalm in the very first years of the feast. But no collection of old psalms could fully suffice for such an occasion, and there is every reason to think that the *hallel*, which especially in its closing part contains allusions that fit no other time so well, was first arranged for the same ceremony. The course of the subsequent history makes it very intelligible that the Psalter was finally closed, as we have seen from the date of the Greek version that it must have been, within a few years at most after this great event.[1] From the time of Hyrcanus downwards the ideal of the princely high priests became more and more divergent from the ideal of the pious in Israel, and in the Psalter of Solomon we see religious poetry turned against the lords of the temple and its worship. (See MESSIAH.)

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[1] Ps. lxxxiii., in which Judah is threatened by the neighbouring states acting with the support rather than under the guidance of Asshur (the satrap of Syria?) is also much more easily understood under the loose rule of Persia than under the Greeks, and the association of Tyre with Philistia (as in lxxxvii. 4) agrees with Pseudo-Scylax (see vol. xviii. p. 809). If this psalm has a definite historical background, which many critics doubt, it must be later than the destruction of Sidon by Ochus. That it is not of the Assyrian age is obvious from the mention of Arab tribes.

[2] For details as to the linguistic phenomena of the Psalms, see especially Giesebrecht in Stade's *Zeitschr.*, 1881, p. 276 *sq.* The objections of Driver (*Journ. of Phil.*, xi. 233) do not touch the argument that such psalms as cxxxix. belong to the very latest stage of Biblical Hebrew.

All this does not, of course, imply that there are not in books iv. and v. any pieces older than the completion of books ii. and iii., for the composition of a poem and its acceptance as part of the Levitical liturgy are not necessarily coincident in date, except in psalms written with a direct liturgical purpose. In the fifteen "songs of degrees" (Pss. cxx.-cxxxiv.) we have a case in point. According to the Mishna (*Middoth*, ii. 5) and other Jewish traditions, these psalms were sung by the Levites at the Feast of Tabernacles on the fifteen steps or degrees that led from the women's to the men's court. But when we look at the psalms themselves we see that they must originally have been a hymn-book, not for the Levites, but for the laity who came up to Jerusalem at the great pilgrimage feasts; and the title of this hymn-book (which can be restored from the titles derived from it that were prefixed to each song when they were taken into the Levitical connexion) was simply "Pilgrimage Songs."[2] All these songs are plainly later than the exile; but some of them cannot well be so late as the formation of the Elohistic psalm-book, and the simple reason why they are not included in it is that they were hymns of the laity, describing with much beauty and depth of feeling the emotions of the pilgrim when his feet stood within the gates of Jerusalem, when he looked forth on the encircling hills, when he felt how good it was to be camping side by side with his brethren on the slopes of Zion (cxxxiii.), when a sense of Jehovah's forgiving grace and the certainty of the redemption of Israel triumphed over all the evils of the present and filled his soul with humble and patient hope.

The titles which ascribe four of the pilgrimage songs to David and one to Solomon are lacking in the true LXX., and inconsistent with the contents of the psalms. Better attested, because found in the LXX. as well as in the Hebrew, and therefore probably as old as the collection itself, are the name of Moses in Ps. xc. and that of David in Pss. ci., cii., cviii.-cx., cxxxviii.-cxlv. But where did the last collectors of the Psalms find such very ancient pieces which had been passed by by all previous collectors, and what criterion was there to establish their genuineness? No canon of literary criticism can treat as valuable external evidence an attestation which first appears so many centuries after the supposed date of the poems, especially when it is confronted by facts so conclusive as that Ps. cviii. is made up of extracts from Pss. lvii. and lx. and that Ps. cxxxix. is marked by its language as one of the latest pieces in the book. The only possible question for the critic is whether the ascription of these psalms to David was due to the idea that he was the psalmist *par excellence*, to whom any poem of unknown origin was naturally ascribed, or whether we have in some at least of these titles an example of the habit so common in later Jewish literature of writing in the name of ancient worthies. In the case of Ps. xc. it can hardly be doubted that this is the real explanation, and the same account must be given of the title in Ps. cxlv., if, as seems probable, it is meant to cover the whole of the great *hallel* or *tehilla* (Ps. cxlv.-cl.), which must, from the allusions in Ps. cxlix., as well as from its place, be almost if not quite the latest thing in the Psalter

Davidic Psalms.—For the later stages of the history of the Psalter we have, as has been seen, a fair amount of circumstantial evidence pointing to conclusions of a pretty definite kind. The approximate dates which their contents suggest for the collection of the Elohistic psalm-book and of books iv. and v. confirm one another and are in harmony with such indications as we obtain from external sources. But, in order to advance from the conclusions already reached to a view of the history of the Psalter as a whole, we have still to consider the two great groups of psalms ascribed to David in books i. and ii. Both these groups appear once to have formed separate collections and in their separate form to have been ascribed to David; for in book i. every psalm, except the introductory poems i. and ii. and the late Ps. xxxiii., which may have been added as a liturgical sequel to Ps. xxxii., bears the title "of David," and in like manner the group Pss. li.-lxxii., though it contains a few anonymous pieces and one psalm which is either "of" or rather according to the oldest tradition "for Solomon," is essentially a Davidic hymn-book, which has been taken over as a whole into the Elohistic Psalter, even the subscription lxxii. 20 not being omitted. Moreover, the collectors of books i.-iii. knew of no Davidic psalms outside of these two collections, for Ps. lxxxvi. in the appendix to the Elohistic collection is merely a cento of quotations from Davidic pieces with a verse or two from Exodus and Jeremiah. These two groups, therefore, represented to the collectors the oldest tradition of Hebrew psalmody; they are either really Davidic or they passed as such. This fact is important; but its weight may readily be over-estimated, for the Levitical psalms comprise poems of the last half-century of the Persian empire, and the final collection of books ii. and iii. may fall a good deal later. Thus the tradition that David is the author of these two collections comes to us, not exactly from the time of the Chronicler, but certainly from the time when the view of Hebrew history which he expresses was in the course of formation. And it is not too much to say that that view—which to some extent appears in the historical psalms of the Elohistic Psalter—implies absolute incapacity to understand the difference between old Israel and later Judaism and makes almost anything possible in the way of the ascription of comparatively modern pieces to ancient authors. Nor will it avail to say that this uncritical age did not ascribe the Psalms to David but accepted them on the ground of older titles, for it is hardly likely that each psalm in the Davidic collections had a title before it was transferred to the larger Psalter; and in any case the titles are manifestly the product of the same uncritical spirit as we have just been speaking of, for not only are many of the titles certainly wrong but they are wrong in such a way as to prove that they date from an age to which David was merely the abstract psalmist, and which had no idea whatever of the historical conditions of his age. For example, Pss. xx., xxi. are not spoken by a king but addressed to a king by his people; Pss. v., xxvii. allude to the temple (which did not exist in David's time), and the author of the latter psalm desires to live there continually. Even in the older Davidic psalm-book there is a whole series of hymns in which the writer identifies himself with the poor and needy, the righteous people of God suffering in silence at the hands of the wicked, without other hope than patiently to wait for the interposition of Jehovah (Pss. xii., xxv., xxxvii., xxxviii., &c.). Nothing can be farther removed than this from any possible situation in the life of the David of the books of Samuel, and the case is still worse in the second Davidic collection, especially where we have in the titles definite notes as to the historical occasion on which the poems are supposed to have been written. To refer Ps. liii. to Doeg, Ps. liv. to the Ziphites, Ps. lix. to David when watched in his house by Saul, implies an absolute lack of the very elements of historical judgment. Even the bare names of the old history were no longer correctly known when Abimelech (the Philistine king in the stories of Abraham and Isaac) could be substituted in the title of Ps. xxxiv. for Achish, king of Gath. In a word, the ascription of these two collections to David has none of the characters of a genuine historical tradition.

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[1] Possibly under Simon; compare the other *hallel* (Ps. cxlv.-cl.) with 1 Mac. xiii. 50 *sq.*

[2] שיר המעלות (מעלה as in Ezra vii. 9 seems to be properly a plural like בית האבות,

At the same time it is clear that the two collections do not stand on quite the same footing. The Elohistic redaction—the change in the names of God—extends only to the second. Now the formation of the Elohistic Psalter must have been an official act directed to the consolidation of the liturgical material of the temple, and if it left one of the so-called Davidic collections untouched the reason must have been that this collection had already a fixed liturgical position. In other words, book i. is the oldest extant liturgy of the second temple, while there is no evidence that the Davidic psalms of book ii. had a fixed liturgical place till at least the close of the Persian period.

And now the question arises: May we suppose that the oldest liturgy of the second temple was also the liturgy of the temple of Solomon? We have it in evidence that music and song accompanied the worship of the great sanctuaries of northern Israel in the 8th century B.C. (Amos v. 23), but from the context it appears probable that the musicians were not officers of the temple but rather the worshippers at large (compare Amos vi. 5). So it certainly was in the days of David (2 Sam. vi. 5) and even of Isaiah (xxx. 29); the same thing is implied in the song of Hezekiah (Isa. xxxviii. 20), and in Lam. ii. 7 the noise within the sanctuary on a feast-day which affords a simile for the shouts of the victorious Chaldæans suggests rather the untrained efforts of the congregation than the disciplined music of a temple choir. The allusion to "chambers of singers" in Ezek. xl. 44 is not found in the Septuagint text, which is justified by the context, and the first certain allusion to a class of singers belonging to the sacred ministers is at the return from Babylon (Ezra ii. 41). The way in which these singers, the sons of Asaph, are spoken of may be taken as evidence that there was a guild of temple singers before the exile; but they cannot have been very conspicuous or we should have heard more of them. The historical books, as edited in the captivity, are fond of varying the narrative by the insertion of lyrical pieces, and one or two of these—the "passover song" (Exod. xv.) and perhaps the song from the book of Jashar ascribed to Solomon (see vol. xi. p. 598)—look as if they were sung in the first temple; but they are not found in the Psalter, and, conversely, no piece from the Psalter is used to illustrate the life of David except Ps. xviii., and it occurs in a section which can be shown to be an interpolation in the original form of 2 Samuel. These facts seem to indicate that even book i. of the Psalter did not exist when the editing of the historical books was completed, and that in music as in other matters the ritual of the second temple was completely reconstructed. Indeed the radical change in the religious life of the nation caused by the captivity could not fail to influence the psalmody of the sanctuary more than any other part of the worship; the book of Lamentations marks an era of profound importance in the religious poetry of Israel, and no collection formed before these dirges were first sung could have been an adequate hymn-book for the second temple. In point of fact the notes struck in the Lamentations and in Isa. xl.-lxvi. meet our ears again in not a few psalms of book i., *e.g.*, Pss. xxii., xxv., where the closing prayer for the redemption of Israel in a verse additional to the acrostic perhaps gives, as Lagarde suggests, the characteristic post-exile name Pedaiah as that of the author; Ps. xxxi., with many points of resemblance to Jeremiah; Pss. xxxiv., xxxv., where the "servant of Jehovah" is the same collective idea as in Deutero-Isaiah; and Pss. xxxviii., xli. The key to many of these psalms is that the singer is not an individual but, as in Lam. iii., the true people of God represented as one person; and only in this way can we do justice to expressions which have always been a stumbling-block to those who regard David as the author. But, at the same time, other psalms of the collection treat the problems of individual religion in the line of thought first opened by Jeremiah. Such a psalm is xxxix., and above all Ps. xvi. Other pieces, indeed, may well be earlier. When we compare Ps. viii. with Job vii. 17, 18, we can hardly doubt that the psalm lay before the writer who gave its expressions so bitter a turn in the anguish of his soul, and Pss. xx., xxi. plainly belong to the old kingdom. But on the whole it is not the pre-exilic pieces that give the tone to the collection; whatever the date of this or that individual poem, the collection as a whole—whether by selection or authorship—is adapted to express a religious life of which the exile is the presupposition. Only in this way can we understand the conflict and triumph of spiritual faith, habitually represented as the faith of a poor and struggling band living in the midst of oppressors and with no strength or help save the consciousness of loyalty to Jehovah, which is the fundamental note of the whole book.

Whether any of the older poems really are David's is a question more curious than important, as, at least, there is none which we can fit with certainty into any part of his life. If we were sure that 2 Sam. xxii. was in any sense part of the old tradition of David's life, there would be every reason to answer the question in the affirmative, as has been done by Ewald (see DAVID); but the grave doubts that exist on this point throw the whole question into the region of mere conjecture.

The contents of book i. make it little probable that it was originally collected by the temple ministers, whose hymn-book it ultimately became. The singers and Levites were ill provided for, and consequently irregular in their attendance at the temple, till the time of Nehemiah, who made it his business to settle the revenues of the clergy in such a way as to make regular service possible. With regular service a regular liturgy would be required, and in the absence of direct evidence it may be conjectured that the adoption of the first part of the Psalter for this purpose took place in connexion with the other far-reaching reforms of Ezra and Nehemiah, which first gave a stable character to the community of the second temple. In any case these psalms, full as they are of spiritual elements which can never cease to be the model of true worship, are the necessary complement of the law as published by Ezra, and must be always taken along with it by those who would understand what Judaism in its early days really was, and how it prepared the way for the gospel.

The second Davidic collection, which begins with a psalm of the exile (Ps. li.; see the last two verses), contains some pieces which carry us down to a date decidedly later than that of Nehemiah. Thus Ps. lxviii. 27 represents the worshipping congregation as drawn partly from the neighbourhood of Jerusalem and partly from the colony of Galilee. In several psalms of this collection, as in the Levitical psalms with which it is coupled, we see that the Jews have again begun to feel themselves a nation and not a mere municipality, though they are still passing through bitter struggles; and side by side with this there is a development of Messianic hope, which in Ps. lxxii. takes a wide sweep, based on the vision of Deutero-Isaiah. All these marks carry us down for this as for the other collections of the Elohistic Psalter to the time when passive obedience to the Achæmenians was interrupted. Several points indicate that the collection was not originally formed as part of the temple liturgy. The title, as preserved in the subscription to Ps. lxxii. 20, was not "Psalms" but "Prayers of David." Again, while the Levitical psalms were sung in the name of righteous Israel, of which, according to the theory of the second temple, the priestly and Levitical circles were the special holy representatives, these Davidic psalms contain touching expressions of contrition and confession (li., lxv.). And, while there are direct references to the temple service, these are often made from the standpoint, not of the ministers of the temple, but of the laity who come up to join in the solemn feasts or appear before the altar to fulfil their vows (Pss. liv. 6, lv. 14, lxiii., lxvi. 13, &c.). Moreover, the didactic element so prominent in the Levitical psalms is not found here.

Such is the fragmentary and conjectural outline which it seems possible to supply of the history of the two Davidic collections, from which it appears that the name of David which they bear is at least so far appropriate as it marks the generally non-clerical origin of these poems. But the positive origin of this title must be sought in another direction and in connexion with book i. From the days of Amos, and in full accordance with the older history, the name of David had been connected with musical skill and even the invention of musical instruments (Amos vi. 5) In the days of Nehemiah, though we do not hear of psalms of David,[1] we do learn that instruments of the singers were designated as Davidic, and the epithet "man of God" (Neh. xii. 36) probably implies that agreeably with this David was already regarded as having furnished psalms as well as instruments. But it was because the temple music was ascribed to him that the oldest liturgy came to be known in its totality as "Psalms of David," and the same name was extended to the lay collection of "Prayers of David," while the psalms whose origin was known because they had always been temple psalms were simply named from the Levitical choirs, or at a later date had no title.

Musical Execution and Place of the Psalms in the Temple Service.—The musical notes found in the titles of the psalms and occasionally also in the text (Selah, Higgaion) are so obscure that it seems unnecessary to enter here upon the various conjectures that have been made about them. The clearest point is that a number of the psalms were set to melodies named after songs,[2] and that one of these songs, beginning אל־תשחת (Al-taschith in E.V., Ps. lvii. *sq.*), may be probably identified with the vintage song, Isa. lxv. 8. The temple music was therefore apparently based on popular melodies. A good deal is said about the musical services of the Levites in Chronicles, both in the account given of David's ordinances and in the descriptions of particular festival occasions. But unfortunately it has not been found possible to get from these accounts any clear picture of the ritual or any certainty as to the technical terms used. By the time of the Septuagint these terms were no longer understood; it is not quite clear whether even the Chronicler understood them fully.

The music of the temple attracted the attention of Theophrastus (ap. Porph., *De Abst.*, ii. 26), who was perhaps the first of the Greeks to make observations on the Jews. His description of the temple ritual is not strictly accurate, but he speaks of the worshippers as passing the night in gazing at the stars and calling on God in prayer; his words, if they do not exactly fit anything in the later ritual, are well fitted to illustrate the original liturgical use of Pss. viii., cxxxiv. Some of the Jewish traditions as to the use of particular psalms have been already cited; it may be added that the Mishna (*Tāmīd*) assigns to the service of the continual burnt-offering the following weekly cycle of psalms,—(1) xxiv., (2) xlviii., (3) lxxxii., (4) xciv., (5) lxxxi., (6) xciii., (Sabbath) xcii., as in the title. Many other details are given in the treatise *Sōfĕrīm*, but these for the most part refer primarily to the synagogue service after the destruction of the temple. For details on the liturgical use of the Psalter in Christendom the reader may refer to Smith's *Dict. Chr. Ant.*, s.v. "Psalmody."

Ancient Versions.—A. The oldest version, the LXX., follows a text generally closely corresponding to the Massoretic Hebrew, the main variations being in the titles and in the addition (lacking in some MSS.) of an apocryphal psalm ascribed to David when he fought with Goliath. Pss. ix. and x. are rightly taken as one psalm, but conversely Ps. cxlvii. is divided into two. The LXX. text has many "daughters," of which may be noticed (*a*) the Memphitic (ed. Lagarde, 1875); (*b*) the old Latin, which as revised by Jerome in 383 after the current Greek text forms the *Psalterium Romanum*, long read in the Roman Church and still used in St Peter's; (*c*) various Arabic versions, including that printed in the polyglotts of Le Jay and Walton, and two others of the four exhibited together in Lagarde's *Psalterium, Iob, Proverbia, Arabice*, 1876; on the relations and history of these versions, see G. Hoffmann, in *Jenaer Literaturz.*, 1876, art. 539; the fourth of Lagarde's versions is from the Peshito. The Hexaplar text of the LXX., as reduced by Origen into greater conformity with the Hebrew by the aid of subsequent Greek versions,[3] was further the mother (*d*) of the *Psalterium Gallicanum*,—that is, of Jerome's second revision of the Psalter (385) by the aid of the Hexaplar text; this edition became current in Gaul and ultimately was taken into the Vulgate (*e*) of the Syro-Hexaplar version (published by Bugati, 1820, and in facsimile from the famous Ambrosian MS. by Ceriani, Milan, 1874). B. The Christian Aramaic version or Peshito (P'shīṭtā) is largely influenced by the LXX.; compare Baethgen, *Untersuchungen über die Psalmen nach der Peschita*, Kiel, 1878 (unfinished). This version has peculiar titles taken from Eusebius and Theodore of Mopsuestia (see Nestle, in *Theol. Literaturz.*, 1876, p. 283). C. The Jewish Aramaic version or Targum is probably a late work. The most convenient edition is in Lagarde, *Hagiographa Chaldaice*, 1873. D. The best of all the old versions is that made by Jerome after the Hebrew in 405. It did not, however, obtain ecclesiastical currency—the old versions holding their ground, just as English churchmen still read the Psalms in the version of the "Great Bible" printed in their Prayer Book. This important version was first published in a good text by Lagarde, *Psalterium iuxta Hebræos Hieronymi*, Leipsic, 1874.

Exegetical Works.—While some works of patristic writers are still of value for text criticism and for the history of early exegetical tradition, the treatment of the Psalms by ancient and mediæval Christian writers is as a whole such as to throw light on the ideas of the commentators and their times rather than on the sense of a text which most of them knew only through translations. For the Psalms as for the other books of the Old Testament the scholars of the period of the revival of Hebrew studies about the time of the Reformation were mainly dependent on the ancient versions and on the Jewish scholars of the Middle Ages. In the latter class Ḳimḥi stands pre-eminent; to the editions of his commentary on the Psalms enumerated in the article Kimhi must now be added the admirable edition of Dr Schiller-Szinessy (Cambridge, 1883), containing unfortunately only the first book of his longer commentary. Among the works of older Christian scholars since the revival of letters, the commentary of Calvin (1557)—full of religious insight and sound thought—and the laborious work of M. Geier (1668, 1681 *et sæpius*) may still be consulted with advantage, but for most purposes Rosenmüller's *Scholia in Pss.* (2d ed., 1821-22) supersedes the necessity of frequent reference to the predecessors of that industrious compiler. Of more recent works the freshest and most indispensable are Ewald's, in the first two half volumes of his *Dichter des alten Bundes* (2d ed., Göttingen, 1866; Eng. tr., 1880), and Olshausen's (1853). To these may be added (excluding general commentaries on the Old Testament) the two acute but wayward commentaries of Hitzig (1836, 1863-65), that of Delitzsch (1859-60, then in shorter form in several editions since 1867; Eng. tr., 1871), and that of Hupfeld (2d ed. by Riehm, 1867, 2 vols.). The last-named work, though lacking in original power and clearness of judgment, is extremely convenient and useful, and has had an influence perhaps disproportionate to its real exegetical merits. The question of the text was first properly raised by Olshausen, and has since received special attention from, among others, Lagarde (*Prophetæ Chald.*, 1872, p. xlvi. *sq.*), Dyserinck (in the "scholia" to his Dutch translation of the Psalms, *Theol. Tijdschr.*, 1878, p. 279 *sq.*), and Bickell (*Carmina V. T. metrice*, &c., Innsbruck, 1882), whose critical services are not to be judged merely by the measure of assent which his metrical theories may command. In English we have, among others, the useful work of Perowne (5th ed., 1883), that of Lowe and Jennings (2d ed., 1885), and the valuable translation of Cheyne (1884). The mass of literature on the Psalms is so enormous that no full list even of recent commentaries can be here attempted, much less an enumeration of treatises on individual psalms and special critical questions. For the latter Kuenen's *Onderzoek*, vol. iii., is, up to its date (1865), the most complete, and the new edition now in preparation will doubtless prove the standard work of reference. As regards the dates and historical interpretation of the Psalms, all older discussions, even those of Ewald, are in great measure antiquated by recent progress in Pentateuch criticism and the history of the canon, and an entirely fresh treatment of the Psalter by a sober critical commentator is urgently needed. (W. R. S.)

PSALTERY. For the mediæval instrument of this name ("sautrie" or "cembalo"), see Pianoforte (vol. xix. p. 65). The Hebrew נֵבֶל, rendered ψαλτήριον,[4] νάβλα, ψαλμός (Ps. lxxi. 22), κιθάρα (Ps. lxxxi. 2), ὄργανον (Am. v. 23, vi. 5), in the LXX., and "psaltery" or "viol" in the A.V. (also "lute" in the Prayer-Book version of the Psalms), appears to have been a small stringed instrument, harp or lyre, the strings of which were touched with the player's fingers. The statement of Josephus (*Ant.*, vii. 12, 3), that the *κινύρα* (כִּנּוֹר) had ten strings and was struck with the plectrum, while the *νάβλα* had twelve and was played with the hand, is the earliest definition having any authority to be met with of these obscure instruments. The *κινύρα*, if not a smaller lyre with tighter strings requiring a plectrum, may, as some suppose, have been a kind of guitar, rather a tamboura, the most extensively known Eastern stringed instrument, which, in principle, is found represented in the oldest Egyptian monuments. The paucity of strings in the latter is, however, against this attribution. Nothing being more variable than the number of strings attached to the various stringed instruments at different times and in different places, eight, nine, or ten strings to the *κινύρα*, or ten (see Ps. xxxiii. 2, cxliv. 9, Heb.) or twelve to the *νάβλα*, are probably immaterial variations. The musical instruments of the Bible are the most difficult subject in musical archæology, about which the translators of the A.V. or the Prayer-Book Psalms did not trouble themselves, but named the instruments from those in use around them.

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[1] *I.e.*, not in the parts of the book of Nehemiah which are by Nehemiah himself.

[2] Compare the similar way of citing melodies with the prep. *'al* or *'al ḳālā*, &c., in Syriac (Land, *Anecd.*, iv.; Ephr. Syr., *Hymni*, ed. Lamy).

[3] See Field, *Origenis Hexapla*, where the fragments of these versions are collected. That of Symmachus is esteemed the best.

[4] This word reappears in the פְּסַנְתֵּרִין of Dan. iii. 5, &c.

PSAMMETICHUS. See Egypt, vol. vii. p. 743.

PSELLUS, the name of several Byzantine writers, of whom the following were the most important.

1. Michael Psellus the elder, a native of Andros and a pupil of Photius. He flourished in the second half of the 9th century, and strove to stem the rising tide of barbarism by his devotion to letters and philosophy. His study of the Alexandrine theology, as well as of profane literature, brought him under the suspicions of the orthodox, and a former pupil of his, by name Constantine, accused him in an elegiac poem of having abandoned Christianity. In order to perfect his knowledge of Christian doctrine, Psellus had recourse to the instructions of Photius, and then replied to his adversary in a long iambic poem, in which he maintained his orthodoxy. It has been conjectured by Allatius, Cave, and others that some of the books commonly attributed to the younger Psellus are the works of the elder, *e.g.*, the *Dialogue on Operations of Demons*, and the short treatises *On the Virtues of Stones* and *On Demons*. Their reasons, however, resting on the inferiority of literary style and mode of treatment, are inconclusive.

2. Michael Constantine Psellus the younger was born at Constantinople in 1020, of a consular and patrician family He studied at Athens, and by his talents and vast industry made himself master of all the learning of the age, including theology, law, physics, mathematics, philosophy, and history. At Constantinople he taught philosophy, rhetoric, and dialectic with the greatest success, and was honoured with the title of "Prince of Philosophers" by the emperors, who sometimes sought his advice and employed his services. But in 1078, when his pupil, the emperor Michael Ducas, was deposed, Psellus shared his downfall, being compelled by the new emperor, Nicephorus Botanias, to retire to a monastery On his accession to the empire in 1081 Alexius Comnenus deprived Psellus of his title of "Prince of Philosophers" and transferred it to his less talented rival John the Italian. He appears to have been still alive in 1105 and perhaps in 1110.

Of his works, which are very numerous, many have not yet been printed. Even of those which have been printed there is no complete edition. Of his published works we may mention—(1) his mathematical *Opus in quatuor Mathematicas Disciplinas, Arithmeticam, Musicam, Geometriam, et Astronomiam*, published at Venice in 1532, and several times reprinted, as at Basel in 1556 with the notes of Xylander; (2) a *Paraphrase of Aristotle's Περὶ ἑρμηνείας*, published in Greek by Aldus at Venice in 1503; (3) *Synopsis legum*, in iambic verse, edited with a Latin translation and notes by Franciscus Bosquetus, Paris, 1632; (4) *De Vitiis et Virtutibus, et Allegoriæ*, in iambic verse, published by Arsenius at Rome (no date), and reprinted at Basel, 1544; (5) Περὶ ἐνεργείας δαιμόνων διάλογος (*De operatione dæmonum dialogus*), translated into Latin by Petrus Morellus and published at Paris in 1577; (6) *De lapidum virtutibus*, published in Greek and Latin at Toulouse in 1615 (for 5 and 6 see Michael Psellus above).

PSEUDONYMOUS LITERATURE. See Bibliography, vol. iii. pp. 657-658.

PSKOFF, a government of the lake-region of north-west Russia, which extends from Lake Peipus to the source of the Dwina, having St Petersburg on the N., Novgorod, Tver, and Smolensk on the E., Vitebsk on the S., and Livonia on the W. It has an area of 16,678 square miles. In the south-east it extends partly over the Alaun heights—a broad ridge 800 to 1000 feet above the sea, deeply indented with numerous valleys and ravines, thickly covered with forests, and dotted with small lakes and ponds. In the district of Toropets these heights take the name of Vorobiovy Hills; extending westwards into Vitebsk, they send to the north a series of irregular ranges, separated by broad valleys, which occupy the north-western parts of Pskoff and give rise to the rivers flowing into Lakes Peipus and Ilmeñ. A depression 120 miles long and 35 miles broad, watered by the Lovat and Polist, occupies the interval between the two hilly tracts; it is covered throughout with forests and thickly studded with marshes overgrown with rank vegetation, the only tracts suitable for human occupation being narrow isolated strips of land on the banks of rivers, or between the marshes, and no communication is possible except along the watercourses. These marshy tracts, which extend westwards into Vitebsk and north-eastwards towards St Petersburg, were even more impassable ten centuries ago, and, encircling the old Russian city of Pskoff, formed its best protection against the repeated attacks of its neighbours.

With the exception of the south-eastern corner, where Carboniferous rocks make their appearance, nearly the whole of the government consists of Devonian deposits of great thickness,—the Old Red Sandstone, with subordinate layers of various sandstones, and clays containing brown iron ore; and the White Limestone, which contains layers of dolomite, marls, clays with deposits of gypsum, and white sandstone, which is extensively quarried for building purposes. As regards the fauna the Devonian deposits of Pskoff are intermediate between those of Belgium, the Eifel, and Poland and those of middle Russia. The whole is covered with very thick sheets of boulder clay and bears unmistakable traces of glacial action; the bottom moraine of the Scandinavian and Finnish ice-sheet formerly extended over the whole of this region, which often takes the shape of ridges (*kames* or *eskers*), the upper parts consisting of Glacial sands and post-Glacial clays, sands, and peat-bogs. The soil is thus not only infertile on the whole, but also badly drained, on account of the impermeable nature of the boulder clay and the frequent occurrence of depressions having no distinct outlets to the rivers. Only those parts of the territory which are covered with thicker strata of post-Glacial deposits are suitable for agriculture.

The rivers are numerous and belong to three separate basins—to Lakes Peipus and Pskoff the rivers in the north-west, to Lake Ilmeñ those in the middle, and to that of the Dwina the rivers in the south-east. A great number of small streams pour into Lake Pskoff, the chief being the Velikaya, which flows from south to north and receives numerous tributaries, which are used for floating rafts, a wide region being thus brought into communication with Lake Peipus and thence with the Narova. The Velikaya, which is now navigable for only 25 miles from Lake Pskoff, was formerly deeper. The Lovat and Sheloñ, belonging to the basin of Lake Ilmeñ, are both navigable, and a lively traffic is carried on on both; while the Dwina flows for 100 miles on the borders of the government or within it, and is used only for floating timber. There are no less than 850 lakes in Pskoff, with a total area of 391 square miles. The largest is Lake Pskoff, which is 50 miles long and 13 broad, and covers 312 square miles, having a depth of from 3 to 18 feet; it is connected by a channel, 40 miles long and 3 to 10 wide, with Lake Peipus. Its islands, numbering nearly fifty, have an aggregate population of 2000 persons. The marshes on the banks of the Polist are nearly 1250 square miles in extent; one in the neighbourhood of Lake Dviniye is 27 miles long and 17 broad, and another on the Toropa extends for 17 miles, while many elongated marshes, 15, 20, and 30 miles long and from 2 to 3 broad, run parallel to one another in the broad depression of the Lovat. Forests occupy nearly one-half (about 45 (per cent.) of the entire area, and in some districts (Cholm, Toropets, Porkhoff) as much as two-thirds of the surface. Large pine forests are met with in the north; in other parts the birch and aspen prevail; but almost one-quarter of the forest area is covered with low brushwood.

The climate is very moist and changeable. The average temperature is 41° Fahr. (17°·1 in January and 64°·8 in July).

The population of the government, which was 895,710 in 1881 (718,910 in 1863), consists almost exclusively of Great Russians, there being only 8000 Esthonians (in the district of Pskoff), about 500 Letts, and less than 1500 Jews. Many German traders live at Pskoff. The Russians and the greater part of the Esthonians belong to the Greek Church, or are Nonconformists (upwards of 12,000 in 1866, according to official figures). Of the total number of inhabitants only 58,900 live in towns, the remainder being distributed over no fewer than 15,000 small villages.

Notwithstanding the infertility of the soil the chief occupation is agriculture—rye, oats, barley, and potatoes being grown everywhere; but though corn is exported by the larger landowners to the average annual amount of nearly 1,600,000 bushels the amount imported is much greater (9,600,000 bushels). The annual export of flax is estimated at 530,000 cwts., Pskoff, Ostroff, Opotchka, Porkhoff, and Soltsy being important centres for the trade. The average annual crops during 1870-77 were 28,972,800 bushels of corn and 5,984,000 bushels of potatoes. The limited area of pasture lands is unfavourable for cattle-breeding, and in 1881 there were only 171,000 horses, 304,000 head of cattle, and 166,000 sheep; murrains are very frequent. Fishing is a considerable source of wealth on the shores of the larger lakes, small salted or frozen fish (*snyetki*) being annually exported to the value of £25,000 or £35,000. The timber trade is steadily increasing, the exports being estimated at present at nearly £50,000; wood for fuel is, however, at the same time imported from the government of St Petersburg. The population engage also in the preparation of lime, in stone-quarrying, in the transport of merchandise, and in some domestic trades. The manufactures are insignificant; their aggregate production in 1879 reached £518,800, and gave occupation to only 2350 persons. The total amount of merchandise loaded and discharged on the rivers within the government in 1880 was 1,761,000 cwts.

Pskoff is divided into eight districts, the chief towns of which are—Pskoff (21,170 inhabitants), Cholm (5550), Novorjeff (1915), Opotchka (4075), Ostroff (4200), Porkhoff (3925), Toropets (5760), Velikiya Luki (6600). Alexandrovskii Posad (2920) and Soltsy (5825, an important shipping place on the Sheloñ river) have also municipal institutions.

PSKOFF, capital of the above government, is picturesquely situated on both banks of the broad Velikaya river, 9 miles from Lake Pskoff and 171 miles by rail south-west of St Petersburg. The chief part of the town, with its kremlin on a hill and several suburbs, occupies the right bank of the river, to which the ruins of its old walls descend; the Zapskovie, consisting of several suburbs, stretches along the same bank of the Velikaya below its confluence with the Pskova; and the Zavelitchie occupies the left bank of the Velikaya,—all three keeping their old historical names. The cathedral in the kremlin has been four times rebuilt since the 12th century and contains some very old shrines, as also the graves of the bishops of Pskoff and of several princes, including those of Dovmont and Vsevolod. The church of Dmitrii Solunskii also dates originally from the 12th century; there are others belonging to the 14th and 15th. The Spaso-Mirojskii monastery, founded in 1156, has many remarkable antiquities. The ruins of numerous rich and populous monasteries in or near the town attest its former wealth and greatness. The present town is ill built, chiefly of wood, and shows traces of decay. Many of the inhabitants live by agriculture or gardening; the remainder are engaged in loading and unloading merchandise on the Velikaya and at the railway station, in combing flax, fishing, and domestic trades. The manufactures are unimportant. Since the completion of the St Petersburg and Warsaw railway the trade of Pskoff has increased. In 1880 the exports reached 99,000 cwts. on the Velikaya and 463,000 cwts. by rail; the imports were 125,700 cwts. on the Velikaya and 591,600 cwts. by rail. Pskoff has regular steam communication with Dorpat. The population in 1882 was 21,170 (15,086 in 1866).

History.—Pskoff, formerly the sister republic of Novgorod, and one of the oldest cities of Russia, maintained its independence and its free institutions until the 16th century, being thus the last to be brought under the rule of Moscow. Its annals, unquestionably the fullest and liveliest of any in Russia, affirm that it already existed in the time of Rurik; and Nestor mentions under the year 914 that Igor's wife, Olga, was brought from Pleskoff (*i.e.*, Pskoff). It was quite natural that a Russian fortified town should rise at the entrance of the Velikaya valley within the earliest period of the Russian colonization of that region; the river had from a remote antiquity been a channel for the trade of the south with the north Baltic coast. Pskoff being an important strategic point, its possession was obstinately disputed between the Russians and the Germans and Lithuanians, and throughout the 11th and 12th centuries numerous battles were fought. At that time the place had its own independent institutions; but, attacked as it was from the west, it became in the 12th century a "prigorod" of the Novgorod republic,—that is (so far as can be judged from the incomplete testimony of historical documents), a city having its own free institutions, but included in certain respects within the jurisdiction of the metropolis, and compelled in time of war to march against the common enemy. Pskoff had, however, its own prince (*defensor municipii*); and in the second half of the 13th century Prince (Timotheus) Dovmont fortified it so strongly, and was so successful in repelling its enemies, that the town acquired much importance and asserted its independence of Novgorod, with which in 1348 it concluded a treaty wherein the two republics were recognized as equals. The institutions of Pskoff resembled those of Novgorod; it, in its turn, had several prigorods, and its rule extended over the territory which now forms the districts of Pskoff, Ostroff, Opotchka, and Gdoff. Within this territory the "vyetche" or "forum" of Pskoff was sovereign, the vyetches of the subordinate towns being supreme in their own municipal affairs. The city of Pskoff was divided into several sections or "kontsy," according to the prevalent occupations of the inhabitants, and the kontsy were divided into "ulitsy" (streets), which enjoyed extensive powers of self-government. The vyetche was supreme in all affairs of general interest, as well as a supreme court of justice, and the princes were elected by it; these last had to defend the city and levied the taxes, which were assessed by twelve citizens, who combined to some extent the functions of judges with those of a jury. Pskoff differed widely, however, from Novgorod in the more democratic character of its institutions; and, while the latter constantly showed a tendency to become an oligarchy of the wealthier merchants, the former figured as a republic where the influence of the poorer classes prevailed. Its trading associations, supported by those of the labourers, checked the influence of the wealthier merchants.

This struggle (of which the annals give a lively picture) continued throughout the 14th and 15th centuries, resulting sometimes in armed riots. Notwithstanding these conflicts Pskoff was a very wealthy city. Its strong walls, whose ruins are still to be seen, its forty-two large and wealthy churches, built during this period, as also its numerous monasteries and its extensive trade, bear testimony to the wealth of the inhabitants, who then numbered about 60,000. The "dyetinets" or fort, enclosed by a stone wall erected by Dovmont, stood on a hill between the Pskova and the Velikaya, having within its walls the cathedral of the Holy Trinity. Another stone wall enclosed the commercial part, the Kromy (kremlin) or middle town. In 1465 the suburb Polonische became so prosperous that it also was enclosed by a wall, and included within the circuit of the town proper. Even the Zapskovie was enclosed by a wooden palisade in the 15th century and later on by a stone wall; while the Zavelitchie was a busy centre of foreign trade. As early as the 13th century Pskoff had become an important station for the trade between Novgorod and Riga. A century later it entered the Hanseatic League. Its merchants and trading associations had factories at Narva, Revel, Riga, and exported flax, corn, tallow, skins, tar, pitch, honey, and timber for shipbuilding, which were transported or shipped *via* Lake Peipus, the Narova, and the Embach to the ports on the Baltic and on the Gulf of Finland. Silks, woollen stuffs, and all kinds of manufactured wares were brought back in exchange and sold throughout northern Russia.

Nevertheless, the continuous struggle between the "black" and "white" people (the patricians and the plebeians) offered many opportunities to Moscow for interference in the internal affairs of Pskoff, especially with regard to the election of the princes, which was often the occasion of severe conflicts. In 1399 the prince of Moscow arrogated the privilege of confirming the elected prince of Pskoff in his rights; and though, fifty years later, Pskoff and Novgorod concluded several defensive treaties against Moscow the fall of both republics was inevitable, the poorer classes continuing to seek at Moscow a protection against the oppression of the richer citizens. After the fall of Novgorod (1475) Pskoff could no longer maintain its independence, and in 1510 it was taken by Vasilii Joannovitch. The vyetche was abolished and its bell taken away, and a waywode was nominated by Moscow to govern the city. Moscow merchants were settled at Pskoff, and put in possession of the fortunes of the former citizens. The conquered territory still maintained to some extent its self-government, especially with regard to trade, but the struggle between rich and poor was aggravated by the intervention of foreigners. The "lutschiye ludi" (wealthier merchants) prohibited the "malomotchnyie" (poorer merchants) from entering into direct trade relations with foreigners, and compelled them to sell their wares to themselves or to become their agents. These disputes furnished Moscow at the end of the 17th century with a pretext for abolishing the last vestiges of self-government at Pskoff, and for placing all affairs of local administration in the hands of the Moscow waywodes. Thenceforward Pskoff fell into rapid decay. It became a stronghold of Russia against Poland and was besieged for seven months by Stephan Bathory during the Livonian War, and later on by Gustavus Adolphus. Under Peter I. it became a fortified camp, and its walls were protected by earthworks. But it never recovered its former importance, and is now one of the poorer cities of the empire. (P. A. K.)

PSYCHE. See CUPID.

PSYCHOLOGY

The Standpoint of Psychology.

IN the several natural sciences the scope and subject-matter of each are so evident that little preliminary discussion on this score is called for. It is easy to distinguish the facts dealt with in a treatise on light from those that belong to one on sound; and even when the need arises to compare the results of two such sciences—as in the case, say, of light and electricity—there is still no difficulty,—apart, of course, from any which the imperfect state of the sciences themselves may occasion. Theoretically, a standpoint is attainable from which this comparison can be made, in so far, say, as the facts of both sciences can be expressed in terms of matter and motion. But with psychology, however much it is freed from metaphysics, all this is different. It is indeed ordinarily assumed that its subject-matter can be at once defined: "It is what you can perceive by consciousness or reflexion or the internal sense," says one, "just as the subject-matter of optics is what you can perceive by sight." Or, "psychology is the science of the phenomena of mind," we are told again, "and is thus marked off from the physical sciences, which treat only of the phenomena of matter." But, whereas nothing is simpler than to distinguish between seeing and hearing, or between the phenomena of heat and the phenomena of gravitation, a very little reflexion may convince us that we cannot in the same fashion distinguish internal from external sense, or make clear to ourselves what we mean by phenomena of mind as distinct from phenomena of matter

Let us begin with the supposed differentia of internal and external; and first of all what are we to understand by an inner sense? To every sense there corresponds a sense-organ; the several senses are distinct and independent, so that no one sense can add to or alter the materials of another; and each is *sui generis* as regards quality,—the possession of five senses, *e.g.*, furnishing no data as to the character of a possible sixth. Moreover, sense-impressions are passively received and occur in the first instance without regard to the feeling or volition of the recipient and without any manner of relation to the "contents of consciousness" at the moment. Now such a description will apply but very partially to the so-called "internal sense." We can imagine consciousness without self-consciousness, still more without introspection, much as we can imagine sight without taste or smell. But this does not entitle us to speak of self-consciousness as a sense. For we do not by means of it passively receive impressions differing from all previous presentations, as the sensations of colour for one couched differ from all he has experienced before: the new facts consist rather in the recognition of certain relations among pre-existing presentations, *i.e.*, are due to our mental activity and not to a special mode of what has been called our sensitivity. For when we taste we cannot hear that we taste, when we see we cannot smell that we see; but when we taste we may be conscious that we taste, when we hear we may be conscious that we hear. In this way all the objects of the external senses are recognized as having new relations by the miscalled "internal sense." Moreover, the facts so ascertained are never independent of feeling and volition and of the contents of consciousness at the time, as true sensations are. Also if we consult the physiologist we learn that there is no evidence of any organ or "centre" that could be regarded as the "physical basis" of this inner sense; and, if self-consciousness alone is temporarily in abeyance and a man merely "beside himself," such state of delirium has little analogy to the functional blindness or deafness that constitutes the temporary suspension of sight or hearing.

To the conception of an internal perception or observation the preceding objections do not necessarily apply,—that is to say, this conception may be so defined that they need not. But then in proportion as we escape the charge of assuming a special sense which furnishes the material for such perception or observation, in that same proportion are we compelled to seek for some other mode of distinguishing its subject-matter. For, so far as the mere mental activity of perceiving or observing is concerned, it is not easy to see any essential difference in the process whether what is observed be psychical or physical. It is quite true that the so-called psychological observation is more difficult, because the facts observed are often less definite and less persistent, and admit less of actual isolation than physical facts do; but the process of recognizing similarities or differences, the dangers of mal-observation or non-observation, are not materially altered on that account. It may be further allowed that there is one difficulty peculiarly felt in psychological observation, the one most inaccurately expressed by saying that here the observer and the observed are one. But this difficulty is surely in the first instance due to the very obvious fact that our powers of attention are limited, so that we cannot alter the distribution of attention at any moment without altering the contents of consciousness at that moment. Accordingly, where there are no other ways of surmounting this difficulty, the psychological observer must either trust to representations at a later time, or he must acquire the power of taking momentary glances at the psychological aspects of the phase of consciousness in question. And this one with any aptitude for such studies can do with so slight a diversion of attention as not to disturb very seriously either the given state or that which immediately succeeds it. But very similar difficulties have to be similarly met by physical observers in certain special cases, as, *e.g.*, in observing and registering the phenomena of solar eclipse; and similar aptitudes in the distribution of attention have to be acquired, say, by extempore orators or skilful surgeons. Just as little, then, as there is anything that we can with propriety call an inner sense, just so little can we find in the process of inner perception any satisfactory characteristic of the subject-matter of psychology. The question still is: What is it that is perceived or observed? and the readiest answer of course is: Internal experience as distinguished from external, what takes place in the mind as distinct from what takes place without.

This answer, it must be at once allowed, is adequate for most purposes, and a great deal of excellent psychological work has been done without ever calling it in question. But the distinction between internal and external experience is not one that can be drawn from the standpoint of psychology, at least not at the outset. From this standpoint it appears to be either (1) inaccurate or (2) not extra-psychological. As to (1), the boundary between the internal and the external was, no doubt, originally the surface of the body, with which the subject or self was identified; and in this sense the terms are of course correctly used. For a thing may, in the same sense of the word, be in one space and therefore not in—*i.e.*, out of—another; but we express no intelligible relation if we speak of two things as being one in a given room and the other in last week. Any one is at liberty to say if he choose that a certain thing is "in his mind"; but if in this way he distinguishes it from something else not in his mind, then to be intelligible this must imply one of two statements,—either that the something else is actually or possibly in some other mind, or, his own mind being alone considered, that at the time the something else does not exist at all. Yet, evident as it seems that the correlatives in and not-in must both apply to the same category, whether space, time, presentation (or non-presentation) to a given subject, and so forth, we still find psychologists more or less consciously confused between "internal," meaning "presented" in the psychological sense, and "external," meaning not "not-presented" but corporeal or oftener extra-corporeal. But (2), when used to distinguish between presentations (some of which, or some relations of which with respect to others, are called "internal," and others or other relations, "external"), these terms are at all events accurate; only then they cease to mark off the psychological from the extra-psychological, inasmuch as psychology has to analyse this distinction and to exhibit the steps by which it has come about. But we have still to examine whether the distinction of phenomena of Matter and phenomena of Mind furnishes a better dividing line than the distinction of internal and external.

A phenomenon, as commonly understood, is what is manifest, sensible, evident, the implication being that there are eyes to see, ears to hear, and so forth,—in other words, that there is presentation to a subject; and wherever there is presentation to a subject it will be allowed that we are in the domain of psychology. But in talking of physical phenomena we, in a way, abstract from this fact of presentation. Though consciousness should cease, the physicist would consider the sum total of objects to remain the same: the orange would still be round, yellow, and fragrant as before. For the physicist—whether aware of it or not—has taken up a position which for the present may be described by saying that phenomenon with him means appearance or manifestation, or—as we had better say—object, not for a concrete individual, but rather for what Kant called *Bewusstsein überhaupt*, or, as some render it, the objective consciousness, *i.e.*, for an imaginary subject freed from all the limitations of actual subjects save that of depending on "sensibility" for the material of experience. However, this is not all, for, as we shall see presently, the psychologist also occupies this position; at least if he does not, his is not a true science. But further, the physicist leaves out of sight altogether the facts of attention, feeling, and so forth, all which actual presentation entails. From the psychological point of view, on the other hand, the removal of the subject removes not only all such facts as attention and feeling, but all presentation or possibility of presentation whatever. Surely, then, to call a certain object, when we abstract from its presentation, a material phenomenon, and to call the actual presentation of this object a mental phenomenon, is a clumsy and confusing way of representing the difference between the two points of view. For the terms "material" and "mental" seem to imply that the two so-called phenomena have nothing in common, whereas the same object is involved in both, while the term "phenomenon" implies that the point of view is in each case the same. when in truth what is emphasized by the one the other ignores.

Paradoxical though it may be, we must then conclude that psychology cannot be defined by reference to a special subject-matter as such concrete sciences, for example, as mineralogy and botany can; and, since it deals in some sort with the whole of experience, it is obviously not an abstract science, in any ordinary sense of that term. To be characterized at all, therefore, apart from metaphysical assumptions, it must be characterized by the standpoint from which this experience is viewed. It is by way of expressing this that widely different schools of psychology define it as subjective, all other positive sciences being distinguished as objective. But this seems scarcely more than a first approximation to the truth, and, as we have seen incidentally, is apt to be misleading. The distinction rather is that the standpoint of psychology is what is sometimes termed "individualistic." that of the so-called object-sciences being "universalistic," both alike being objective in the sense of being true for all, consisting of what Kant would call judgments of experience. For psychology is not a biography in any sense, still less a biography dealing with idiosyncrasies, and in an idiom having an interest and a meaning for one subject only, and incommunicable to any other. Locke, Berkeley, and Hume have been of late severely handled because they regarded the critical investigation of knowledge as a psychological problem, and set to work to study the individual mind simply for the sake of this problem. But none the less their standpoint was the proper one for the science of psychology itself; and, however surely their philosophy was foredoomed to a collapse, there is no denying a steady psychological advance as we pass from Locke to Hume and his modern representatives. By "idea" Locke tells us he means "whatsoever is the object of the understanding when a man thinks" (*i.e.*, is conscious), and having, as it were, shut himself within such a circle of ideas he finds himself powerless to explain his knowledge of a world that is independent of it; but he is able to give a very good account of some of these ideas themselves. He cannot justify his belief in the world of things whence certain of his simple ideas "were conveyed" any more than Robinson Crusoe could have explored the continents whose products were drifted to his desert island, though he might perhaps survey the island itself well enough. Berkeley accordingly, as Professor Fraser happily puts it, abolished Locke's hypothetical outer circle. Thereby he made the psychological standpoint clearer than ever—hence the truth of Hume's remark, that Berkeley's arguments "admit of no answer"; at the same time the epistemological problem was as hopeless as before—hence again the truth of Hume's remark that those arguments "produced no conviction." Of all the facts with which he deals, the psychologist may truly say that their *esse* is *percipi*, inasmuch as all his facts are facts of presentation, are ideas in Locke's sense, or objects which imply a subject. Before we became conscious there was no world for us; should our consciousness cease, the world for us ceases too; had we been born blind, the world would for us have had no colour; if deaf, it would have had no sounds; if idiotic, it would have had no meaning. Psychology, then, never transcends the limits of the individual; even the knowledge that there is a real world, as common-sense assumes, is, when psychologically regarded, an individual's knowledge, which had a beginning and a growth, and can have an end. In fact, for the psychologist it is not essentially knowledge, but presentations, partly possible, partly actual, in the mind of A, B, or C; just as this page is for the printer essentially "copy," and only for the reader essentially "discourse." But what the psychologist has to say about knowledge is, of course, itself knowledge, *i.e.*, assuming it to be correct; the knowledge about which he knows is, however, for him not primarily knowledge, but "states of consciousness."

But now, though this Berkeleyan standpoint is the standpoint of psychology—as we find it occupied, say, by J. S. Mill and Dr Bain—psychology is not pledged to the method employed by Berkeley and by Locke. Psychology may be individualistic without being confined exclusively to the introspective method. There is nothing to hinder the psychologist from employing materials furnished by his observations of other men, of infants, of the lower animals, or of the insane; nothing to hinder him taking counsel with the philologist or even the physiologist, provided always he can show the psychological bearings of those facts which are not directly psychological. Nor, again, are we bound, because we take the individualistic standpoint as psychologists, to accept the philosophical conclusions that have been reached from it, unless, indeed, we hold that it is the right point of view for philosophical speculation. A psychologist *may* be an idealist in Berkeley's sense or in Fichte's, but he need not; he is just as free, if he see reason, to call himself, after Hamilton, a natural realist; only psychology will afford him no safe warrant for the realism part of it. The standpoint of psychology, then, is individualistic; by whatever methods, from whatever sources its facts are ascertained, they must—to have a psychological import—be regarded as having place in, or as being part of, *some one's consciousness.* In this sense, *i.e.*, as presented to an individual, "the whole choir of heaven and furniture of earth" may belong to psychology, but otherwise they are psychological nonentities. The problem of psychology, in dealing with this complex subject-matter, is in general—first, to ascertain its constituent elements, and secondly, to ascertain and explain the laws of their combination and interaction.

General Analysis of Mind; its Ultimate Constituents.

As to the first, there is in the main substantial agreement: the elementary facts of mind cannot, it is held, be expressed in less than three propositions,—I feel somehow, I know something, I do something. But here at once there arises an important question, viz., What are we to understand by the subject of these propositions? Nobody nowadays would understand it to imply that every psychical fact must be ascertained or verified by personal introspection; perhaps no modern writer ever did understand this; at any rate to do so is to confound the personal with the psychological. We are no more confined to our own immediate observations here than elsewhere; but the point is that, whether seeking to analyse one's own consciousness or to infer that of a lobster, whether discussing the association of ideas or the expression of emotions, there is always an individual mind or self or subject in question. It is not enough to talk of feelings or volitions: what we mean is that some individual, man or worm, feels, wills, acts—thus or thus. Obvious as this may seem, it has been frequently either forgotten or gainsaid. It has been forgotten among details or through the assumption of a medley of faculties, each treated as an individual in turn, and among which the real individual was lost. Or it has been gainsaid, because to admit that all psychological facts pertain to a psychological subject seemed to carry with it the admission that they pertained to a particular spiritual substance, which was simple, indestructible, and so forth; and it was manifestly desirable to exclude such assumptions from psychology, *i.e.*, from a science which aims only at a scientific exposition of what can be known and verified by observation. But, however much assailed or disowned, the conception of a mind or conscious subject is to be found implicitly or explicitly in all psychological writers whatever,—not more in Berkeley, who accepts it as a fact, than in Hume, who accepts it as a fiction. This being so, we are far more likely to reach the truth eventually if we openly acknowledge this inexpugnable assumption, if such it prove, instead of resorting to all sorts of devious periphrases to hide it. Now wherever the word *Subject*, or its derivatives, occurs in psychology we might substitute the word Ego and analogous derivatives, did such exist. But Subject is almost always the preferable term; its impersonal form is an advantage, and it readily recalls its modern correlative Object. Moreover, Ego has two senses, distinguished by Kant as pure and empirical, the latter of which is, of course, an object, while the former is subject always. By pure Ego or Subject it is proposed to denote the simple fact that everything mental is referred to a Self. This psychological conception of a self or subject, then, is after all by no means identical with the metaphysical conceptions of a soul or mind-atom, or of mind-stuff not atomic; it may be kept as free from metaphysical implications as the conception of the biological individual or organism with which it is so intimately connected.

The attempt, indeed, has frequently been made to resolve the former into the latter, and so to find in mind only such an individuality as has an obvious counterpart in this individuality of the organism, *i.e.*, what we may call an objective individuality. But such procedure owes all its plausibility to the fact that it leaves out of sight the difference between the biological and the psychological standpoints. All that the biologist means by a dog is "the sum of the phenomena which make up its corporeal existence."[1] And, inasmuch as its presentation to any one in particular is a point of no importance, the fact of presentation at all may be very well dropped out of account. Let us now turn to mind: Why should we not take this word or "the word 'soul' simply as a name for the series of mental phenomena which make up an individual mind?"[2] Surely the moment we try distinctly to understand this question we realize that the cases are different. "Series of mental phenomena" for whom? For any passer-by such as might take stock of our biological dog? No, obviously only for that individual mind itself; yet that is supposed to be made up of, to be nothing different from, the series of phenomena. Are we, then, (1) quoting J. S. Mill's words, "to accept the paradox that something which *ex hypothesi* is but a series of feelings, can be aware of itself as a series?"[3] Or (2) shall we say that the several parts of the series are mutually phenomenal, much as A may look at B, who was just now looking at A? Or (3) finally, shall we say that a large part of the so-called series, in fact every term but one, is phenomenal for the rest—for that one?

As to the first alternative, paradox is too mild a word for it; even contradiction will hardly suffice. It is as impossible to express "being aware of" by one term as it is to express an equation or any other relation by one term: what knows can no more be identical with what is known than a weight with what it weighs. If a series of feelings is what is known or presented, then what knows, what it is presented to, cannot be that series of feelings, and this without regard to the point Mill mentions, viz., that the infinitely greater part of the series is either past or future. The question is not in the first instance one of time or substance at all, but simply turns upon the fact that knowledge or consciousness is unmeaning except as it implies something knowing or conscious of something. But it may be replied:—Granted that the formula for consciousness is something doing something, to put it generally; still, if the two somethings are the same when I touch myself or when I see myself, why may not agent and patient be the same when the action is knowing or being aware of; why may I not know myself—in fact, do I not know myself? Certainly not; agent and patient never are the same in the same act; the conceptions of self-caused, self-moved, self-known, *et id genus omne*, either connote the incomprehensible or are abbreviated expressions—such, *e.g.*, as touching oneself when one's right hand touched one's left.

And so we come to the second alternative:—As one hand washes the other, may not different members of the series of feelings be subject and object in turn? Compare, for example, the state of mind of a man succumbing to temptation (as he pictures himself enjoying the coveted good and impatiently repudiates scruples of conscience or dictates of prudence) with his state when, filled with remorse, he sides with conscience and condemns this "former self,"—the "better self" having meanwhile become supreme. Here the cluster of presentations and their associated sentiments and motives, which together play the rôle of self in the one field of consciousness, have —only momentarily it is true, but still have—for a time the place of not-self; and under abnormal circumstances this partial alternation may become complete alienation, as in what is called "double consciousness." Or again, the development of self-consciousness might be loosely described as taking the subject or self of one stage as an object in the next,—self being, *e.g.*, first identified with the body and afterwards distinguished from it. But all this, however true, is beside the mark; and it is really a very serious misnomer, —though the vagueness of our psychological terminology seems to allow it—to do, as *e.g.*, Mr Spencer does—represent the development of self-consciousness as a "differentiation of subject and object." It is, if anything, a differentiation of object and object, *i.e.*, in plainer words, it is a differentiation among presentations—a differentiation every step of which implies just that relation to a subject which it is supposed to supersede.

There still remains an alternative, which, like the first, may be expressed in the words of J. S. Mill, viz., "the alternative of believing that the Mind or Ego is something different from any series of feelings or possibilities of them." To admit this, of course, is to admit the necessity of distinguishing between Mind or Ego, meaning the unity or continuity of consciousness as a complex of presentations, and Mind or Ego as the subject to which this complex is presented. In dealing with the body from the ordinary biological standpoint no such necessity arises. But, whereas there the individual organism is spoken of unequivocally, in psychology, on the other hand, the individual mind may mean either (i.) the series of feelings or "mental phenomena" above referred to; or (ii.) the subject of these feelings for whom they are phenomena; or (iii.) the subject of these feelings or phenomena + the series of feelings or phenomena themselves, the two being in that relation to each other in which alone the one is subject and the other a series of feelings, phenomena, or objects. It is in this last sense that Mind is used in empirical psychology, its exclusive use in the first sense being favoured only by those who shrink from the speculative associations connected with its exclusive use in the second. But psychology is not called upon to transcend the relation of subject to object or, as we may call it, the fact of presentation. On the other hand, as has been said, the attempt to ignore one term of the relation is hopeless; and equally hopeless, even futile, is the attempt, by means of phrases such as consciousness or the unity of consciousness, to dispense with the recognition of a conscious subject.

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[1] Professor Huxley, *Hume* (English Men of Letters series), p. 171.

[2] Professor Huxley, *op. cit.*, p. 172.

[3] *Examination of Sir W. Hamilton's Philosophy*, ch. xii. *fin.*

We might now proceed to inquire more closely into the character and relations of the three states, modes, or acts[1] of this subject, which are commonly held to be the invariable constituents of psychical life and broadly distinguished as cognitions, feelings, and conations. But we should be at once confronted by a doctrine much in vogue at present, which, strictly taken, amounts almost to a denial of this tripartite classification of the facts of mind—the doctrine, viz., that *feeling* alone is primordial, and invariably present wherever there is consciousness at all. Every living creature, it is said, feels, though it may never do any more; only the higher animals, and these only after a time, learn to discriminate and identify and to act with a purpose. This doctrine, as might be expected, derives its plausibility partly from the vagueness of psychological terminology, and partly from the intimate connexion that undoubtedly exists between feeling and cognition on the one hand and feeling and volition on the other. As to the meaning of the term, it is plain that further definition is requisite for a word that may mean (*a*) a touch, as feeling of roughness; (*b*) an organic sensation, as feeling of hunger; (*c*) an emotion, as feeling of anger; (*d*) feeling proper, as pleasure or pain. But, even taking feeling in the last, its strict sense, it has been maintained that all the more complex forms of consciousness are resolvable into, or at least have been developed from, feelings of pleasure and pain. The only proof of such position, since we cannot directly observe the beginnings of conscious life, must consist of considerations such as the following. So far as we can judge, we find feeling everywhere; but, as we work downwards from higher to lower forms of life, the possible variety and the definiteness of sense-impressions both steadily diminish. Moreover, we can directly observe in our own organic sensations, which seem to come nearest to the whole content of infantile and molluscous experience, an almost entire absence of any assignable *quale*. Finally, in our sense-experience generally, we find the element of feeling at a maximum in the lower senses and the intellectual element at a maximum in the higher. But the so-called intellectual senses are the most used, and use we know blunts feeling and favours intellection, as we see in chemists, who sort the most filthy mixtures by smell and taste without discomfort. If, then, feeling predominates more and more as we approach the beginning of consciousness, may we not say that it is the only *sine qua non* of consciousness? Considerations of this kind, however impressive when exhibited at length, are always liable to be overturned by some apparently unimportant fact which may easily be overlooked. Two lines, *e.g.*, may get nearer and nearer and yet will never meet, if the rate of approach is simply proportional to the distance. A triangle may be diminished indefinitely and yet we cannot infer that it becomes eventually all angles, though the angles get no less and the sides do. Now, before we decide that pleasure or pain alone may constitute a complete state of mind, it may be well to inquire: What is the connexion between feelings of pleasure and pain and the two remaining possible constituents of consciousness, as we can observe them now? And this is an inquiry which will help us towards an answer to our main question, namely, that concerning the nature and connexions of what are commonly regarded as the three ultimate facts of mind.

Broadly speaking, in any state of mind that we can directly observe, what we find is (1) that we are aware of a certain change in our sensations, thoughts, or circumstances, (2) that we are pleased or pained with the change, and (3) that we act accordingly. We never find that feeling directly alters—*i.e.*, without the intervention of the action to which it prompts—either our sensations or situation, but that regularly these latter with remarkable promptness and certainty alter it. We have not first a change of feeling, and then a change in our sensations, perceptions, and ideas; but, these changing, change of feeling follows. In short, feeling appears frequently to be an effect, which therefore cannot exist without its cause, though in different circumstances the same cause may produce a different amount or even a different state of feeling. Turning from what we may call the receptive phase of consciousness to the active or appetitive phase, we find in like manner that feeling is certainly not, in such cases as we can clearly observe, the whole of consciousness at any moment. True, in common speech we talk of liking pleasure and disliking pain; but this is either tautology, equivalent to saying, we are pleased when we are pleased and pained when we are pained, or else it is an allowable abbreviation, and means that we like pleasurable *objects* and dislike painful *objects*, as when we say, we like feeling warm and dislike feeling hungry. And feeling warm or feeling hungry, we must remember, is not pure feeling in the strict sense of the word. Such states admit, if not of description, yet at least of identification and distinction as truly as colours and sounds do. Within the limits of our observation, then, we find that feeling accompanies some more or less definite presentation which for the sake of it becomes the object of appetite or aversion; in other words, feeling implies a relation to a pleasurable or painful presentation, that, as cause of feeling and end of the action to which feeling prompts, is doubly distinguished from it. Thus the very facts that lead us to distinguish feeling from cognition and conation make against the hypothesis that consciousness can ever be all feeling.

Feeling and sensatio distinct.

But, as already said, the plausibility of this hypothesis is in good part due to a laxity in the use of terms. Most psychologists before Kant, and English psychologists even to the present day, speak of pleasure and pain as sensations. But it is plain that pleasure and pain are not simple ideas, as Locke called them, in the sense in which touches and tastes are,—that is to say, they are never like these localized or projected, nor elaborated in conjunction with other sensations and movements into percepts or intuitions of the external. This confusion of feeling with sensations is largely consequent on the use of one word pain for certain organic sensations and for the purely subjective state. But, to say nothing of the fact that such pains are always more or less definitely localized,—which of itself is so far cognition,—they are also distinguished as shooting, burning, gnawing, &c. &c., all which symptoms indicate a certain objective quality. Accordingly all the more recent psychologists have been driven by one means or another to recognize two "aspects" (Bain), or "properties" (Wundt), in what they call a sensation, the one a "sensible or intellectual" or "qualitative," the other an "affective" or "emotive," aspect or property. The term "aspect" is figurative and obviously inaccurate; even to describe pleasure and pain as properties of sensation is a matter open to much question. But the point which at present concerns us is simply that when feeling is said to be the primordial element in consciousness more is usually included under feeling than pure pleasure and pain, viz., some characteristic or quality by which one pleasurable or painful sensation is distinguishable from another. No doubt, as we go downwards in the chain of life the qualitative or objective elements in the so-called sensations become less and less definite; and at the same time organisms with well-developed sense-organs give place to others without any clearly differentiated organs at all. But there is no ground for supposing even the amœba itself to be affected in all respects the same whether by changes of temperature or of pressure or by changes in its internal fluids, albeit all of these changes will further or hinder its life and so presumably be in some sort pleasurable or painful. On the whole, then, there are grounds for saying that the endeavour to represent all the various facts of consciousness as evolved out of feeling is due to a hasty striving after simplicity, and has been favoured by the ambiguity of the term feeling itself. If by feeling we mean a certain subjective state varying continuously in intensity and passing from time to time from its positive phase (pleasure) to its negative phase (pain), then this purely pathic state implies an agreeing or disagreeing something which psychologically determines it. If, on the other hand, we let feeling stand for both this state and the cause of it, then, perhaps, a succession of such "feelings" may make up a consciousness; but then we are including two of our elementary facts under the name of one of them. *The simplest form of psychical life, therefore, involves not only a subject feeling but a subject having qualitatively distinguishable presentations which are the occasion of its feeling.*

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[1] It is useless at this point attempting to decide on the comparative appropriateness of these and similar terms, such as "faculties," "capacities," "functions," &c.

We may now try to ascertain what is meant by cognition as an essential element in this life, or, more exactly, what we are to understand by the term *presentation*. It was an important step onwards for psychology when Locke introduced that "new way of ideas" which Stillingfleet found alternately so amusing and so dangerous. By idea Locke tells us he meant true appearances in men's minds, or "whatsoever is the immediate object of perception, thought, or understanding"; and it was so far a retrograde step when Hume restricted the term to certain only of these appearances or objects, or rather to these appearances or objects in a certain state, viz., as reproduced ideas or images. And, indeed, the history of psychology seems to show that its most important advances have been made by those who have kept closely to this way of ideas; the establishment of the laws of association and their many fruitful applications and the whole Herbartian psychology may suffice as instances (see HERBART). The truth is that the use of such a term is itself a mark of an important generalization, one which helps to free us from the mythology and verbiage of the "faculty-psychologists." All that variety of mental facts which we speak of as sensations, perceptions, images, intuitions, concepts, notions, have two characteristics in common:—(1) they admit of being more or less attended to, and (2) can be reproduced and associated together. It is here proposed to use the term presentation to connote such a mental fact, and as the best English equivalent for what Locke meant by idea and what Kant and Herbart called a Vorstellung.

A presentation has then a twofold relation,—first, directly to the subject, and secondly, to other presentations. By the first is meant the fact that the presentation is attended to, that the subject is more or less conscious of it: it is "in his mind" or presented. As presented to a subject a presentation might with advantage be called an object, or perhaps a psychical object, to distinguish it from what are called objects apart from presentation, *i.e.*, conceived as independent of any particular subject. Locke, as we have seen, did so call it; still, to avoid possible confusion, it may turn out best to dispense with the frequent use of object in this sense. But on one account, at least, it is desirable not to lose sight altogether of this which is after all the stricter as well as the older signification of object, namely, because it enables us to express definitely, without implicating any ontological theory, what we have so far seen reason to think is the fundamental fact in psychology. Instead of depending mainly on that vague and treacherous word "consciousness," or committing ourselves to the position that ideas are modifications of a certain mental substance and identical with the subject to which they are presented, we may leave all this on one side, and say that ideas are objects, and the relation of objects to subjects—that whereby the one is object and the other subject—is presentation. And it is because only objects sustain this relation that they may be spoken of simply as presentations.

It will be convenient here to digress for a moment to take account of an objection that is sure to be urged, viz., that sensations at all events ought not to be called objects, that they are "states of the subject" and that this is a deliverance of common sense, if anything is. Now if by this be meant (i.) that sensations are *metaphysically* subjective modifications in an idealistic sense, there is no need at this stage either to assert or deny that. But if the meaning be (ii.) that sensations are *presented* as modes of the subject, such a position is due to a confusion between the subject proper or pure Ego and that complex presentation or object, the empirical, or as we might call it the biotic, Ego. A self-conscious subject may not only have a sensation but may recognize it as its own,—recognize a certain connexion, that is to say, between the sensation and that presentation of the empirical self which self-consciousness implies. But such reference only renders more obvious the objective nature of a sensation, in the psychological sense of the term objective. Or, again, the meaning may be (iii.) that a subject whose presentations were all sensations would know nothing of the difference between subject and object. In this objection there is a lurking confusion between the standpoint of a given experience and the standpoint of its exposition. The true way, surely, to represent the bare fact of sensation is not to attempt to reproduce an experience as yet confined to sensations, but to describe such experience as a scientific psychologist would do if we could imagine him a spectator of it. The infant who is delighted by a bright colour does not of course conceive himself as face to face with an object; but neither does he conceive the colour as a subjective affection. We are bound to describe his state of mind truthfully, but that is no reason for abandoning terms which have no counterpart in his consciousness, when these terms are only used to depict that consciousness to us. As to the objection (iv.) that, when all is said and done, sensations are *conceived* by common sense as modifications of self, whether so presented or not, it may be granted that it appears so at first blush, but not when common sense is more closely examined. The fact is we are here upon what has been called "the margin of psychology," where our ordinary thinking brings into one view what science has to be at great pains to keep distinct. Though it is scientifically a long way round from a fact of mind to the corresponding fact of body, yet it is only on careful reflexion that we can distinguish the two in those cases in which our practical interests have closely associated them. Such a case is that of sensation. The ordinary conception of a sensation coincides, no doubt, with the definition given by Hamilton and Mansel:—"Sensation proper is the consciousness of certain affections of our body as an animated organism"; and it is because in ordinary thinking we reckon the body as part of self that we come to think of sensations as subjective modifications. But, when considerations of method compel us to eliminate physiological implications from the ordinary conception of a sensation, we are able here to distinguish the conscious subject and the "affections" of which it is conscious as clearly as we can distinguish subject and object in other cases of presentation. On the whole, then, we may conclude that there is nothing either in the facts or in our necessary conceptions of them to prevent us from representing whatever admits of psychical reproduction and association, no matter how simple it be, as an object presented to a subject.

As to the subjective relation of objects, the relation of presentation itself, we have merely to note that on the side of the subject it implies what, for want of a better word, may be called *attention*, extending the denotation of this term so as to include even what we ordinarily call inattention. Attention so used will thus cover part of what is meant by consciousness,—so much of it, that is, as answers to being mentally active, active enough at least to "*receive* impressions." Attention on the side of the subject implies intensity on the side of the object: we might indeed almost call intensity the matter of a presentation, without which it is a nonentity.[1] As to the connexion between these two, subjective attention and objective intensity—in that higher form of attention called voluntary we are aware (1) that concentration of attention increases or its abstraction diminishes the intensity of a presentation in circumstances where physically and physiologically there is nothing to prevent the intensity of the presentation from continuing uniform. Again, (2) in circumstances when psychologically we are aware of no previous change in the distribution of attention, we find the intensity of a presentation increased or diminished if certain physical concomitants of the presentation (*e.g.*, stimulus, nervous process, &c.) are increased or diminished. Thus, though this is a point we could hardly establish without the aid of psychophysics, we may conclude that the intensity of a presentation may be altered from two sides; that it depends, in other words, partly upon what we may perhaps call its physical intensity and partly on the amount of attention it receives.

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[1] Compare Kant's Principle of the Anticipations of Perception:—"In all phenomena the real which is the object of sensation has intensive magnitude."

Some further exposition of the connexion between subjective attention and objective intensity is perhaps desirable here, where we are seeking to get a general view of the essential facts of mind and their relations, rather than later on, when we shall be more concerned with details. We are aware in ordinary life that the intensity of any given sensation depends upon certain physical quantities, varying directly in some proportion as these vary. Hence, since our habitual standpoint is the physical not the psychological, we conceive sensory objects as having an intensity *per se* apart from the attention that their presentation secures. From the physical standpoint indeed it is manifest that no other conception is compatible with a scientific treatment of phenomena. Subjective sources of variation are supposed to be eliminated: the general mind to which, according to the physicist's conception of a phenomenon, that phenomenon is implicitly supposed to be presented is a mind in which there is no feeling to produce variations of attention, or to favour æsthetic combinations of objects. Attention is thus assumed to be constant, and all variations in intensity to be objectively determined. But psychologically we cannot assume this. In any given presentation there is, it must be admitted, no immediate evidence that the intensity of the object is a function of two variables,—(1) what we have called its physical or absolute intensity and (2) the intensity of attention. Still there are facts which justify this conclusion. That the intensity of the presentation varies with the absolute intensity of the object, attention remaining constant, is a proposition not likely to be challenged. What has to be shown is that the intensity of presentations varies with the attention, all else remaining constant. Assuming that voluntary and non-voluntary attention are fundamentally the same, this amounts to showing (1) that concentration of attention upon some objects diminishes the intensity of presentation of others in the same field, whether the concentration be voluntary or non-voluntary, *i.e.*, due to a shock; and (2) that, even though only within narrow limits, increasing attention voluntarily has the same effect on the presentation as increasing the objective intensity from the physical side. The narrowness of these limits—practically an all-important fact—is theoretically no objection. It would not be difficult psychologically to account for our inability to concentrate attention indefinitely: that we can concentrate it at all is enough to show that there is a subjective as well as an objective factor in the intensity of a presentation. Any fuller consideration of the connexion between attention and presentations may be deferred.

The inter-objective relations of presentations, on which their second characteristic, that of revivability and associability depends, though of the first importance in themselves, hardly call for examination in a general analysis like the present. But there is one point still more fundamental that we cannot wholly pass by: it is—in part at any rate—what is commonly termed the unity or continuity of consciousness. From the physical standpoint and in ordinary life we can talk of objects that are isolated and independent and in all respects distinct individuals. The screech of the owl, for example, has physically nothing to do with the brightness of the moon: either may come or go without changing the order of things to which the other belongs. But psychologically, for the individual percipient, they are parts of one whole: special attention to one diminishes the intensity of presentation of the other and the recurrence of the one will afterwards entail the re-presentation of the other also. Not only are they still parts of one whole, but such distinctness as they have at present is the result of a gradual differentiation. It is quite impossible for us now to imagine the effects of years of experience removed, or to picture the character of our infantile presentations before our interests had led us habitually to concentrate attention on some, and to ignore others, whose intensity thus diminished as that of the former increased. In place of the many things which we can now see and hear, not merely would there then be a confused presentation of the whole field of vision and of a mass of undistinguished sounds, but even the difference between sights and sounds themselves would be without its present distinctness. Thus the further we go back the nearer we approach to a total presentation having the character of one general *continuum* in which differences are latent. There is, then, in psychology, as in biology, what may be called a principle of "progressive differentiation or specialization"; and this, as well as the facts of reproduction and association, forcibly suggests the conception of a certain objective continuum forming the background or basis to the several relatively distinct presentations that are elaborated out of it—the equivalent, in fact, of that unity and continuity of consciousness which has been supposed to supersede the need for a conscious subject.

There is one class of objects of special interest even in a general survey, viz., movements or motor presentations. These, like sensory presentations, admit of association and reproduction, and seem to attain to such distinctness as they possess in adult human experience by a gradual differentiation out of an original diffused mobility which is little besides emotional expression. Of this, however, more presently. It is primarily to such dependence upon feeling that movements owe their distinctive character, the possession, that is, under normal circumstances, of definite and assignable psychical antecedents, in contrast to sensory presentations, which enter the field of consciousness *ex abrupto*. We cannot psychologically explain the order in which particular sights and sounds occur; but the movements that follow them, on the other hand, can be adequately explained only by psychology. The twilight that sends the hens to roost sets the fox to prowl, and the lion's roar which gathers the jackals scatters the sheep. Such diversity in the movements, although the sensory presentations are similar, is due, in fact, to what we might call the principle of "subjective or hedonic selection"—that, out of all the manifold changes of sensory presentation which a given individual experiences, only a few are the occasion of such decided feeling as to become objects of possible appetite (or aversion). The representation of what interests us comes to be associated with the representation of such movements as will secure its realization, so that—although no concentration of attention will secure the requisite intensity to a pleasurable object present only in idea—we can by what is strangely like a concentration of attention convert the idea of a movement into the fact, and by means of the movement attain the coveted reality.

And this has brought us round naturally to what is perhaps the easiest way of approaching the question: What is a *conation* or *action*? In ordinary voluntary movement we have first of all an idea or re-presentation of the movement, and last of all the actual movement itself,—a new presentation which may for the present be described as the filling out of the re-presentation,[1] which thereby attains that intensity, distinctness, and embodiment we call reality. How does this change come about? The attempt has often been made to explain it by a reference to the more uniform, and apparently simpler, case of reflex action, including under this term what are called sensori-motor and ideo-motor actions. In all these the movement seems to be the result of a mere transference of intensity from the associated sensation or idea that sets on the movement. But, when by some chance or mischance the same sensory presentation excites two alternative and conflicting motor ideas, a temporary block, it is said, occurs; and, when at length one of these nascent motor changes finally prevails and becomes real, then we have the state of mind called volition.[1] But this assumption that sensory and motor ideas are associated before volition, and that the volition begins where automatic or reflex action ends, is due to that inveterate habit of confounding the psychical and the physical which is the bane of modern psychology. How did these particular sensory and motor presentations ever come to be associated? It is wholly beside the mark to answer that they are "*organically determined* psychical changes." In one respect all psychical changes alike are organically determined, inasmuch as all alike—so far, at least, as we at all know or surmise—have organic concomitants. In another respect no psychical changes are organically determined, inasmuch as physical events and psychical events have no common factors. Now the only psychological evidence we have of any very intimate connexion between sensory and motor representations is that furnished by our acquired dexterities, *i.e.*, by such movements as Hartley styled secondary automatic. But then all these have been preceded by volition: as Mr Spencer says, "the child learning to walk wills each movement before walking it." Surely, then, a psychologist should take this as his typical case and prefer to assume that all automatic actions that come within his ken at all are in this sense secondarily automatic, *i.e.*, to say that either in the experience of the individual or of his ancestors volition, or something analogous to it, preceded habit.

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[1] On the connexion of presentations and re-presentations, see p. 58 below.

But, if we are thus compelled by a sound method to regard sensori-motor actions as degraded or mechanical forms of voluntary actions, instead of regarding voluntary actions as gradually differentiated out of something physical, we have not to ask: What happens when one of two alternative movements is executed? but the more general question: What happens when any movement is made in consequence of feeling? It is obvious that on this view the simplest *definitely purposive* movement must have been preceded by some movement simpler still. For any distinct movement purposely made presupposes the ideal presentation, before the actual realization, of the movement. But such ideal presentation, being a re-presentation, equally presupposes a previous actual movement of which it is the so-called mental residuum. There is then, it would seem, but one way left, viz., to regard those movements which are immediately expressive of pleasure or pain as primordial, and to regard the so-called voluntary movements as elaborated out of these. The vague and diffusive character of these primitive emotional manifestations is really a point in favour of this position. For such "diffusion" is evidence of an underlying continuity of motor presentations parallel to that already discussed in connexion with sensory presentations, a continuity which, in each case, becomes differentiated in the course of experience into comparatively distinct and discrete movements and sensations respectively.[2]

But, whereas we can only infer, and that in a very roundabout fashion, that our sensations are not absolutely distinct but are parts of one massive sensation, as it were, we are still liable under the influence of strong emotion directly to experience the corresponding continuity in the case of movement. Such motor-continuum we may suppose is the psychical counterpart of that permanent readiness to act, or rather that continual nascent acting, which among the older physiologists was spoken of as "tonic action"; and as this is now known to be intimately dependent on afferent excitations so is our motor consciousness on our sensory. Still, since we cannot imagine the beginning of life but only life begun, the simplest picture we can form of a concrete state of mind is not one in which there are movements before there are any sensations or sensations before there are any movements, but one in which change of sensation is followed by change of movement, the link between the two being a change of feeling.

Dependence of action on feeling

Having thus simplified the question, we may now ask again: How is this change of movement through feeling brought about? The answer, as already hinted, appears to be: By a change of attention. We learn from such observations as psychologists describe under the head of fascination, imitation, hypnotism, &c., that the mere concentration of attention upon a movement is often enough to bring the movement to pass. But, of course, in such cases there is neither emotional experience nor volition in question; such facts are only cited to show the connexion between attention and movements. Everybody too has often observed how the execution of any but mechanical movements arrests attention to thoughts or sensations, and *vice versa*. Let us suppose, then, that we have at any given moment a certain distribution of attention between sensory and motor presentations; a change in that distribution means a change in the intensity of some or all of these, and change of intensity in motor presentations means change of movement. Such changes are, however, quite minimal in amount so long as the given presentations are not conspicuously agreeable or disagreeable. As soon as they are, we find pleasure to lead at once to concentration of attention on the pleasurable object; so that pleasure is not at all so certainly followed by movement as we find pain to be, save of course when movements are themselves the pleasurable objects and are executed, as we say, for their own sakes. In fact, pleasure would seem rather to repress movement, except so far as it is coincident either with a more economic distribution, or with a positive augmentation, of the available attention; and either of these, on the view supposed, would lead to increased but indefinite (*i.e.*, playful) movement. Pain, on the other hand, is much more closely connected with movement, and movement too which for obvious reasons much sooner acquires a purposive character. Instead of voluntary concentration of attention upon a painful presentation we find attention to such an object always involuntary; in other words, attention is, as it were, excentrated, dispersed, or withdrawn. If, therefore, the painful presentation is a movement, it is suspended; if it is a sensation, movements are set up which further distract attention, and some of which may effect the removal of the physical source of the sensation.

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[1] Compare Spencer's *Principles of Psychology*, i. 496

[2] It may be well to call to mind here that Dr Bain also has regarded emotional expression as a possible commencement of action, but only to reject it in favour of his own peculiar doctrine of "spontaneity," which, however, is open to the objection that it makes movement precede feeling instead of following it—an objection that would be serious even if the arguments advanced to support his hypothesis were as cogent as only Dr Bain takes them to be. Against the position maintained above he objects that "the emotional wave almost invariably affects a whole group of movements," and therefore does not furnish the "*isolated* promptings that are desiderated in the case of the will" (*Mental and Moral Science*, p. 323). But to make this objection is to let heredity count for nothing. In fact, wherever a variety of isolated movements is physically possible, there also we always find corresponding instincts, "that untaught ability to perform actions," to use Dr Bain's own language, which a minimum of practice suffices to perfect.

We are now at the end of our analysis, and the results may perhaps be most conveniently summarized by first throwing them into a tabular form and then appending a few remarks by way of indicating the main purport of the table. Taking no account of the specific difference between one concrete state of mind and another, and supposing that we are dealing with presentations in their simplest form, *i.e.*, as sensations and movements, we have:—

$$\text{SUBJECT}\left\{\begin{array}{l} \left.\begin{array}{l}\text{(1) non-voluntarily attending to changes}\\ \text{in the sensory-continuum}^{1}\text{;}\\ \qquad[\textit{Cognition}]\end{array}\right\} = \text{Presentation of } \textit{sensory} \\ \\ \begin{array}{l}\text{(2) being, in consequence, either pleased}\\ \text{or pained;}\\ \qquad[\textit{Feeling}]\end{array} \\ \\ \left.\begin{array}{l}\text{and (3) by voluntary attention or ``innervation''}\\ \text{producing changes in the motor-continuum.}^{1}\\ \qquad[\textit{Conation}]\end{array}\right\} = \text{Presentation of } \textit{motor}\end{array}\right\}\text{OBJECTS.}$$

Of the three phases, thus logically distinguishable, the first and the third correspond in the main with the receptive and active states or powers of the older psychologists. The second phase, being more difficult to isolate, was long overlooked; or, at all events, its essential characteristics were not distinctly marked: it was either confounded with (1), which is its cause, or with (3), its effect. But perhaps the most important of all psychological distinctions is that which traverses both the old bipartite and the prevailing tripartite classification, viz., that between the subject, on the one hand, as acting and feeling, and the objects of this activity on the other. Such distinction lurks indeed under such terms as faculty, power, consciousness, but they tend to keep it out of sight. With this distinction clearly before us—instead of crediting the subject with an indefinite number of faculties or capacities, we must seek to explain not only reproduction, association, agreement, difference, &c., but all varieties of thinking and acting by the laws pertaining to ideas or presentations, leaving to the subject only the one power of variously distributing that attention upon which the intensity of a presentation in part depends. Of this single subjective activity what we call activity in the narrower sense (as, *e.g.*, purposive movement and intellection) is but a special case, although a very important one.

According to this view, then, *presentations*, *attention*, *feeling*, are not to be regarded as three co-ordinate genera, each a distinguishable "state of mind or consciousness," *i.e.*, as being all alike included under this one supreme category. There is, as Berkeley long ago urged, no resemblance between activity and an idea; nor is it easy to see anything common to pure feeling and an idea, unless it be that both possess intensity. Classification seems, in fact, to be here out of place. Instead, therefore, of the one *summum genus*, state of mind or consciousness, with its three co-ordinate subdivisions—cognition, emotion, conation—our analysis seems to lead us to recognize three distinct and irreducible facts—attention, feeling, and objects or presentations—as together, in a certain connexion, constituting one concrete state of mind or *psychosis*. Of such concrete states of mind we may then say there are two forms, more or less distinct, corresponding to the two ways in which attention may be determined and the two classes of objects attended to in each, viz., (1) the *sensory* or *receptive state*, when attention is non-voluntarily determined, *i.e.*, where feeling follows the act of attention; and (2) the *motor* or *active state*, where feeling precedes the act of attention, which is thus determined voluntarily.

To say that feeling and attention are not presentations will seem to many an extravagant paradox. If all knowledge consists of presentations, it will be said, how come we to know anything of feeling and attention if they are not presented? We know of them indirectly through their effects, not directly in themselves. This is, perhaps, but a more concrete statement of what philosophers have very widely acknowledged in a more abstract form since the days of Kant[2]—the impossibility of the subjective *qua* subjective being presented. It is in the main clearly put in the following passage from Hamilton, who, however, has not had the strength of his convictions in all cases:—"The peculiarity of feeling, therefore, is that there is nothing but what is subjectively subjective; there is no object different from self,—no objectification of any mode of self. We are, indeed, able to constitute our states of pain and pleasure into objects of reflexion, but, in so far as they are objects of reflexion, they are not feelings but only reflex cognitions of feelings."[3] But this last sentence is not, perhaps, altogether satisfactory. The meaning seems to be that feeling "can only be studied through its reminiscence," which is what Hamilton has said elsewhere of the "phænomena of consciousness" generally. But this is a position hard to reconcile with the other, viz., that feeling and cognition are generically distinct. How can that which was not originally a cognition become such by being reproduced? The statements that feeling is "subjectively subjective," that in it "there is no object different from self," are surely tantamount to saying that it is not presented; and what is not presented cannot, of course, be re-presented. Instead, therefore, of the position that feeling and attention are known by being made objects of reflexion, it would seem we can only maintain that we know *of* them by their effects, by the changes, *i.e.*, which they produce in the character and succession of our presentations.[4] We ought also to bear in mind that the effects of attention and feeling cannot be known without attention and feeling: to whatever stage we advance, therefore, we have always in any given "state of mind" attention and feeling on the one side, and on the other a presentation of objects. Attention and feeling seem thus to be ever present, and not to admit of the continuous differentiation into parts which gives to presentations a certain individuality, and makes their association and reproduction possible.

Theory of Presentations.

Having now ascertained what seem to be the essential elements in any state of mind, we may next proceed to examine these several elements separately in more detail. It will be best to begin with that which is both the clearest in itself and helps us the most to understand the rest, viz., the objects of attention or consciousness, *i.e.*, presentations. And this exposition will be simplified if we start with a supposition that will enable us to leave aside, at least for the present, the difficult question of heredity.

Assum tion of psycho- logical indi- vidual.

We know that in the course of each individual's life there is more or less of progressive differentiation or development; we know too that the same holds broadly of a race; and it is believed to hold in like manner of the evolution of the animal kingdom generally. It is believed that there has existed a series of sentient individuals beginning with the lowest form of life and advancing continuously up to man. Some traces of the advance already made may be reproduced in the growth of each human being now, but for the most part such traces have been obliterated. What was experience in the past has become instinct in the present. The descendant has no consciousness of his ancestors' failures when performing by "an

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[1] To cover more complex cases, we might here add the words "or trains of ideas."

[2] Compare "Gefühle der Lust und Unlust und der Wille . . . die gar nicht Erkenntnisse sind" (*Kritik der reinen vernunft*, Hartenstein's ed., p. 76).

[3] *Lectures on Metaphysics*, ii. p. 432.

[4] But, while we cannot say that we know what attention and feeling are, inasmuch as they are not presented, neither can we with any propriety maintain that we are ignorant of them, inasmuch as they are by their very nature unpresentable. As Ferrier contends, "we can be ignorant only of what can possibly be known; in other words, there can be ignorance only of that of which there can be knowledge" (*Institutes of Metaphysics*, § II., Agnoiology, prop. iii. *sq.*). The antithesis between the objective and the subjective factors in presentation is wider than that between knowledge and ignorance, which is an antithesis pertaining to the objective side alone.

untaught ability" what they slowly and painfully found out. But if we are to attempt to follow the genesis of mind from its earliest dawn it is the primary experience rather than the eventual instinct that we have first of all to keep in view. To this end, then, it is proposed to assume that we are dealing with one individual which has continuously advanced from the beginning of psychical life, and not with a series of individuals of which all save the first have inherited certain capacities from its progenitors. The life-history of such an imaginary individual, that is to say, would correspond with all that was new, all that could be called evolution or development, in a certain typical series of individuals each of whom advanced a certain stage in mental differentiation. On the other hand, from this history would be omitted that inherited reproduction of ancestral experience, or tendency to its reproduction, by which alone, under the actual conditions of existence, progress is possible.

If an assumption of this kind had been explicitly avowed by the psychologists who have discussed the growth of experience in accordance with the evolution hypothesis, not a few of the difficulties in the way of that hypothesis might have been removed. That individual minds make some advance in the complexity and distinctness of their presentations between birth and maturity is an obvious fact; heredity, though a less obvious fact, is also beyond question. Using Locke's analogy of a writing-tablet—or let us say an etching-tablet—by way of illustration, we may be sure that every individual started with some features of the picture completely preformed, however latent, others more or less clearly outlined, and others again barely indicated, while of others there is as yet absolutely no trace. But the process of reproducing the old might differ as widely from that of producing the new as electrotyping does from engraving. However, as psychologists we know nothing directly about it; neither can we distinguish precisely at any link in the chain of life what is old and inherited—original in the sense of Locke and Leibnitz—from what is new or acquired—original in the modern sense. But we are bound as a matter of method to suppose all complexity and differentiation among presentations to have been originated, *i.e.*, experimentally acquired, at some time or other. So long, then, as we are concerned primarily with the progress of this differentiation we may disregard the fact that it has not actually been, as it were, the product of one hand dealing with one *tabula rasa* but of many hands, each of which, starting with a reproduction of what had been wrought on the preceding tabulæ, put in more or fewer new touches before devising the whole to a successor who would proceed in like manner.

What is implied in this process of differentiation or mental growth and what is it that grows or becomes differentiated?—these are the questions to which we must now attend. Psychologists have usually represented mental advance as consisting fundamentally in the combination and recombination of various elementary units, the so-called sensations and primitive movements, or, in other words, in a species of "mental chemistry." If we are to resort to physical analogies at all—a matter of very doubtful propriety—we shall find in the growth of a seed or an embryo far better illustrations of the unfolding of the contents of consciousness than in the building up of molecules: the process seems much more a segmentation of what is originally continuous than an aggregation of elements at first independent and distinct. Comparing higher minds or stages of mental development with lower—by what means such comparison is possible we need not now consider—we find in the higher conspicuous differences between presentations which in the lower are indistinguishable or absent altogether. The worm is aware only of the difference between light and dark. The steel-worker sees half a dozen tints where others see only a uniform glow. To the child, it is said, all faces are alike; and throughout life we are apt to note the general, the points of resemblance, before the special, the points of difference.[1] But, even when most definite, what we call a presentation is still part of a larger whole. It is not separated from other presentations, whether simultaneous or successive, by something which is not of the nature of presentation, as one island is separated from another by the intervening sea, or one note in a melody from the next by an interval of silence. In our search for a theory of presentations, then, it is from this "unity of consciousness" that we must take our start. Working backwards from this as we find it now, we are led alike by particular facts and general considerations to the conception of a *totum objectivum* or objective continuum which is gradually differentiated, thereby becoming what we call distinct presentations, just as with mental growth some particular presentation, clear as a whole, as Leibnitz would say, becomes a complex of distinguishable parts. Of the very beginning of this continuum we can say nothing: absolute beginnings are beyond the pale of science. Actual presentation consists in this continuum being differentiated; and every differentiation constitutes a new presentation. Hence the commonplace of psychologists:—We are only conscious as we are conscious of change.

Gradual differentiation of presentation-continuum.

But "change of consciousness" is too loose an expression to take the place of the unwieldy phrase differentiation of a presentation-continuum, to which we have been driven. For not only does the term "consciousness" confuse what exactness requires us to keep distinct, an activity and its object, but also the term "change" fails to express the characteristics which distinguish presentations from other changes. Differentiation implies that the simple becomes complex or the complex more complex; it implies also that this increased complexity is due to the persistence of former changes; we may even say such persistence is essential to the very idea of development or growth. In trying, then, to conceive our psychological individual in the earliest stages of development we must not picture it as experiencing a succession of absolutely new sensations, which, coming out of nothingness, admit of being strung upon the "thread of consciousness" like beads picked up at random, or cemented into a mass like the bits of stick and sand with which the young caddis covers its nakedness. The notion, which Kant has done much to encourage, that psychical life begins with a confused manifold of sensations not only without logical but without psychological unity is one that becomes more inconceivable the more closely we consider it. An absolutely new presentation, having no sort of connexion with former presentations till the subject has synthesized it with them, is a conception for which it would be hard to find a warrant either by direct observation, by inference from biology, or in considerations of an *a priori* kind. At any given moment we have a certain whole of presentations, a "field of consciousness" psychologically one and continuous; at the next we have not an entirely new field but a partial change within this field. Many who would allow this in the case of representations, *i.e.*, where idea succeeds idea by the workings of association, would demur to it in the case of primary presentations or sensations. "For," they would say, "may not silence be broken by a clap of thunder, and have not the blind been made to see?" To urge such objections is to miss the drift of our discussion, and to answer them may serve to make it clearer. Where silence can be broken there are representations of preceding sounds and in all probability even subjective presentations of sound as well; silence as experienced by one who has heard is very different from the silence of Condillac's statue before it had ever heard. The question is rather whether such a conception as that of Condillac's is possible; supposing a sound to be, qualitatively, entirely distinct from a smell, could a field of consciousness consisting of smells be followed at once by one in which sounds had part? And, as regards the blind coming to see, we must remember not only that the blind have eyes but that they are descended from ancestors who could see. What nascent presentations of sight are thus involved it would be hard to say; and the problem of heredity is one that we have for the present left aside.

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[1] This last statement is apt to mislead by implying an active comparison of several objects; but that absence or confusion of differences which hides the many is really very different from the detection of resemblances which makes the many one.

The view here taken is (1) that at its first appearance in psychical life a new sensation or so-called elementary presentation is really a partial modification of some pre-existing presentation, which thereby becomes as a whole more complex than it was before; and (2) that this complexity and differentiation of parts never become a plurality of discontinuous presentations, having a distinctness and individuality such as the atoms or elementary particles of the physical world are supposed to have. Beginners in psychology, and some who are not beginners, are apt to be led astray by expositions which begin with the sensations of the special senses, as if these furnished us with the type of an elementary presentation. The fact is we never experience a mere sensation of colour, sound, touch, and the like; and what the young student mistakes for such is really a perception, a sensory presentation combined with various sensory and motor presentations and with representations—and having thus a definiteness and completeness only possible to complex presentations. Moreover, if we could attend to a pure sensation of sound or colour by itself, there is much to justify the suspicion that even this is complex and not simple, and owes to such complexity its clearly marked specific quality. In certain of our vaguest and most diffused organic sensations, in which we can distinguish little besides variations in intensity and massiveness, there is probably a much nearer approach to the character of the really primitive presentations.

Diffusion and restriction. The importance of getting a firm grasp of this conception of a presentation-continuum as fundamental to the whole doctrine of presentations will justify us in ignoring a little longer the details of actual mental development and regarding it first from this more general point of view. In a given sensation, more particularly in our organic sensations, we can distinguish three variations, viz., variations of quality, of intensity, and of what Dr Bain has called massiveness, or, as we will say, extensity. This last characteristic, which everybody knows who knows the difference between the ache of a big bruise and the ache of a little one, between total and partial immersion in a bath, is, as we shall see later on, an essential element in our perception of space. But it is certainly not the whole of it, for in this experience of massive sensation alone it is impossible to find other elements which an analysis of spatial intuition unmistakably yields. Extensity and extension, then, are not to be confounded. Now we find, even at our level of mental evolution, that an increase in the intensity of a sensation is apt to entail an increase in its extensity too; this is still more apparent in the case of movements, and especially in the movements of the young. In like manner we observe a greater extent of movement in emotional expression when the intensity of the emotion increases. Even the higher region of imagination is no exception, as is shown by the whirl and confusion of ideas incident to delirium, and, indeed, to all strong excitement. But this "diffusion" or "radiation," as it has been called, diminishes as we pass from the class of organic sensations to the sensations of the five senses, from movements expressive of feeling to movements definitely purposive, and from the tumult of ideas excited by passion to the steadier sequences determined by efforts to think. Increased differentiation seems, then, to be intimately connected with increased "restriction." The causal relations of the two must be largely matter of conjecture and cannot be fully discussed here. Probably there may be found certain initial differentiations which for psychology are ultimate facts that it cannot explain. But, such differentiations being given, then it may be safely said that, in accordance with what we have called the principle of subjective selection (see p. 42), attention would be voluntarily concentrated upon some of them and voluntary movements specially connected with these. To such subjectively initiated modifications of the presentation-continuum, moreover, we may reasonably suppose "restriction" to be in large measure due. But increased restriction would render further differentiation of the given presentation possible and so the two processes might supplement each other. But, be their interaction what it may, these processes have now proceeded so far that at the level of human consciousness we find it hard to form any tolerably clear conception of a field of consciousness in which an intense sensation, no matter what, might diffuse over the whole. Colours, *e.g.*, are with us so distinct from sounds that—except as regards the drain upon attention—there is nothing in the intensest colour to affect the simultaneous presentation of a sound. But at the beginning whatever we regard as the earliest differentiation of sound might have been incopresentable with the earliest differentiation of colour, if sufficiently diffused, just as now a field of sight all blue is incopresentable with one all red. Or, if the stimuli appropriate to both were active together, the resulting sensation might have been what we should describe as a blending of the two, as purple is a blending of red and violet. Now, on the other hand, colours and sounds are necessarily so far localized that we are directly aware that the eye is concerned with the one and the ear with the other. This brings to our notice a fact so ridiculously obvious that it has never been deemed worthy of mention, and yet it has undeniably important bearings—the fact, viz., that certain sensations or movements are an absolute bar to the simultaneous presentation of other sensations or movements. We cannot see an orange as at once yellow and green, though we can feel it at once as both smooth and cold; we cannot open and close the same hand at the same moment, but we can open one hand while closing the other. Such incopresentability or contrariety is thus more than mere difference, and occurs only between presentations belonging to the same sense or to the same group of movements. Strictly speaking, it does not always occur even then; for red and yellow, hot and cold are presentable together provided they have certain other differences which we shall meet again presently as differences of local sign.

In the preceding paragraphs we have had occasion to distinguish between the presentation-continuum or whole field of consciousness, as we may for the present call it, and those several modifications within this field which are ordinarily spoken of as presentations, and to which—now that their true character as parts is clear—we too may confine the term. But it will be well in the next place, before inquiring more closely into their characteristics, to consider for a moment that persistence of preceding modifications which the differentiation of the presentation-continuum implies. This persistence is best spoken of as retentiveness; it is sometimes confounded with memory, though this is something much more complex and special. Retentiveness is both a biological and a psychological fact; memory is exclusively the latter. In memory there is necessarily some contrast of past and present, in retentiveness nothing but the persistence of the old. If psychologists have erred in regarding the presentations in consciousness together as a plurality of units, they have erred in like manner concerning the persisting residua of such presentations. As we see a certain colour or a certain object again and again, we do not go on accumulating images or representations of it, which are somewhere crowded together like shades on the banks of the Styx; nor is such colour, or whatever it be, the same at the hundredth time of presentation as at the first, as the hundredth impression of a seal on wax would be. There is no such constancy or uniformity in mind. Obvious as this must appear when we pause to think of it, yet the explanations of perception most in vogue seem wholly to ignore it. Such explanations are far too mechanical and, so to say, atomistic; but we must fall back upon the unity and continuity of our presentation-continuum if we are to get a better. Suppose that in the course of a few minutes we take half a dozen glances at a strange and curious flower. We have not as many complex presentations which we might symbolize as F_1, F_2, F_3. But rather, at first only the general outline is noted, next the disposition of petals, stamens, &c., then the attachment of the anthers, form of the ovary, and so on; that is to say, symbolizing the whole flower as $[p'\,(a\ b)\ s'\,(c\ d)\ o'\,(f\ g)]$, we first apprehend say $[p'\,..\,s'\,..\,o']$, then $[p'\,(a\ b)\,s'\,..\,o'.]$, or $[p'\,(a\,..)\,s'\,(c\,..)\,o'\,(f\,..)]$, and so forth. It is because the earlier apprehensions persist that the later are an advance upon them and an addition to them. There is nothing in this process properly answering to the reproduction and association of ideas: in the last and complete apprehension as much as in the first vague and inchoate one the flower is there as a primary presentation. There is a limit, of course, to such a procedure, but the instance taken, we may safely say, is not such as to exceed the bounds of a simultaneous field of consciousness. Now the question is: Ought we not to assume that such increase of differentiation through the persistence of preceding differentiations holds of the contents of consciousness as a whole? Here, again, we shall find limitations,—limitations too of great practical importance; for, if presentations did not pale as well as persist, and if the simpler presentations admitted of indefinite differentiation, mental advance—unless the field of consciousness, *i.e.*, the number of presentations to which we could attend together, increased without limit—would be impossible. But, allowing all this, it is still probably the more correct and fundamental view to suppose that, in those circumstances in which we now have a sensation of, say, red or sweet, there was in the primitive consciousness nothing but a vague modification, which persisted; and that on a repetition of the circumstances this persisting modification was again further modified. The whole field of consciousness would thus, like a continually growing picture, increase indefinitely in complexity of pattern, the earlier presentations not disappearing, like the waves of yesterday in the calm of to-day, but rather lasting on, like old scars that show beneath new ones.

There is yet one more topic of a general kind calling for attention before we turn to the consideration of particular presentations—the hypothesis of unconscious mental modifications, as it has been unfortunately termed,—the hypothesis of subconsciousness, as we may style it to avoid this contradiction in terms. It is a fact easily verified, that we do not distinguish or attend separately to presentations of less than a certain assignable intensity. On attaining this intensity presentations are said to pass over the threshold of consciousness, to use Herbart's now classic phrase. What are we to say of them before they have attained it? After they have attained it, any further increase in their intensity is certainly gradual; are we then to suppose that before this their intensity changed instantly from zero to a finite quantity, and not rather that there was also a subliminal stage where too it only changed continuously? The latter alternative constitutes the hypothesis of subconsciousness. According to this hypothesis, a presentation does not cease to be so long as it has any intensity, no matter how little. We can directly observe that an increase in the intensity of many complex presentations brings to light details and differences before imperceptible; since these details are themselves presentations, they have been brought by this increase from the subconscious stage into the field of consciousness. Similarly, presentations not separately distinguishable, because of too close a proximity in time, become distinguishable when the interval between them is such as to allow of a separate concentration of attention upon each. Again, we find that presentations "revived" or re-presented after their disappearance from the field of consciousness appear fainter and less distinct the longer the time that has elapsed between their exits and their re-entrances. Nobody hesitates to regard such obliviscence as a psychological fact; why, then, should we hesitate to suppose that presentations, even when no longer intense enough directly to influence attention, continue to be presented, though with ever lessening intensity?

On the whole we seem justified in assuming three grades of consciousness thus widely understood—(1) a centre or focus of consciousness within (2) a wider field, any part of which may at once become the focus. Just as in sight, surrounding the limited area of distinct vision on which the visual axes are directed, there is a wider region of indirect vision to any part of which those axes may be turned either voluntarily or by a reflex set up by the part itself, as happens, *e.g.*, with moving objects quite on the margin of vision. But in describing (3) subconsciousness as the third grade, this simile, due to Wundt, more or less forsakes us. Presentations in subconsciousness have not the power to divert attention, nor can we voluntarily concentrate attention upon them. Before either can happen the subconscious presentations must cross the threshold of consciousness, and so cease to be subconscious; and this, of course, is far from being always possible. Now in the case of sight an object may fail to catch the eye, either because, though within the field of sight, it is too far away to make a distinct impression or because it is outside the field altogether. But we cannot conveniently interpret "threshold of consciousness" in keeping with the latter alternative; mere accretion from without is a conception as alien to psychology as it is to biology. We must make the best we can of a *totum objectivum* differentiated within itself, and so are confined to the first alternative. Our threshold must be compared to the surface of a lake and subconsciousness to the depths beneath it, and all the current terminology of presentations rising and sinking implies this or some similar figure.

This hypothesis of subconsciousness has been strangely misunderstood, and it would be hard to say at whose hands it has suffered most, those of its exponents or those of its opponents. In the main it is nothing more than the application to the facts of presentation of the law of continuity, its introduction into psychology being due to Leibnitz, who first formulated that law. Half the difficulties in the way of its acceptance are due to the manifold ambiguities of the word consciousness. With Leibnitz consciousness was not coextensive with all psychical life, but only with certain higher phases[1] of it. Of late, however, the tendency has been to make consciousness cover all stages of mental development and all grades of presentation, so that a presentation of which there is no consciousness resolves itself into the manifest contradiction of an unpresented presentation—a contradiction not involved in Leibnitz's "unapperceived perception." Moreover, the active form of the word "conscious" almost unavoidably suggests that an "unconscious mental modification" must be one in which that subjective activity, variously called consciousness, attention, or thinking, has no part. But such is not the meaning intended when it is said, for example, that a soldier in battle is often unconscious of his wounds or a scholar unconscious at any one time of most of the knowledge "hidden in the obscure recesses of his mind." There would be no point in saying a subject is not conscious of objects that are not presented at all; but to say that what is presented lacks the intensity requisite in the given distribution of attention to change that distribution appreciably is pertinent enough. Subconscious presentations may tell on conscious life—as sunshine or mist tells on a landscape or the underlying writing on a palimpsest—although lacking either the differences of intensity or the individual distinctness requisite to make them definite features. Even if there were no facts to warrant this conception of a subliminal presentation of impressions and ideas it might still claim an *a priori* justification. For to assume that there can be no presentations save such as pertain to the complete and perfect consciousness of a human being is as arbitrary and as improbable as it would be to suppose—in the absence of evidence to the contrary—that there was no vision or audition save such as is mediated by human eyes and ears. Psychological magnification is not more absurd than physical, although the processes in the two cases must be materially different; but of course in no case is magnification possible without limit. The point is that, while we cannot fix the limit at which the subconscious becomes the absolutely unconscious, it is only reasonable to expect beforehand that this limit is not just where our powers of discrimination cease.

Over and above hindrances to its acceptance which may be set down to the paradoxical and inaccurate use of the word unconsciousness, there are two material difficulties which prevent this hypothesis from finding favour. First, the prevailingly objective implications of language are apt to make us assume that, as a tree remains the same thing whether it is in the foreground of a landscape or is lost in the grey distance, so a presentation must be a something which is in itself the same whether above the threshold of consciousness or below, if it exist, that is, in this lower degree at all. But it must be remembered that we are not now dealing with physical things but with presentations, and that to these the Berkeleyan *dictum* applies that their *esse* is *percipi*, provided, of course, we give to *percipi* the wide meaning now assigned to consciousness. The qualitative differences of all presentations and the distinctness of structure of such as are complex both diminish with a diminution of intensity. In this sense much is latent or "involved" in presentations lying below the threshold of consciousness that becomes patent or "evolved" as they rise above it. But, on the other hand, the hypothesis of subconsciousness does not commit us to the assumption that all presentations are by their very nature imperishable: while many modifications of consciousness sink only into oblivescence, many, we may well suppose, lapse into complete oblivion and from that there is no recall. Secondly, to any one addicted to the atomistic view of presentations just now referred to it may well seem incredible that all the incidents of a long lifetime and all the items of knowledge of a well-stored mind that may possibly recur—"the infinitely greater part of our spiritual treasures," as Hamilton says—can be in any sense present continuously. The brunt of such an objection is effectually met by the fact that the same presentation may figure in very various connexions, as may the same letter, for example, in many words, the same word in many sentences. We cannot measure the literature of a language by its vocabulary, nor may we equate the extent of our spiritual treasures as successively unfolded with the psychical apparatus, so to say, into which they resolve.[2]

The attempt has more than once been made to avoid the difficulties besetting subconsciousness by falling back on the conceptions of faculties, capacities, or dispositions. Stored-up knowledge, says J. S. Mill, "is not a mental state but a capability of being put into a mental state"; similarly of the cases which Hamilton records, "in which the extinct memory [?] of whole languages was suddenly restored," he says, "it is not the mental impressions that are latent but the power of reproducing them." But surely the capability of being put into a mental state is itself a mental state and something actual, and is, moreover, a different something when the state to be reproduced is different. If not, how is such capability ever exerted? Even where the capability cannot be consciously exerted, must there not still be something actual to justify the phrase latent power? The "exaltation" of delirium may account for the intensification but not for the contents of the "extinct memories" which its unwonted glow reveals. It seems extraordinary that Mill of all men, and in psychology of all subjects, should have supposed such merely formal conveniences as these conceptions of faculties and powers could ever dispense us from further inquiry. It might be urged in Mill's defence that he *has* investigated further and concludes that the only distinct meaning he can attach to unconscious mental modification is that of unconscious modification of the nerves—a modification of the nerves, that is to say, without any psychical accompaniment. But, while we can frequently understand a psychical fact better if we can understand its physical counterpart, a physiological explanation can never take the place of a psychological explanation. If all we have to deal with are nervous modifications which have no psychical concomitants, then so far there is nothing psychological to explain; but, if there really is anything calling for psychological explanation—and this Mill does not deny—then physical accompaniments must admit of psychical interpretation if they are to be of any avail. And in fact, although Mill professes to recognize only unconscious modifications of nerves, he finds a psychological meaning for these by means of his "mental chemistry,"—a doctrine which has done its work and which we need not here discuss.

The exposition of subconsciousness given by Wundt is in the main an advance on that of Mill and calls for brief notice. Presentations, says Wundt,[3] are not substances but functions, whose physiological counterparts in like manner are functional activities, viz., of certain arrangements of nerve-cells. Consciousness of the presentation and the nervous activity cease together, but the latter leaves behind it a molecular modification of the nervous structure which becomes more and more permanent with exercise, and is such as to facilitate the recurrence of the same functional activity. A more precise account of these after-effects of exercise is for the present unattainable; nevertheless Wundt regards it as obvious that they are no more to be compared to the activity to which they predispose than the molecular arrangement of chlorine and nitrogen in nitric chloride is to be compared to the explosive decomposition that ensues if the chloride is slightly disturbed. *Mutatis mutandis*, on the psychological side the only actual presentations are those which we are conscious of as such; but presentations that vanish out of consciousness leave behind psychical dispositions tending to renew them. The essential difference is that, whereas we may some day know the nature of the physical disposition, that of the psychical disposition must of necessity be for ever unknown, for the threshold of consciousness is also the limit of internal experience. The theory thus briefly summarized seems in some respects arbitrary, in some respects ambiguous. It is questionable, for instance, whether the extremely meagre information that physiologists at present possess at all compels us to assume that the "physical disposition" of Wundt cannot consist in a continuous but much fainter discharge of function. At all events it is quite beside the mark to urge, as he does, that the effect of training a group of muscles is not shown in the persistence of slight movements during intervals of apparent rest.[4] The absence of molar motions is no evidence of the absence of molecular motions. And it is certain that psychologically we can be conscious of the idea of a movement without the movement actually ensuing, yet only in such wise that the idea is more apt to pass over into action the intenser it is, and often actually passes over in spite of us. Surely there must be some functional activity answering to this conscious presentation, and if this amount of activity is possible without movement why may not a much less amount be conceived possible too? Again, what meaning can possibly be attached to a psychical disposition which is the counterpart, not of physical changes, but of an arrangement of molecules? Compared with such an inconceivable unknown, the perfectly conceivable hypothesis of infinitesimal presentations so faint as to elude discrimination is every way preferable. In fact, if conceivability is to count for anything, we have, according to Wundt, no choice, for "we can never think of a presentation that has disappeared from consciousness except as retaining the properties it had when in consciousness." None the less he holds it to be an error "to apply to presentations themselves a style of conception that has resulted from our being of necessity confined to consciousness." Verily, this is phenomenalism with a vengeance, as if presentations themselves were not also confined to consciousness!

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[1] The following brief passage from his *Principes de la Nature et de la Grace* (§ 4) shows his meaning:—"Il est bon de faire distinction entre la *Perception*, qui est l'état intérieur de la *Monade* representant les choses externes, et l'*Apperception*, qui est la *Conscience*, ou la connoissance réflexive de cet état intérieur, laquelle n'est point donnée à toutes les âmes, *ni toujours à la même âme*. Et c'est faute de cette distinction que les Cartésiens ont manqué, en comptant pour rien les perceptions dont on ne s'apperçoit pas, comme le peuple compte pour rien les corps insensibles" (*Op. Phil.*, Erdmann's ed., ii. p. 715).

[2] Much light may be thrown on this matter and on many others by such inquiries as those undertaken by Mr Francis Galton, and described in his *Inquiries into Human Faculty*, pp. 182-203.

[3] *Physiologische Psychologie*, p. 203 *sq.*

[4] J. S. Mill adopts substantially the same line of argument: "I have the power to walk across the room, though I am sitting in my chair; but we should hardly call this power a latent act of walking" (*Examination of Sir W. Hamilton's Philosophy*, 3d ed., p. 329).

This will be the most convenient place to take note of certain psychological doctrines which, though differing in some material respects, are usually included under the term Law of Relativity.

1. Hobbes's *Idem semper sentire et non sentire ad idem recidunt* is often cited as one of the first formulations of this law; and if we take it to apply to the whole field of consciousness it becomes at once true and trite: a field of consciousness unaltered either by change of impression or of ideas would certainly be a blank and a contradiction. Understood in this sense the Law of Relativity amounts to what Hamilton called the Law of Variety (Reid's *Works*, p. 932). But, though consciousness involves change, it is still possible that particular presentations in the field of consciousness may continue unchanged indefinitely. When it is said that "a constant impression is the same as a blank," what is meant turns out to be something not psychological at all, as, *e.g.*, our insensibility to the motion of the earth or to the pressure of the air—cases in which there is obviously no presentation, nor even any evidence of nervous change. Or else this paradox proves to be but an awkward way of expressing what we may call accommodation, whether physiological or psychological. Thus the skin soon adapts itself to certain seasonal alterations of temperature, so that heat or cold ceases to be felt: the sensation ceases because the nervous change, its proximate physical counterpart, has ceased. Again, there is what James Mill calls "an acquired incapacity of attention," such that a constant noise, for example, in which we have no interest is soon inaudible. As attention moves away from a presentation its intensity diminishes, and when the presentation is below the threshold of consciousness its intensity is then subliminal, whatever that of the physical stimulus may be. In such a case of psychological accommodation we should expect also to find on the physiological side some form of central reflexion or isolation more or less complete. As a rule, no doubt, impressions do not continue constant for more than a very short time; still there are sad instances enough in the history of disease, bodily and mental, to show that such a thing can quite well happen, and that such constant impressions (and "fixed ideas," which are in effect tantamount to them), instead of becoming blanks, may dominate the entire consciousness, colouring or bewildering everything.

2. From the fact that the field of consciousness is continually changing it has been supposed to follow, not only that a constant presentation is impossible, but as a further consequence that every presentation is essentially nothing but a transition or difference. "All feeling," says Dr Bain, the leading exponent of this view, "is two-sided. . . . We may attend more to one member of the couple than to the other. . . . We are more conscious of heat when passing to a higher temperature, and of cold when passing to a lower. The state we have passed *to* is our *explicit* consciousness, the state we have passed *from* is our *implicit* consciousness." But the transition need not be from heat to cold, or *vice versa*: it can equally well take place from a neutral state, which is indeed the normal state, of neither heat nor cold; a new-born mammal, *e.g.*, must experience cold, having never experienced heat. Again, suppose a sailor becalmed, gazing for a whole morning upon a stretch of sea and sky, what sensations are implicit here? Shall we say yellow as the greatest contrast to blue, or darkness as the contrary of light, or both? What, again, is the implicit consciousness when the explicit is sweet; is it bitter or sour, and from what is the transition in such a case?

It is difficult to avoid suspecting a certain confusion here between the transition of attention from one presentation to another and the qualitative differences among presentations themselves. It is strange that the psychologist who has laid such stress on neutral states of surprise as being akin to feeling, and so distinct from special presentations, should in any way confound the two. The mistake, if mistake indeed it be, is perhaps accounted for by the fact that Dr Bain, in common with the rest of his school, nowhere distinguishes between attention and the presentations that are attended to. To be conscious or mentally alive we must have a succession of shocks or surprises, new objects calling off attention from old ones; but, over and above these movements of attention from presentation to presentation, do we find that each presentation is also itself but a transition or difference? "We do not know any one thing of itself but only the difference between it and another thing," says Dr Bain. But it is plain we cannot speak of contrast or difference between two states or things as a contrast or difference if the states or things are not themselves presented, else the so-called contrast or difference would itself be a single presentation, and its supposed "relativity" but an inference. Difference is not more necessary to the presentation of two objects than two objects to the presentation of difference. And, what is more, a difference between presentations is not at all the same thing as the presentation of that difference. The former must precede the latter; the latter, which requires active comparison, need not follow. There is an ambiguity in the words "know," "knowledge," which Dr Bain seems not to have considered: "to know" may mean either to perceive or apprehend, or it may mean to understand or comprehend.[1] Knowledge in the first sense is only what we shall have presently to discuss as the recognition or assimilation of an impression (see below, p. 53); knowledge in the latter sense is the result of intellectual comparison and is embodied in a proposition. Thus a blind man who cannot know light in the first sense can know about light in the second if he studies a treatise on optics. Now in simple perception or recognition we cannot with any exactness say that two *things* are perceived: straight is a thing, *i.e.*, a definite object presented; not so not-straight, which may be qualitatively obscure or intensively feeble to any degree. Only when we rise to intellectual knowledge is it true to say, "No one could understand the meaning of a *straight* line without being shown a line not straight, a bent or crooked line."[2] Two distinct presentations are necessary to the comparison that is here implied; but we cannot begin with such definitional differentiation: we must first recognize our objects before we can compare them. We need, then, to distinguish between the comparativity of intellectual knowledge, which we must admit—for it rests at bottom on a purely analytical proposition—and the "differential theory of presentations," which, however plausible at first sight, must be wrong somewhere since it commits us to absurdities. Thus, if we cannot have a presentation X but only the presentation of the difference between Y and Z, it would seem that in like manner we cannot have the presentation of Y or Z, nor therefore of their difference X, till we have had the presentation of A and B say, which differ by Y, and of C and D, which we may suppose differ by Z. The lurking error in this doctrine, that all presentations are but differences, may perhaps emerge if we examine more closely what may be meant by difference. We may speak of (*a*) differences in intensity between sensations supposed to be qualitatively identical, or of (*b*) differences in quality in the same continuum or class of presentations, or of (*c*) differences between sensations of different classes or continua. Now, as regards (*a*) and (*b*), it will be found that the difference between two intensities of the same quality, or between two qualities of the same continuum, may be itself a distinct presentation. But nothing of this kind holds of (*c*).[1] In passing from a load of 10 ℔ to one of 20 ℔, or from the sound of a note to that of its octave, it is possible to make the change continuously, and to estimate it as one might the distance between two places on the same road. But in passing from the scent of a rose to the sound of a gong or a sting from a bee we have no such means of bringing the two into relation—scarcely more than we might have of measuring the length of a journey made partly on the common earth and partly through the looking-glass. In (*c*), then, we have only a change, a difference of presentation, but not a presentation of difference; and we only have more than this in (*a*) or (*b*) provided the selected presentations occur together. If red follows green we may be aware of a greater difference than we could if red followed orange; and we should ordinarily call a 10-℔ load heavy after one of 5 ℔ and light after one of 20 ℔. Facts like these it is which make the differential theory of presentations plausible.

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[1] Other languages give more prominence to this distinction; compare γνῶναι and εἰδέναι, *noscere* and *scire*, *kennen* and *wissen*, *connaître* and *savoir*. On this subject there are some acute remarks in a little-known book, the *Exploratio Philosophica*, of Professor J. Grote. Hobbes too was well awake to this difference, as, *e.g.*, when he says, "There are two kinds of knowledge; the one, sense or knowledge original and remembrance of the same; the other, science or knowledge of the truth of propositions, derived from understanding."

[2] Bain, *Logic*, vol. i. p. 3.

3. On the strength of such facts Wundt has formulated a law of relativity, free, apparently, from the objections just urged against Dr Bain's doctrine, which runs thus:—"Our sensations afford no absolute but only a *relative* measure of external impressions. The intensities of stimuli, the pitch of tones, the qualities of light, we apprehend (*empfinden*) in general only according to their mutual relation, not according to any unalterably fixed unit given along with or before the impression itself."[2] We are not now concerned with so much of this statement as relates to the physical antecedents of sensation; but that what is of psychological account in it requires very substantial qualification is evident at once from a single consideration, viz., that if true this law would make it quite immaterial what the impressions themselves were: provided the relation continued the same, the sensation would be the same too, just as the ratio of 2 to 1 is the same whether our unit be miles or millimètres. In the case of intensities, *e.g.*, there is a *minimum sensibile* and a *maximum sensibile*. The existence of such extremes is alone sufficient to turn the flank of the thoroughgoing relativists; but there are instances enough of intermediate intensities that are directly recognized. A letter-sorter, for example, who identifies an ounce or two ounces with remarkable exactness identifies each for itself and not the first as half the second; of an ounce and a half or of three ounces he may have a comparatively vague idea. And so generally within certain limits of error, *indirectly ascertained*, we can identify intensities, each for itself, neither referring to a common standard nor to one that varies from time to time—to any intensity, that is to say, that chances to be simultaneously presented; just as an enlisting sergeant will recognize a man fit for the Guards without a yard measure and whether the man's comrades are tall or short. Of course such identification is only possible through the reproduction of past impressions, but then such reproduction itself is only possible because the several impressions concerned have all along had a certain independence of related impressions, and a certain identity among themselves. As regards the qualities of sensations the outlook of the relativists is, if anything, worse. In what is called Meyer's experiment, *e.g.* (described under EYE, vol. viii. p. 825), what appears greenish on a red ground will appear of an orange tint on a ground of blue; but this contrast is only possible within certain very narrow limits. In fact, the phenomena of colour-contrast, so far from proving, distinctly disprove that we apprehend the qualities of light only according to their mutual relation. In the case of tones it is very questionable whether such contrasts exist at all. Summing up on the particular doctrine of relativity of which Wundt is the most distinguished adherent, the truth seems to be that, in some cases where two presentations whose difference is itself presentable occur in close connexion, this difference—as we indirectly learn—exerts a certain bias on the assimilation or identification of one or both of the presentations. There is no "unalterably fixed unit" certainly, but, on the other hand, "the mutual relations of impressions" are not everything.[3]

Sensation and Movement.

Qualitative differences.

One of the first questions to arise concerning our simplest presentations or *sensations*[4] is to account for their differences of quality. In some respects it may well seem an idle question, for at some stage or other we must acknowledge final or irresolvable differences. Still, differences can be frequently shown to be due to variety in the number, arrangement, and intensity of parts severally the same,—these several parts being either simultaneously presented or succeeding each other with varying intervals. It is a sound scientific instinct which has led writers like G. H. Lewes and Mr Spencer to look out for evidence of some simple primordial presentation—the psychical counterpart, they supposed, of a single nerve-shock or neural tremor—out of which by various grouping existing sensations have arisen. It must, however, be admitted that but little of such evidence is at present forthcoming; and further, if we look at the question for a moment from the physiological standpoint which these writers are too apt to affect, what we find seems on the whole to make against this assumption. Protoplasm in its simplest state is readily irritated either by light, heat, electricity, or mechanical shock. Till the physiological characteristics of these various stimuli are better known, it is fruitless to speculate as to the nature of primitive sensation. But we have certainly no warrant for supposing that any existing class of sensations is entitled to rank as original. Touch, as we experience it now, is probably quite as complex as any of our special sensations. If a supposition must be ventured at all, it is perhaps most in keeping with what we know to suppose that the sensations answering to the five senses in their earliest form were only slightly differing variations of the more or less massive organic sensation which constituted the primitive presentation-continuum. We may suppose, in other words, that at the outset these sensations corresponded more completely with what we might call the general physiological action of light, heat, &c., as distinct from the action of these stimulants on specially differentiated end-organs. But, short of resolving such sensations into combinations of one primordial modification of consciousness, if we could conceive such, there are many interesting facts which point clearly to a complexity that we can seldom directly detect. Many of our supposed sensations of taste, *e.g.*, are complicated with sensations of touch and smell: thus the pungency of pepper and the dryness of wine are tactual sensations, and their spicy flavours are really smells. How largely smells mingle with what we ordinarily take to be simply tastes is best brought home to us by a severe cold in the head, as this temporarily prevents the access of exhalations to the olfactory surfaces. The difference between the smooth feel of a polished surface and the roughness of one that is unpolished, though to direct introspection an irresolvable difference of quality, is probably due to the fact that several nerve-terminations are excited in each case: where the sensation is one of smoothness all are stimulated equally; where it is one of roughness the ridges compress the nerve-ends more, and the hollows compress them less, than the level parts do. The most striking instance in point, however, is furnished by musical timbre (see Ear, vol. vii. p. 593).

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[1] Common language seems to recognize some connexion even here, or we should not speak of harsh tastes and harsh sounds, or of dull sounds and dull colours, and so forth. All this is, however, superadded to the sensation, probably on the ground of similarities in the accompanying organic sensations.

[2] *Physiologische Psychologie*, 1st ed., p. 421; the doctrine reappears in the 2d ed., but no equally general statement of it is given.

[3] Those who, like Helmholtz, explain the phenomena of contrast and the like as illusions of judgment, must class them as cases of comparativity; those who, like Hering, explain them physiologically, would see in them nothing but physiological adaptation.

[4] For a detailed account of the various sensations and perceptions pertaining to the several senses the reader is referred to the articles EYE, EAR, TOUCH, TASTE, SMELL, &c.

We find other evidence of the complexity of our existing sensations in the variations in quality that accompany variations in intensity, extensity, and duration. With the exception of spectral red all colours give place, sooner or later, to a mere colourless grey as the intensity of the light diminishes, and all in like manner become indistinguishably white after a certain increase of intensity. A longer time is also in most cases necessary to produce a sensation of colour than to produce a sensation merely of light or brightness: the solar spectrum seen for a moment appears not of seven colours but of two only—faintly red towards the left side and blue towards the right. Very small objects, again, such as coloured specks on a white ground, though still distinctly seen, appear as colourless if of less than a certain size, the relation between their intensity and extensity being such that within certain limits the brighter they are the smaller they may be without losing colour, and the larger they are the fainter in like manner. Similar facts are observable in the case of other senses, so that generally we seem justified in regarding what we now distinguish as a sensation as probably complicated in several respects. In other words, if psychical magnification were possible, we might be directly aware that sensations which we now suppose to be both single and simple were both compound and complex—that they consisted, that is, of two or more sensational elements or changes, alike or different in quality, of uniform or variable intensity, and occurring either simultaneously or in regular or irregular succession.

It is interesting to note that all possible sensations of colour, of tone, and of temperature constitute as many groups of qualitative continua. By continuum is here meant a series of presentations changing gradually in quality, *i.e.*, so that any two differ less the more they approximate in the series. We may represent this relation among presentations spatially, so long as the differences do not exceed three. In this way our normal colour-sensations have been compared to a sphere, in which (*a*) the maximum of luminosity is at one pole and the minimum at the other; (*b*) the series of colours proper (red to violet and through purple back to red), constituting a closed line, are placed round the equator or in zones parallel to it, according to shade; and (*c*) the amount of saturation (or absence of white) for any given zone of illumination increases with distance from the axis. The several musical tones, again, have been compared to an ascending spiral, a given tone and its octaves lying in the same perpendicular. Temperatures similarly might be represented as ranging in opposite directions, *i.e.*, through heat or through cold, between a zero of no sensation and the organic sensations that accompany the destructive action of heat and cold alike. As we frequently experience a continuous range of intensity of varying amount, so we may experience continuous variations in quality, as in looking at the rainbow, for example. Still it is not to be supposed that colours or notes are necessarily presented as continua: that they are such is matter of after-observation.

The groups of sensations known as touches, smells, tastes, on the other hand, do not constitute continua: bitter tastes, for instance, will not shade off into acid or sweet tastes, except, of course, through a gradual diminution of intensity rendering the one quality subliminal followed by a gradual increase from zero in the intensity of the other. This want of continuity might be explained if there were grounds for regarding these groups as more complex than the rest,—in so far as tertiary colours or vowel-sounds, say, are complex and comparatively discontinuous. But it might equally well be argued that they are simpler than the rest and, as simple and different, are necessarily disparate, while the continuity of colours or tones is due to a gradual change of components.

Our motor presentations contrast with the sensory by their want of striking qualitative differences. We may divide them into two groups, (*a*) motor presentations proper and (*b*) auxilio-motor presentations. The former answer to our "feelings of muscular effort" or "feelings of innervation." The latter are those presentations due to the straining of tendons, stretching and flexing of the skin, and the like, by which the healthy man knows that his efforts to move are followed by movement, and so knows the position of his body and limbs. It is owing to the absence of these presentations that the anæsthetic patient cannot directly tell whether his efforts are effectual or not, nor in what position his limbs have been placed by movements from without. Thus under normal circumstances motor presentations are always accompanied by auxilio-motor, but in disease and in passive movements they are separated and their distinctness thus made manifest. Originally we may suppose auxilio-motor objects to form one imperfectly differentiated continuum, but now, as with sensations, movements have become a collection of special continua, viz., the groups of movements possible to each limb and certain combinations of these.

Perception.

Mental synthesis or integration.

In treating apart of the differentiation of our sensory and motor continua, as resulting merely in a number of distinguishable sensations and movements, we have been compelled by the exigencies of exposition to leave out of sight another process which really advances *pari passu* with this differentiation, viz., the integration or synthesis of these proximately elementary presentations into those complex presentations which are called perceptions, intuitions, sensori-motor reactions, and the like. It is, of course, not to be supposed that in the evolution of mind any creature attained to such variety of distinct sensations and movements as a human being possesses without making even the first step towards building up this material into the most rudimentary knowledge and action. On the contrary, there is every reason to think, as has been said already incidentally, that further differentiation was helped by previous integration, that perception prepared the way for distincter sensations, and purposive action for more various movements. This process of synthesis, which is in the truest sense a psychical process, deserves some general consideration before we proceed to the several complexes that result from it. Most complexes, certainly the most important, are consequences of that principle of subjective selection whereby interesting sensations lead through the intervention of feeling to movements; and the movements that turn out to subserve such interest come to have a share in it. In this way—which we need not stay to examine more closely now—it happens that, in the alternation of sensory and motor phases which is common to all psychical life, a certain sensation, comparatively intense, and a certain movement, definite enough to control that sensation, engage attention in immediate succession, to the more or less complete exclusion from attention of the other less intense sensations and more diffused movements that accompany them. Apart from this intervention of controlling movements, the presentation-continuum, however much differentiated, would be for all purposes of knowledge little better than the disconnected manifold for which Kant took it. At the same time it is to be remembered that the subject obtains command of particular movements out of all the mass involved in emotional expression only because such movements prove on occurrence adapted to control certain sensations. Before experience, and apart from heredity, there seems not only no scientific warrant for assuming any sort of practical prescience but also none for the hypothesis of *a priori* forms of knowledge. Of a pre-established harmony between the active and passive phases of consciousness we need none, or—it may be safer to say—at least indefinitely little. A sentient creature moves first of all because it feels, not because it intends. A long process, in which natural selection probably played the chief part at the outset—subjective selection becoming more prominent as the process advanced—must have been necessary to secure as much purposive movement as even a lobster displays. It seems impossible to except from this process the movements of the special sense-organs which are essential to our perception of external things. Here too subjective interest will explain, so far as psychological explanation is possible, those syntheses of motor and sensory presentations which we call spatial perceptions and intuitions of material things. For example, some of the earliest lessons of this kind seem to be acquired, as we may presently see, in the process of exploring the body by means of the limbs,—a process for which grounds in subjective interest can obviously never be wanting.

The mere process of "association"—whereby we may suppose the synthesis of presentations to be effected so that presentations originally in no way connected tend to move in consciousness together—will confront us with its own problems later on. We need for the present only to bear in mind that the conjunction or continuity upon which the association primarily depends is one determined by the movements of attention, which movements in turn depend very largely upon the pleasure or pain that presentations occasion. To some extent, however, there is no doubt that attention may pass non-voluntarily from one indifferent presentation to another, each being sufficiently intense to give what has been called a "shock of surprise," but not so intense as to awaken feeling to move for their detention or dismissal. But throughout the process of mental development, where we are concerned with what is new, the range of such indifference is probably small: indifferent presentations there will be, but that does not matter while there are others that are interesting to take the lead.

Perception as a psychological term has received various, though related, meanings for different writers. It is sometimes used for the recognition of a sensation or movement as distinct from its mere presentation, and thus is said to imply the more or less definite revival of certain residua or re-presentations of past experience which resembled the present. More frequently it is used as the equivalent of what has been otherwise called the "localization and projection" of sensations,—that is to say, a sensation presented either as an affection of some part of our own body regarded as extended or as a state of some foreign body beyond it. According to the former usage, strictly taken, there might be perception without any spatial presentation at all: a sensation that had been attended to a few times might be perceived as familiar. Such percept being a "presentative-representative" complex, and wholly sensory, we might symbolize it, details apart, as $S+s$, using S for the present sensation, and s for a former S represented. According to the latter usage, an entirely new sensation, provided it were complicated with motor experiences in the way required for its localization or projection, would become a perception. Such a perception might be roughly symbolized as $X+(M+m)$, or as $X+m$ simply, M standing for actual movements, as in ocular adjustment, which in some cases might be only former movements represented or m. But as a matter of fact actual perception probably invariably includes both cases: impressions which we recognize we also localize or project, and impressions which are localized or projected are never entirely new,—they are, at least, perceived as sounds or colours or aches, &c. It will, however, frequently happen that we are specially concerned with only one side of the whole process, as is the case with a tea-taster or a colour-mixer on the one hand, or, on the other, with the patient who is perplexed to decide whether what he sees and hears is "subjective," or whether it is "real." Usually we have more trouble to discriminate the quality of an impression than to fix it spatially; indeed this latter process was taken for granted by most psychologists till recently. But, however little the two sides are actually separated, it is important to mark their logical distinctness, and it would be well if we had a precise name for each. In any other science save psychology such names would be at once forthcoming; but it seems the fate of this science to be restricted in its terminology to the ill-defined and well-worn currency of common speech, with which every psychologist feels at liberty to do what is right in his own eyes, at least within the wide range which a loose connotation allows. If there were any hope of their general acceptance we might propose to call the first-mentioned process the *assimilation* or *recognition* of an impression, and might apply the term *localization* to its spatial fixation, without distinguishing between the body and space beyond,—a matter of the less importance as projection hardly enters into primitive spatial experience. But there is still a distinction called for: perception as we now know it involves not only localization, or "spatial reference," as it is not very happily termed, but "objective reference" as well. We may perceive sound or light without any presentation of that which sounds or shines; but none the less we do not regard such sound or light as merely the object of our attention, as having only immanent existence, but as the quality or change or state of a thing, an object distinct not only from the subject attending but from all presentations whatever to which it attends. Here again the actual separation is impossible, because this factor in perception has been so intertwined throughout our mental development with the other two. Still a careful psychological analysis will show that such "reification," as we might almost call it, has depended on special circumstances, which we can at any rate conceive absent. These special circumstances are briefly the constant conjunctions and successions of impressions, for which psychology can give no reason, and the constant movements to which they prompt. Thus we receive together, *e.g.*, those impressions we now recognize as severally the scent, colour, and "feel" of the rose we pluck and handle. We might call each a "percept," and the whole a "complex percept." But there is more in such a complex than a sum of partial percepts; there is the apprehension or intuition of the rose as a thing having this scent, colour, and texture. We have, then, under perception to consider (i.) the assimilation and (ii.) the localization of impressions, and (iii.) the intuition of things.

The range of the terms assimilation or recognition of impressions is wide: between the simplest mental process they may be supposed to denote and the most complex there is a great difference. The penguin that watched unmoved the first landing of man upon its lonely rock becomes as wild and wary as more civilized fowl after two or three visits from its molester: it then recognizes that featherless biped. His friends at home also recognize him though altered by years of peril and exposure. In the latter case some trick of his voice or manner, some "striking" feature, calls up and sustains a crowd of memories of the traveller in the past,—events leading on to the present scene. The two recognitions are widely different, and it is from states of mind more like the latter than the former that psychologists have usually drawn their description of perception. At the outset, they say, we have a primary presentation or impression P, and after sundry repetitions there remains a mass or a series of P residua, $p_1 p_2 p_3 \ldots$; perception ensues when, sooner or later, P_n "calls up" and associates itself with these re-presentations or ideas. Much of our later perception, and especially when we are at all interested, awakens, no doubt, both distinct memories and distinct expectations; but, since these imply previous perceptions, it is obvious that the earliest form of recognition, or, as we might better call it, assimilation, must be free from such complications, can have nothing in it answering to the overt judgment, P_n is a P. Assimilation involves retentiveness and differentiation, as we have seen, and prepares the way for re-presentation; but in itself there is no confronting the new with the old, no determination of likeness, and no subsequent classification. The pure sensation we may regard as a psychological myth; and the simple image, or such sensation revived, seems equally mythical, as we may see later on. The nth sensation is not like the first: it is a change in a presentation-continuum that has itself been changed by those preceding; and it cannot with any propriety be said to reproduce these past sensations, for they never had the individuality which such reproduction implies. Nor does it associate with images like itself, since where there is association there must first have been distinctness, and what can be associated can also, for some good time at least, be dissociated.

Localization of impressions.

To treat of the localization of impressions is really to give an account of the steps by which the psychological individual comes to a knowledge of space. At the outset of such an inquiry it seems desirable first of all to make plain what lies within our purview, and what does not, lest we disturb the peace of those who, confounding philosophy and psychology, are ever eager to fight for or against the *a priori* character of this element of knowledge. That space is *a priori* in the epistemological sense it is no concern of the psychologist either to assert or to deny. Psychologically *a priori* or original in such sense that it has been either actually or potentially an element in all presentation from the very beginning it certainly is not. It will help to make this matter clearer if we distinguish what philosophers frequently confuse, viz., the concrete spatial experiences, constituting actual localization for the individual, and the abstract conception of space, generalized from what is found to be common in such experiences. A gannet's mind "possessed of" a philosopher, if such a conceit may be allowed, would certainly afford its tenant very different spatial experiences from those he might share if he took up his quarters in a mole. So, any one who has revisited in after years a place from which he had been absent since childhood knows how largely a "personal equation," as it were, enters into his spatial perceptions. Or the same truth may be brought home to him if, walking with a friend more athletic than himself, they come upon a ditch, which both know to be twelve feet wide, but which the one feels he can clear by a jump and the other feels he cannot. In the concrete "up" is much more than a different direction from "along." The hen-harrier, which cannot soar, is indifferent to a quarry a hundred feet above it—to which the peregrine, built for soaring, would at once give chase—but is on the alert as soon as it descries prey of the same apparent magnitude, but upon the ground. Similarly, in the concrete, the body is the origin or datum to which all positions are referred, and such positions differ not merely quantitatively but qualitatively. Moreover, our various bodily movements and their combinations constitute a network of co-ordinates, qualitatively distinguishable but geometrically, so to put it, both redundant and incomplete. It is a long way from these facts of perception, which the brutes share with us, to that scientific conception of space as having three dimensions and no qualitative differences which we have elaborated by the aid of thought and language, and which reason may see to be the logical presupposition of what in the order of mental development has chronologically preceded it. That the experience of space is not psychologically original seems obvious—quite apart from any successful explanation of its origin—from the mere consideration of its complexity. Thus we must have a plurality of objects—A out of B, B beside C, distant from D, and so on; and these relations of externality, juxtaposition, and size or distance imply further specialization; for with a mere plurality of objects we have not straightway spatial differences. Juxtaposition, *e.g.*, is only possible when the related objects form a continuum; but, again, not any continuity is extensive. Now how has this complexity come about?

Extensity.

The first condition of spatial experience seems to lie in what has been noted above (p. 46) as the extensity of sensation. This much we may allow is original; for the longer we reflect the more clearly we see that no combination or association of sensations varying only in intensity and quality, not even if motor presentations are added, will account for the space-element in our perceptions. A series of touches a, b, c, d may be combined with a series of movements m_1, m_2, m_3, m_4; both series may be reversed; and finally the touches may be presented simultaneously. In this way we can attain the knowledge of the coexistence of objects that have a certain quasi-distance between them, and such experience is an important element in our perception of space; but it is not the whole of it. For, as has been already remarked by critics of the associationist psychology, we have an experience very similar to this in singing and hearing musical notes or the chromatic scale. The most elaborate attempt to get extensity out of succession and coexistence is that of Mr Herbert Spencer. He has done, perhaps, all that can be done, and only to make it the more plain that the entire procedure is a ὕστερον πρότερον. We do not first experience a succession of touches or of retinal excitations by means of movements, and then, when these impressions are simultaneously presented, regard them as extensive, because they are associated with or symbolize the original series of movements; but, before and apart from movement altogether, we experience that massiveness or extensity of impressions in which movements enable us to find positions, and also to measure.[1] But it will be objected, perhaps not without impatience, that this amounts to the monstrous absurdity of making the contents of consciousness extended. The edge of this objection will be best turned by rendering the conception of extensity more precise. Thus, suppose a postage stamp pasted on the back of the hand; we have in consequence a certain sensation. If another be added beside it, the new experience would not be adequately described by merely saying we have a greater quantity of sensation, for intensity involves quantity, and increased intensity is not what is meant. For a sensation of a certain intensity, say a sensation of red, cannot be changed into one having two qualities, red and blue, leaving the intensity unchanged; but with extensity this change is possible. For one of the postage stamps a piece of wet cloth of the same size might be substituted and the massiveness of the compound sensation remain very much the same. Intensity belongs to what may be called graded quantity: it admits of increment or decrement, but is not a sum of parts. Extensity, on the other hand, does imply plurality: we might call it latent or merged plurality or a "ground" of plurality, inasmuch as to say that a single presentation has massiveness is to say that a portion of the presentation-continuum at the moment undifferentiated is capable of differentiation. Attributing this property of extensity to the presentation-continuum as a whole, we may call the relation of any particular sensation to this larger whole its *local sign*, and can see that, so long as the extensity of a presentation admits of diminution without the presentation becoming nil, such presentation has two or more local signs,—its parts, taken separately, though identical in quality and intensity, having a different relation to the whole. Such difference of relation must be regarded fundamentally as a ground or possibility of distinctness of sign—whether as being the ground or possibility of different complexes or otherwise—rather than as being from the beginning such an overt difference as the term "local sign," when used by Lotze, is meant to imply.[1] From this point of view we may say that more partial presentations are concerned in the sensation caused by two stamps than in that caused by one. The fact that these partial presentations, though identical in quality and intensity, on the one hand are not wholly identical, and on the other are presented only as a quantity and not as a plurality, is explained by the distinctness along with the continuity of their local signs. Assuming that to every distinguishable part of the body there corresponds a local sign, we may allow that at any moment only a certain portion of this continuum is definitely within the field of consciousness; but no one will maintain that a part of one hand is ever felt as continuous with part of the other or with part of the face. This we can only represent by saying that the local signs have an invariable relation to each other: two continuous signs are not one day coincident and the next widely separate.[2] This last fact is hardly perhaps implied in the mere massiveness of a sensation, but it will be convenient to include it when speaking of the continuum of local signs as extensive. We have, then, a plurality of presentations constituting a continuum, presented simultaneously as impressions and having certain fixed and invariable relations to each other. Of such experience the typical case is that of passive touch, though the other senses exemplify it. It must be allowed that our conception of space in like manner involves a fixed continuity of positions; but then it involves, further, the possibility of movement. Now in the continuum of local signs there is nothing whatever of this; we might call this continuum an implicit *plenum*. It only becomes the presentation of *occupied space* after its several local signs are complicated or "associated" in an orderly way with *active* touches, when in fact we have experienced the contrast of movements with contact and movements without, *i.e.*, *in vacuo*. It is quite true that we cannot now think of this plenum except as a space, because we cannot divest ourselves of these motor experiences by which we have explored it. We can, however, form some idea of the difference between the perception of space and this one element in the perception by contrasting massive internal sensations with massive superficial ones, or the general sensation of the body as "an animated organism" with our perception of it as extended.

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[1] We are ever in danger of exaggerating the competence of a new discovery; and the associationists seem to have fallen into this mistake, not only in the use they have made of the conception of association in psychology in general, but in the stress they have laid upon the fact of movement when explaining our space-perceptions in particular. Indeed, both ideas have here conspired against them,—association in keeping up the notion that we have only to deal with a plurality of discrete impressions, and movement in keeping to the front the idea of sequence. Mill's *Examination of Hamilton* (3d ed., p. 266 *sq.*) surely ought to convince us that, unless we are prepared to

It must seem strange, if this conception of extensity is essential to a psychological theory of space, that it has escaped notice so long. The reason may be that in investigations into the origin of our knowledge of space it was always the *conception* of space and not our concrete space *perceptions* that came up for examination. Now in space as we conceive it one position is distinguishable from another solely by its co-ordinates, *i.e.*, by the magnitude and signs of certain lines and angles, as referred to a certain datum position, or origin; and these elements our motor experiences seem fully to explain. But on reflexion we ought, surely, to be puzzled by the question, how these coexistent positions could be known before those movements were made which constitute them different positions. The link we thus suspect to be missing is supplied by the more concrete experiences we obtain from our own body, in which two positions have a qualitative difference or "local colour" independently of movement. True, such positions would not be known as spatial without movement; but neither would the movement be known as spatial had those positions no other difference than such as arises from movement.

Movement

We may now consider the part which movement plays in elaborating the presentations of this dimensionless continuum into perceptions of space. In so doing we must bear in mind that this continuum implies the incopresentability of two impressions having the same local sign, but allows not only of the presentation of impressions of varying massiveness but of several distinct impressions at the same time. As regards the motor element itself, the first point of importance is the incopresentability and invariability of a series of auxilio-motor presentations, P_1, P_2, P_3, P_4. P_1 cannot be presented along with P_2, and from P_4 it is impossible to reach P_1 again save through P_3 and P_2. Such a series, taken alone, could afford us, it is evident, nothing but the knowledge of an invariable sequence of impressions which it was in our own power to produce. Its psychological interest would lie solely in the fact that, whereas other impressions depend on an objective initiative, these depend on a subjective. But in the course of the movements necessary to the exploration of

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say, as Mill seems to do, "that the idea of space is at bottom one of time" (p. 276), we must admit the inadequacy of our experience of movement to explain the origin of it.

[1] To illustrate what is meant by different complexes it will be enough to refer to the psychological implications of the fact that scarcely two portions of the sensitive surface of the human body are anatomically alike. Not only in the distribution and character of the nerve-endings but in the variety of the underlying parts—in one place bone, in another fatty tissue, in others tendons or muscles variously arranged—we find ample ground for diversity in "the local colouring" of sensations. And comparative zoology helps us to see how such diversity has been developed as external impressions and the answering movements have gradually differentiated an organism originally almost homogeneous and symmetrical. Between one point and another on the surface of a sphere there is no ground of difference; but this is no longer true if the sphere revolves round a fixed axis, still less if it also runs in one direction along its axis.

[2] The improvements in the sensibility of our "spatial sense" consequent on its variations under practice, the action of drugs, &c., are obviously no real contradiction to this; on the contrary, such facts are all in favour of making extensity a distinct factor in our space experience and one more fundamental than that of movement.

the body—probably our earliest lesson in spatial perception —these auxilio-motor presentations receive a new significance from the active and passive touches that accompany them, just as they impart to these last a significance they could never have alone.

It is only in the resulting complex that we have the presentations of position and of spatial magnitude. For space, though conceived as a coexistent continuum, excludes the notion of omnipresence or ubiquity; two positions l_d and l_g must coexist, but they are not strictly distinct positions so long as we conceive ourselves present in the same sense in both. But, if F_d and F_g are, *e.g.*, two impressions produced by compass-points touching two different spots as l and l_g on the hand or arm, and we place a finger upon l_d and move it to l_g, experiencing thereby the series P_1, P_2, P_3, P_4, this series constitutes l_d and l_g into positions and also invests F_d and F_g with a relation not of mere distinctness but of definite distance. The resulting complex perhaps admits of symbolization as follows:—

$$\begin{array}{c} \ldots\ldots\ \mathrm{F}_a \mathrm{F}_b \mathrm{F}_c F_d \mathrm{F}_e \mathrm{F}_f F_g \mathrm{F}_h \mathrm{F}_i\ \ldots\ldots \\ T\ \ t\ \ t\ \ t \\ P_1 p_2 p_3 p_4 \end{array}$$

Here the first line represents a portion of the tactual continuum, F_d and F_g being distinct "feels," if we may so say, or passive touches presented along with the fainter sensations of the continuum as a whole; T stands for the active touch of the exploring finger and P_1 for the corresponding auxilio-motor object; the rest of the succession, as not actually present at this stage but capable of revival from past explorations, is symbolized by the $t\,t\,t$ and $p_2 p_3 p_4$. When the series of movements is accompanied by active touches without passive there arises the distinction between one's own body and foreign bodies; when the initial movement of a series is accompanied by both active and passive touches, the final movement by active touches only, and the intermediate movements are unaccompanied by either, we get the further presentation of empty space lying between us and them,—but only when by frequent experience of contacts along with those intermediate movements we have come to know all movement as not only succession but change of position. Thus active touches come at length to be projected, passive touches alone being localized in the stricter sense. But in actual fact, of course, the localization of one impression is not perfected before that of another is begun, and we must take care lest our necessarily meagre exposition give rise to the mistaken notion that localizing an impression consists wholly and solely in performing or imaging the particular movements necessary to add active touches to a group of passive impressions. That this cannot suffice is evident merely from the consideration that a single position out of relation to all other positions is a contradiction. Localization, though it depends on many special experiences of the kind described, is not like an artificial product which is completed a part at a time, but is essentially a growth, its several constituent localizations advancing together in definiteness and interconnexion. So far has this development advanced that we do not even imagine the special movements which the localization of an impression implies, that is to say, they are no longer distinctly represented as they would be if we definitely intended to make them: the past experiences are "retained," but too much blended in the mere perception to be appropriately spoken of as remembered or imaged.

Apropos of this almost instinctive character of even our earliest spatial perceptions it will be appropriate to animadvert on a misleading implication in the current use of such terms as "localization," "projection," "bodily reference," "spatial reference," and the like. The implication is that external space, or the body as extended, is in some sort presented or supposed apart from the localization, projection, or reference of impressions to such space. That it may be possible to put a book in its place on a shelf there must be (1) the book, and (2), distinct and apart from it, the place on the shelf. But in the evolution of our spatial experience impressions and positions are not thus presented apart. We *can* have, or at least we can suppose, an impression which is recognized without being localized; but if it *is* localized this means that a more complex presentation is formed by the addition of new elements, not that a second distinct object is presented and some indescribable connexion established between the impression and it, still less that the impression is referred to something not strictly presented at all. The truth is that the body as extended is from the psychological point of view not perceived at all apart from localized impressions. In like manner impressions projected (or the absence of impressions projected) constitute all that is perceived as the occupied (or unoccupied) space beyond. It is not till a much later stage, after many varying experiences of different impressions similarly localized or projected, that even the mere materials are present for the formation of such an abstract conception of space as "spatial reference" implies. Psychologists, being themselves at this later stage, are apt to commit the oversight of introducing it into the earlier stage which they have to expound.

In a complex presentation, such as that of an orange or a piece of wax, may be distinguished the following points concerning which psychology may be expected to give an account:—(*a*) its reality, (*b*) its solidity or occupation of space, (*c*) its permanence, or rather its continuity in time (*d*) its unity and complexity, and (*e*) its substantiality and the connexion of its attributes and powers. Though, in fact, these items are most intimately blended, our exposition will be clearer if we consider each for a moment apart

(*a*) The terms actuality and reality have each more than one meaning. Thus what is real, in the sense of material, is opposed to what is mental; as the existent or actual it is opposed to the non-existent; and again, what is actual is distinguished from what is possible or necessary. But here both terms, with a certain shade of difference, in so far as actual is more appropriate to movements and events, are used, in antithesis to whatever is ideal or represented, for what is sense-given or presented. This seems at least their primary psychological meaning; and it is the one most in vogue in English philosophy at any rate over-tinged as that is with psychology.[1] Any examination of this characteristic will be best deferred till we come to deal with ideation generally (see p. 58 below). Meanwhile it may suffice to remark that reality or actuality is not a single distinct element added to the others which enter into the complex presentation we call a thing, as colour or solidity may be. Neither is it a special relation among these elements, like that of substance and attribute, for example. In these respects the real and the ideal, the actual and the possible, are alike; all the elements or qualities within the complex, and all the relations of those elements to each other, are the same in the rose represented as in the presented rose. The difference turns not upon what these elements are, regarded as qualities or relations presented or represented, but upon whatever it is that distinguishes the presentation from the representation of any given qualities or relations. Now this, as we shall see, turns partly upon the relation of such complex presentation to other presentations in consciousness with it, partly upon its relation as a presentation to the subject whose presentation it is. In this respect we find a difference, not only between the simple qualities, such as cold, hard, red, and sweet in strawberry ice, *e.g.*, as presented and as represented, but also, though less conspicuously, in the spatial, and even the temporal, relations which enter into our intuition as distinct from our imagination of it. Where no such difference exists we have passed beyond the distinction of percept and image to the higher level of conception and thought. So, then, reality or actuality is not strictly an item by itself, but a characteristic of all the items that follow.

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[1] Thus Locke says, "Our simple ideas [*i.e.*, presentations or impressions, as we should now say] are all real . . . and not fictions at pleasure; for the mind . . . can make to itself no simple idea more than what it has received" (*Essay*, ii. 30, 2). And Berkeley says, "The ideas imprinted on the senses by the Author of Nature are called *real things*; and those excited in the imagination, being less regular, vivid, and constant, are more properly termed *ideas* or *images of things*, which they copy or represent" (*Prin. of Hum. Know.*, part i. § 33).

(*b*) Here our properly motor presentations or "feelings of effort or innervation" come specially into play. They are not entirely absent in those movements of exploration by which we attain a knowledge of space; but it is when these movements are definitely resisted, or are only possible by increased effort, that we reach the full meaning of body as that which occupies space. Heat and cold, light and sound, the natural man regards as real, and by and by perhaps as due to the powers of things known or unknown, but not as themselves things. At the outset things are all corporeal like his own body, the first and archetypal thing, that is to say: things are intuited only when touch is accompanied by pressure; and, though at a later stage passive touch without pressure may suffice, this is only because pressures depending on a subjective initiative, *i.e.*, on voluntary muscular exertion, have been previously experienced. It is of more than psychological interest to remark how the primordial factor in materiality is thus due to the projection of a subjectively determined reaction to that action of a not-self on which sense-impressions depend,—an action of the not-self which, of course, is not known as such till this projection of the subjective reaction has taken place. Still we must remember that accompanying sense-impressions are a condition of its projection: muscular effort without simultaneous sensations of contact would not yield the distinct presentation of the resistant occupying the space into which we have moved and would move again. Nay more, it is in the highest degree an essential circumstance in this experience that muscular effort, though subjectively initiated, is still only possible when there is contact with something that, as it seems, is making an effort the counterpart of our own. But this something is so far no more than thing-stuff; without the elements next to be considered our psychological individual would fall short of the complete intuition of distinct things.

Unity and complexity.

(*c*) The remaining important factors in the psychological constitution of things might be described in general terms as the time-relations of their components. Such relations are themselves in no way psychologically determined; impressions recur with a certain order or want of order quite independently of the subject's interest or of any psychological principles of synthesis or association whatever. It is essential that impressions should recur, and recur as they have previously occurred, if knowledge is ever to begin; out of a continual chaos of sensation, all matter and no form, such as some philosophers describe, nothing but chaos could result. But a flux of impressions having this real or sense-given order will not suffice; there must be also attention to and retention of the order, and these indispensable processes at least are psychological. Still they need not be further emphasized here, nor would it have been necessary at this point to call them to mind at all had not British empirical philosophers brought psychology into disrepute by overlooking them altogether.

But for its familiarity we should marvel at the fact that out of the variety of impressions simultaneously presented we do not instantly group together all the sounds and all the colours, all the touches and all the smells, but, dividing what is given together, single out a certain sound or smell as belonging with a certain colour and feel, similarly singled out from the rest, to what we call one thing. We might wonder, too—those at least who have made so much of association by similarity ought to wonder—that, say, the white of snow calls up directly, not other shades of white or other colours, but the expectation of cold or of powdery softness. The first step in this process has been the simultaneous projection into the same occupied space of the several impressions which we thus come to regard as the qualities of the body filling it. Yet such simultaneous and coincident projection would avail but little unless the constituent impressions were again and again repeated in like order so as to prompt anew the same grouping, and unless, further, this constancy in the one group was present along with changes in other groups and in the general field. There is nothing in its first experience to tell the infant that the song of the bird does not inhere in the hawthorn whence the notes proceed, but that the fragrance of the may-flower does. It is only where a group, as a whole, has been found to change its position relatively to other groups, and —apart from causal relations—to be independent of changes of position among them, that such complexes can become distinct unities and yield a world of things. Again, because things are so often a world within themselves, their several parts or members not only having distinguishing qualities but moving and changing with more or less independence of the rest, it comes about that what is from one point of view one thing becomes from another point of view several,—like a tree with its separable branches and fruits, for example. Wherein, then, more precisely, does the unity of a thing consist? This question, so far as it here admits of answer, carries us over to temporal continuity.

Temporal continuity.

(*d*) Amidst all the change above described there is one thing comparatively fixed: our own body is both constant as a group and a constant item in every field of groups; and not only so, but it is beyond all other things an object of constant and peculiar interest, inasmuch as our earliest pleasures and pains depend solely upon it and what affects it. The body becomes, in fact, the earliest form of self, the first datum for our later conceptions of permanence and individuality. A continuity like that of self is then transferred to other bodies which resemble our own, so far as our direct experience goes, in passing continuously from place to place and undergoing only partial and gradual changes of form and quality. As we have existed—or, more exactly, as the body has been continuously presented—during the interval between two encounters with some other recognized body, so this is regarded as having continuously existed during its absence from us. However permanent we suppose the conscious subject to be, it is hard to see how, without the continuous presentation to it of such a group as the bodily self, we should ever be prompted to resolve the discontinuous presentations of external things into a continuity of existence. It might be said: "Since the second presentation of a particular group would, by the mere workings of psychical laws, coalesce or become identical with the image of the first, this coalescence suffices to 'generate' the conception of continued existence." But such assimilation is only the ground of an intellectual identification and furnishes no motive, one way or the other, for resolving two like things into the same thing: between a second presentation of A and the presentation at different times of two A's there is so far no difference. Real identity no more involves exact similarity than exact similarity involves sameness of things; on the contrary, we are wont to find the same thing alter with time, so that exact similarity after an interval, so far from suggesting one thing, is often the surest proof that there are two concerned Of such real identity, then, it would seem we must have direct experience; and we have it in the continuous presentation of the bodily self; apart from this it could not be "generated" by association among changing presentations Other bodies being in the first instance personified that then is regarded as one thing—from whatever point of view we look at it, whether as part of a larger thing or as itself compounded of such parts—which has had one beginning in time. But what is it that has thus a beginning and continues indefinitely? This leads to our last point.

(*e*) So far we have been concerned only with the combination of sensory and motor presentations into groups and with the differentiation of group from group; the relations to each other of the constituents of each group still for the most part remain. To these relations in the main must be referred the correlative conceptions of substance and attribute, the distinction in substances of qualities and powers, of primary qualities and secondary, and the like.[1]

Of all the constituents of things only one is universally present, that above described as physical solidity, which presents itself according to circumstances as impenetrability, resistance, or weight. Things differing in temperature, colour, taste, and smell agree in resisting compression, in filling space. Because of this quality we regard the wind as a thing, though it has neither shape nor colour, while a shadow, though it has both but not resistance, is the very type of nothingness. This constituent is invariable, while other qualities are either absent or change,—form altering, colour disappearing with light, sound and smells intermitting. Many of the other qualities—colour, temperature, sound, smell—increase in intensity until we reach and touch a body occupying space; with the same movement too its visual magnitude varies. At the moment of contact an unvarying tactual magnitude is ascertained, while the other qualities and the visual magnitude reach a fixed maximum; then first it becomes possible by effort to change or attempt to change the position and form of what we apprehend. This tangible plenum we thenceforth regard as the seat and source of all the qualities we project into it. In other words, that which occupies space is psychologically the substantial; the other real constituents are but its properties or attributes, the marks or manifestations which lead us to expect its presence.

Imagination or Ideation.

mpre- ions and deas

Before the intuition of things has reached a stage so complete and definite as that just described, imagination or ideation as distinct from perception has well begun. In passing to the consideration of this higher form of mental life we have to note the distinction between impressions and images or ideas, to which Hume first gave general currency. Hume did not think it "necessary to employ many words in explaining this distinction. Every one of himself will readily perceive the difference . . .; though it is not impossible but in particular instances they may very nearly approach to each other. Thus in sleep, in a fever, in madness, or in any very violent emotions of soul, our ideas may approach to our impressions; as, on the other hand, it sometimes happens our impressions are so faint and low that we cannot distinguish them from our ideas."[2] In most cases, no doubt, the obvious difference in intensity, or, as Hume puts it, "in the force or liveliness with which they strike upon the mind," is a sufficient characteristic, but we must examine a good deal further and pay more attention to his uncertain cases if this important distinction is ever to be in any sense psychologically "explained."

To begin with, it is very questionable whether Hume was right in applying Locke's distinction of simple and complex to ideas in the narrower sense as well as to impressions. "That idea of red," says Hume, "which we form in the dark and that impression which strikes our eyes in the sunshine differ only in degree, not in nature."[3] But what he seems to overlook is that, whereas there can be a mere sensation red—and such a presentation may for present purposes be regarded as simple—we can only have an image or representation of a red thing or a red form, *i.e.*, of red in some way ideally projected or intuited. In other words, there are no ideas answering to simple or isolated impressions: what are revived in memory and imagination are percepts, not unlocalized sensations and movements. It is not only that we cannot now directly observe such representations,—because, for that matter, we can no longer directly observe even the original presentations as merely elementary impressions; the point rather is that ideas as such are from the first complex, and do not begin to appear in consciousness apart from the impressions which they are said to reproduce till after these impressions have been frequently attended to together, and have been more or less firmly synthesized into percepts or intuitions.

The effects of even the earliest of these syntheses or "associations" of impressions must of course in some way persist, or progress in perception would be impossible. On this account it has been usual to say that "perception" implies both "memory" and "imagination"; but such a statement can be allowed only so long as these terms are vaguely used. The dog's mouth waters only at the *sight* of food, but the gourmand's mouth will also water at the *thought* of it. We recognize the smell of violets as certainly as we recognize the colour when the spring brings them round again; but few persons, if any, can recall the scent when the flower has gone, so as to say with Shelley—

> "Odours, when sweet violets sicken,
> Live within the sense they quicken"—

though most can recall the colour with tolerable clearness. In like manner everybody can perform innumerable complex voluntary movements which only a few can mentally rehearse or describe without the prompting of actual execution. And not only does such reproduction as suffices for perception fall short of that involved in reminiscence or memory in the narrower sense, but the manner in which the constituent elements in a perception are combined differs materially from what is strictly to be called the association of ideas. To realize this difference we need only to observe first how the sight of a suit of polished armour, for example, instantly reinstates and steadily maintains all that we retain of former sensations of its hardness and smoothness and coldness, and then to observe how this same sight gradually calls up ideas now of tournaments, now of crusades, and so through all the changing imagery of romance. Though the percept is complex, it is but a single whole, and the act of perception is single too; but, where, as is the case in memory and imagination, attention passes, whether voluntarily or non-voluntarily, from one representation to another, it is obvious that these several objects of attention are still distinct and that it is directed in turn to each. The term "association" seems only appropriate to the latter. To the connexion of the partial presentations in a complex, whether perception or idea, it would be better to apply the term "complication," which was used in this sense by Herbart, and has been so used by many psychologists since. When we perceive an orange by sight we may say that its taste or feel is represented, when we perceive it by touch we may in like manner say that its colour is represented, symbolizing the whole complex in the first case sufficiently for our present purpose as Ctf, in the second as Fct. We might also symbolize the idea of an orange as seen by $c'tf$ and the idea of an orange as felt by $f'ct$, using the accented letter to signify that different constituents are dominant in the two cases. What we have, then, to observe is briefly (1) that the processes by which the whole complex $c'tf$ or $f'ct$ is brought into consciousness differ importantly from the process by which C or F reinstates and maintains tf or ct, and (2) that c, t, and f never have that distinct existence as representations which they had as presentations or impressions.

The mental synthesis which has taken place in the evolution of the percept can only partially fail in the idea, and never so far as to leave us with a chaotic "manifold" of mere sensational remnants. On the contrary, we find that in "constructive imagination" a new kind of effort is often requisite in order to dissociate these representational complexes as a preliminary to new combinations. But it is doubtful whether the results of such an analysis are ever the ultimate elements of the percept, that is, merely isolated impressions in a fainter form. We may now try to ascertain further the characteristic marks which distinguish what is imaged from what is perceived.

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[1] The distinction between the thing and its properties, like all the foregoing distinctions, is one that might be more fully treated under the head of "Thought and Conception." Still, inasmuch as the material warrant for these concepts is contained more or less implicitly in our percepts, some consideration of it is in place here.

[2] *Treatise of Human Nature*, book i. part i. § 1.

[3] *Ibid.*

The most obvious, if not the most invariable, difference is that which, as we have seen, Hume calls the superior force or liveliness of primary presentations as compared with secondary presentations. But what exactly are we to understand by this somewhat figurative language? A simple difference of intensity cannot be all that is meant, for, though we may be momentarily confused, we can perfectly well distinguish the faintest impression from an image, and yet can hardly suppose the faintest impression to be intenser than the most lively image. Moreover, we can reproduce such faintest impressions in idea, so that, if everything depended on intensity, we should be committed to the gratuitous supposition that secondary presentations can secure attention with a less intensity than is required for primary presentations. The whole subject of the intensity of representations awaits investigation. Between moonlight and sunlight or between midday and dawn we could discriminate many grades of intensity; but it does not appear that there is any corresponding variation of intensity between them when they are not seen but imagined. Many persons suppose they can imagine a waxing or a waning sound or the gradual abatement of an intense pain; but what really happens in such cases is probably not a rise and fall in the intensity of a single representation, but a change in the complex represented. In the primary presentation there has been a change of quality along with change of intensity, and not only so, but most frequently a change in the muscular adaptations of the sense-organs too, to say nothing of organic sensations accompanying these changes. A representation of some or all of these attendants is perhaps what takes place when variations of intensity are supposed to be reproduced. Again, hallucinations are often described as abnormally intense images which simply, by reason of their intensity, are mistaken for percepts. But such statement, though supported by very high authority, is almost certainly false, and would probably never have been made if physiological and epistemological considerations had been excluded as they ought to have been. Hallucinations, when carefully examined, seem just as much as percepts to contain among their constituents some primary presentation—either a so-called subjective sensation of sight and hearing or some organic sensation due to deranged circulation or secretion. Now we have noticed already incidentally in a preceding paragraph that primary presentations reinstate and maintain the representational constituents of a percept in a manner very different from that in which what are unmistakably *ideas* reproduce each other. The intensity and steadiness of the impressional elements are, as it were, shared by the ideational elements in a complex containing both. Intensity alone, then, will not suffice to discriminate, neither will extremes of intensity alone lead us to confuse, impressions and images.

The superior steadiness just mentioned is perhaps a more constant and not less striking characteristic of percepts. Ideas are not only in a continual flux, but even when we attempt forcibly to detain one it varies continually in clearness and completeness, reminding one of nothing so much as of the illuminated devices made of gas jets, common at fêtes, when the wind sweeps across them, momentarily obliterating one part and at the same time intensifying another. There is not this perpetual flow and flicker in what we perceive; for this, unlike the train of ideas, has at the outset neither a logical nor a psychological continuity. The impressions entering consciousness at any one moment are psychologically independent of each other; they are equally independent of the impressions and images presented the moment before—independent, *i.e.*, as regards their order and character, not, of course, as regards the share of attention they secure. Attention to be concentrated in one direction must be withdrawn from another, and images may absorb it to the exclusion of impressions as readily as a first impression to the exclusion of a second. But, when attention *is* secured, a faint impression has a fixity and definiteness lacking in the case of even vivid ideas. One ground for this definiteness and independence lies in the localization or projection which accompanies all perception. But why, if so, it might be asked, do we not confound percept and image when what we imagine is imagined as definitely localized and projected? Because we have a contrary percept to give the image the lie; where this fails, as in dreams, or where, as in hallucination, the image obtains in other ways the fixity characteristic of impressions, such confusion does in fact result. But in normal waking life we have the whole presentation-continuum, as it were, occupied and in operation: we are distinctly conscious of being embodied and having our senses about us.

This contrariety between impression and image suggests, however, a deeper question: we may ask, not how it is resolved, but how it is possible. With eyes wide open, and while clearly aware of the actual field of sight and its filling, one can recall or imagine a wholly different scene: lying warm in bed one can imagine oneself out walking in the cold. It is useless to say the terms are different, that what is perceived is present and what is imaged is past or future.[1] The images, it is true, have certain temporal marks—of which more presently—by which they may be referred to past or future; but as imaged they *are* present, and, as we have just observed, are regarded as both actual and present in the absence of correcting impressions. We cannot at once see the sky red and blue; how is it we can imagine it the one while perceiving it to be the other? When we attempt to make the field of sight at once red and blue, as in looking through red glass with one eye and through blue glass with the other, either the colours merge and we see a purple sky or we see the sky first of the one colour and then of the other in irregular alternation. That this does not happen between impression and image shows that, whatever their connexion, images altogether are distinct from the presentation-continuum and cannot with strict propriety be spoken of as revived or reproduced impressions. This difference is manifest in another respect, viz., when we compare the effects of diffusion in the two cases. An increase in the intensity of a sensation of touch entails an increase in the extensity; an increase of muscular innervation entails irradiation to adjacent muscles; but when a particular idea becomes clearer and more distinct there rises into consciousness an associated idea qualitatively related probably to impressions of quite another class, as when the smell of tar calls up memories of the sea-beach and fishing-boats. Since images are thus distinct from impressions, and yet so far continuous with each other as to form a train in itself unbroken, we should be justified, if it were convenient, in speaking of images as changes in a representation- or memory-continuum; and later on we may see that this is convenient.

Impressions, then, have no associates to whose presence their own is accommodated and on whose intensity their own depends. Each bids independently for attention, so that often a state of distraction ensues, such as the train of ideas left to itself never occasions. The better to hear we listen; the better to see we look; to smell better we dilate the nostrils and sniff; and so with all the special senses: each sensory impression sets up nascent movements for its better reception.[1] In like manner there is also an adjustment for images which can be distinguished from sensory adjustments almost as readily as these are distinguished from each other. We become most aware of this, as, *mutatis mutandis*, we do of them, when we voluntarily concentrate attention upon particular ideas instead of remaining mere passive spectators, as it were, of the general procession. To this ideational adjustment may be referred most of the strain and "head-splitting" connected with recollecting, reflecting, and all that people call head-work; and the "absent look" of one intently thinking or absorbed in reverie seems directly due to the absence of sensory adjustment that accompanies the concentration of attention upon ideas.

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[1] Moreover, as we shall see, the distinction between present and past or future psychologically presupposes the contrast of impression and image.

Connexion of impressions and images.

But, distinct as they are, impressions and images are still closely connected. In the first place, there are two or three well-marked intermediate stages, so that, though we cannot observe it, we seem justified in assuming a steady transition from the one to the other. As the first of such intermediate stages, it is usual to reckon what are often, and—so far as psychology goes—inaccurately, styled after-images. They would be better described as after-sensations, except perhaps when the sense of sight is specially in question, inasmuch as they are due either (1) to the persistence of the original peripheral excitation after the stimulus is withdrawn, or (2) to the effects of the exhaustion or the repair that immediately follows this excitation. In the former case they are qualitatively identical with the original sensation and are called "positive," in the latter they are complementary to it and are called "negative" (see EYE, vol. viii. p. 823). These last, then, of which we have clear instances only in connexion with sight, are obviously in no sort re-presentations of the original impression, but a sequent presentation of diametrically opposite quality; while positive after-sensations are, psychologically regarded, nothing but the original sensations in a state of evanescence. It is this continuance and gradual waning after the physical stimulus has completely ceased that give after-sensations their chief title to a place in the transition from impression to image. There is, however, another point of resemblance: after-sensations are less affected by movement. If we turn away our eyes we cease to see the flame at which we have been looking, but the after-image remains and is projected upon the wall, and continues still localized in the dark field of sight even if we close our eyes altogether. But the fact that movement affects their localization, though it does not exclude them, and the fact also that we are distinctly aware of our sense-organs being concerned in their presentation, both serve to mark them off as primary and not secondary presentations. The after-sensation is in reality more elementary than either the preceding percept or its image. In both these, in the case of sight, objects appear in space of three dimensions, *i.e.*, with all the marks of solidity and perspective;[2] but the so-called after-image lacks all these. Still further removed from normal sensations (*i.e.*, sensations determined by the stimuli appropriate to the sense-organ) are the "recurrent sensations" often unnoticed but probably experienced more or less frequently by everybody—cases, that is, in which sights or sounds, usually such as at the time were engrossing and impressive, suddenly reappear several hours or even days after the physical stimuli, as well as their effects on the terminal sense-organ, seem entirely to have ceased. Thus workers with the microscope often see objects which they have examined during the day stand out clearly before them in the dark: it was indeed precisely such an experience that led the anatomist Henle first to call attention to these facts. But he and others have wrongly referred them to what he called a "sense-memory"; all that we know is against the supposition that the eye or the ear has any power to retain and reproduce percepts. "Recurrent sensations" have all the marks of percepts which after-images lack; they only differ from what are more strictly called "hallucinations" in being, as regards form and quality, exact reproductions of the original impression and in being independent of all subjective suggestion determined by emotion or mental derangement.

In what Fechner has called the "memory-after-image," or primary memory-image, as it is better termed, we have the ordinary image in its earliest form. As an instance of what is meant may be cited the familiar experience that a knock at the door, the hour struck on the clock, the face of a friend whom we have passed unnoticed, may sometimes be recognized a few moments later by means of the persisting image, although the actual impression was entirely disregarded. But the primary memory-image can always be obtained, and is obtained to most advantage, by looking intently at some object for an instant and then closing the eyes or turning them away. The object is then imaged for a moment very vividly and distinctly, and can be so recovered several times in succession by an effort of attention. Such reinstatement is materially helped by rapidly opening and closing the eyes, or by suddenly moving them in any way. In this respect a primary memory-image resembles an after-sensation, which can be repeatedly revived in this manner when it would otherwise have disappeared. But in other respects the two are very different: the after-sensation is necessarily presented if the intensity and direction of the original excitation suffice for its production, and cannot be presented, however much we attend, if they do not. Moreover, the after-sensation is only for a moment positive, and then passes into the negative or complementary phase, when, so far from even contributing towards the continuance of the original percept, it directly hinders it. Primary memory-images, on the other hand, and indeed all images, depend mainly upon the attention given to the impression; provided that was sufficient the faintest impression may be long retained, and without it very intense ones will soon leave no trace. The primary memory-image retains so much of its original definiteness and intensity as to make it possible with great accuracy to compare two physical phenomena, one of which is in this way remembered while the other is really present; for the most part this is indeed a more accurate procedure than that of dealing with both together. But this is only possible for a very short time. From Weber's experiments with weights and lines[3] it would appear that even after

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[1] Organic sensations, though distinguishable from images by their definite though often anatomically inaccurate localization, furnish no clear evidence of such adaptations. But in another respect they are still more clearly marked off from images, viz., by the pleasure or pain they directly occasion.

[2] The following scant quotation from Fechner, one of the best observers in this department, must suffice in illustration. "Lying awake in the early morning after daybreak, with my eyes motionless though open, there usually appears, when I chance to close them for a moment, the black after-image of the white bed immediately before me and the white after-image of the black stove-pipe some distance away against the opposite wall. . . . Both [after-images] appear as if they were in juxtaposition in the same plane; and, though—when my eyes are open—I seem to see the white bed in its entire length, the after-image—when my eyes are shut—presents instead only a narrow black stripe owing to the fact that the bed is seen considerably fore-shortened. But the memory-image on the other hand completely reproduces the pictorial illusion as it appears when the eyes are open" (*Elemente der Psychophysik*, ii. p. 478).

[3] *Die Lehre vom Tastsinne*, &c., p. 86 *sq.*

10 seconds a considerable waning has taken place, and after 100 seconds all that is distinctive of the primary image has probably ceased.

On the whole, then, it appears that the ordinary memory-image is a joint effect; it is not the mere residuum of changes in the presentation-continuum, but an effect of these only when there has been some concentration of attention upon them. It has the form of a percept, but is not constituted of "revived impressions," for the essential marks of impressions are absent; there is no localization or projection, neither is there the motor adaptation, nor the tone of feeling, incident to the reception of impressions. Ideas do not reproduce the intensity of these original constituents, but only their quality and complication. What we call the vividness of an idea is of the nature of intensity, but it is an intensity very partially and indirectly determined by that of the original impression; it depends much more upon the state of the memory-continuum and the attention the idea receives. The range of vividness in ideas is probably comparatively small; what are called variations in vividness are often really variations in distinctness and completeness.[1] Where we have great intensity, as in hallucinations, primary presentations may be reasonably supposed to enter into the complex.

It is manifest that the memory-continuum has been in some way formed out of or differentiated from the presentation-continuum by the movements of attention, but the precise connexion of the two continua is still very difficult to determine. We see perhaps the first distinct step of this evolution in the primary memory-image: here there has been no cessation in presentation and yet the characteristic marks of the impression are gone, so much so, indeed, that superposition without "fusion" with an exactly similar impression is possible. In this manner we seem to have several primary images in the field of consciousness together, as when we count up the strokes of the clock after it has ceased striking. But, though the image thus first arises in the field of consciousness as a sort of *ἀπόρροια* or emanation from the presentation-continuum, its return (at which stage it first becomes a proper re-presentation) is never determined directly and solely by a second presentation like that which first gave it being. Its "revival" is not another birth. With a second impression exactly like the first we should have assimilation or simple recognition—an identity of the indiscernible which precludes the individual distinctness required in representation. But how, then, was this distinctness in the first instance possible in the series of primary images just referred to as being due to the repetition of the same presentation? Seemingly to differences in the rest of that field of consciousness in which each in turn occurred and to some persistence of these differences. If the whole field which the second impression entered had been just like the field of the first it is hard to see what ground for distinctness there would have been. When such second impression does not occur till after the primary memory-image has ceased, a representation is still possible provided the new impression can reinstate sufficient of the mental framing of the old to give the image individual distinctness. This is really what happens in what is ordinarily called "association by similarity,"—similarity, that is, in the midst of some diversity. Our inquiry into the connexion between presentations and representations has thus brought us to the general consideration of mental association.

Mental Association and the Memory-continuum.

Only a very brief treatment of this important subject is permissible here, as it has already been handled at length under ASSOCIATION OF IDEAS (*q.v.*). Great confusion has been occasioned, as we have seen incidentally, by the lax use of the term "association"; this confusion has been increased by a further laxity in the use of the term "association by similarity." In so far as the similarity amounts to identity, as in assimilation, we have a process which is more fundamental than association by contiguity, but then it is not a process of association. Yet, when the reviving presentation is only partially similar to the presentation revived, the nature of the association does not appear to differ from that operative when one "contiguous" presentation revives another. In the one case we have, say, *a b x* recalling *a b y* and in the other *a b c* recalling *d e f*. Now anybody who will reflect must surely see that the similarity between *a b x* and *a b y*, as distinct from the identity of their partial constituent *a b*, cannot be the means of recall; for this similarity is nothing but the state of mind—to be studied presently—which results when *a b x* and *a b y*, having been recalled, are in consciousness together and then *compared*. But, if *a b*, having concurred with *y* before and being now present in *a b x*, again revives *y*, the association, so far as that goes, is manifestly one of contiguity, albeit the state of mind immediately incident as soon as the revival is complete be what Dr Bain loves to style "the flash of similarity." So far as the mere revival itself goes, there is no more similarity in this case than there is when *a b c* revives *d e f*. For the very *a b c* that now operates as the reviving presentation was obviously never in time contiguous with the *d e f* that is revived; if all traces of previous experiences of *a b c* were obliterated there would be no revival. In other words, the *a b c* now present must be "automatically associated," or, as we prefer to say, must be assimilated to those residua of *a b c* which were "contiguous" with *d e f*, before its representation can occur. And this, and nothing more than this, we have seen, is all the "similarity" that could be at work when *a b x* "brought up" *a b y*.

Contiguity inexplicable.

On the whole, then, we may assume that the only principle of association we have to examine is the so-called "association by contiguity," which, as ordinarily formulated, runs:—Any presentations whatever, which are in consciousness together or in close succession, cohere in such a way that when one recurs it tends to revive the rest, such tendency increasing with the frequency of the conjunction. But such a statement is liable to all the objections already urged against what we may call atomistic psychology. Presentations do not really crowd into Mansoul by the avenues of Eyegate, Eargate, &c., there to form bonds and unions as in Bunyan's famous allegory. It has been often contended that any investigation into the nature of association must be fruitless.[2] But, if association is thus a first principle, it ought at least to admit of such a statement as shall remove the necessity for inquiry. So long, however, as we are asked to conceive presentations originally distinct and isolated becoming eventually linked together, we shall naturally feel the need of some explanation of the process, for neither the isolation nor the links are clear,—not the isolation, for we can only conceive two presentations separated by other presentations intervening; nor the links, unless these are also presentations, and then the difficulty recurs. But, if for contiguity we substitute continuity and regard the associated presentations as parts of a new continuum, the only important inquiry is how this new whole was first of all integrated.

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[1] As we have seen that there is a steady transition from percept to image, so, if space allowed, the study of hallucinations might make clear an opposite and abnormal process—the passage, that is to say, of images into percepts, for such, to all intents and purposes, are hallucinations of perception, psychologically regarded.

[2] So Hume, *Treatise of Human Nature*, pt. i. § 4 (Green and Grose's ed., p. 321); also Lotze, *Metaphysik*, 1st ed., p. 526.

To ascertain this point we must examine each of the two leading divisions of contiguous association—that of simultaneous presentations and that of presentations occurring in close succession. The last, being the clearer, may be taken first. In a series of associated presentations, *A B C D E*, such as the movements made in writing, the words of a poem learned by heart, or the simple letters of the alphabet themselves, we find that each member recalls its successor but not its predecessor. Familiar as this fact is, it is not perhaps easy to explain it satisfactorily. Since *C* is associated both with *B* and *D*, and apparently as intimately with the one as with the other, why does it revive the later only and not the earlier? *B* recalls *C*; why does not *C* recall *B*? We have seen that any reproduction at all of *A* or *B* or *C* depends primarily upon its having been the object of special attention so as to occupy at least momentarily the focus of consciousness. Now we can in the first instance only surmise that the order in which they are reproduced is determined by the order in which they were thus attended to when first presented. The next question is whether the association of objects simultaneously presented can be resolved into an association of objects successively attended to. Whenever we try to recall a scene we saw but for a moment there are always a few traits that recur, the rest being blurred and vague, instead of the whole being revived in equal distinctness or indistinctness. On seeing the same scene a second time our attention is apt to be caught by something unnoticed before, as this has the advantage of novelty; and so on, till we have "lived ourselves into" the whole, which may then admit of simultaneous recall. Dr Bain, who is rightly held to have given the best exposition of the laws of association, admits something very like this in saying that "coexistence is an artificial growth formed from a certain peculiar class of mental successions." But, while it is easy to think of instances in which the associated objects were attended to successively, and we are all perfectly aware that the surest —not to say the only—way to fix the association of a number of objects is by thus concentrating attention on each in turn, it seems hardly possible to mention a case in which attention to the associated objects could not have been successive. In fact, an aggregate of objects on which attention could be focused at once would be already associated.

The only case, then, that now remains to be considered is that—to take it in its simplest form—of two primary presentations *A* and *X*, parts of different special continua or distinct—*i.e.*, non-adjacent—parts of the same, and occupying the focus of consciousness in immediate succession. This constitutes their integration; for the result of this occupation may be regarded as a new continuum in which *A* and *X* become adjacent parts. For it is characteristic of a continuum that an increase in the intensity of any part leads to the intenser presentation of adjacent parts; and in this sense *A* and *X*, which were not originally continuous, have come to be so. We have here, then, some justification for the term secondary or memory-continuum when applied to this continuous series of representations to distinguish it from the primary or presentation-continuum from which its constituents are derived. The most important peculiarity of this continuum, therefore, is that it is a series of representations integrated by means of the movements of attention out of the differentiations of the primary or presentation-continuum, or rather out of so much of these differentiations as pertain to what we know as the primary memory-image. These movements of attention, if the phrase may be allowed, come in the end to depend mainly upon interest, but at first appear to be determined entirely by mere intensity.[1] To them it is proposed to look for that continuity which images lose in so far as they part with the local signs they had as impressions and cease to be either localized or projected. Inasmuch as it is assumed that these movements form the connexion between one representation and another in the memory-train they may be called "temporal signs."[2] The evidence for their existence can be more conveniently adduced presently; it must suffice to remark here that it consists almost wholly of facts connected with voluntary attention and the voluntary control of the flow of ideas, so that temporal signs, unlike local signs, are fundamentally motor and not sensory. And, unlike impressions, representations can have each but a single sign,[3] the continuum of which, in contrast to that of local signs, is not rounded and complete but continuously advancing.

But in saying this we are assuming for a moment that the memory-continuum forms a perfectly single and unbroken train. If it ever actually became so, then, in the absence of any repetition of old impressions and apart from voluntary interference with the train, consciousness, till it ceased entirely, would consist of a fixed and mechanical round of images. Some approximation to such a state is often found in uncultured persons who lead uneventful lives, and still more in idiots, who can scarcely think at all.

Oblivescence.

In actual fact, however, the memory-train is liable to change in two respects, which considerably modify its structure, viz., (1) through the evanescence of some parts, and (2) through the partial recurrence of like impressions, which produces reduplications of varying amount and extent in other parts. As regards the first, we may infer that the waning or sinking towards the threshold of consciousness which we can observe in the primary mental image continues in subconsciousness after the threshold is past. For the longer the time that elapses before their revival the fainter, the less distinct, and the less complete are the images when revived, and the more slowly they rise. All the elements of a complex are not equally revivable, as we have seen already: tastes, smells, and organic sensations, though powerful as impressions to revive other images, have little capacity for ideal reproduction themselves, while muscular movements, though perhaps of all presentations the most readily revived, do not so readily revive other presentations. Idiosyncrasies are, however, frequent; thus we find one person has an exceptional memory for sounds, another for colours, another for forms. Still it is in general true that the most intense, the most impressive, and the most interesting presentations persist the longest. But the evanescence, which is in all cases comparatively rapid at first, deepens sooner or later into real or apparent oblivion. In this manner it comes about that parts of the memory-continuum lose all distinctness of feature and, being without recognizable content, shrivel up to a dim and meagre representation of life that has lapsed—a representation that just suffices, for example, to show us that "our earliest recollections" are not of our first experiences, or to save them from being not only isolated but discontinuous. Such discontinuity can, of course, never be absolute; we must have something represented even to mark the gap. Oblivion and the absence of all representation are thus the same, and the absence of all representation cannot psychologically constitute a break. The terms "evolution" and "involution" have in this respect been happily applied to the rising and falling of representations. When we recall a particular period of our past life or what has long ceased to be a familiar scene, events and features gradually unfold and, as it were, spread out as we keep on attending. A precisely opposite process may then be supposed to take place when they are left in undisturbed forgetfulness; with loss of distinctness in the several members of a whole or series, there is a loss of individuality and of individual differences. And such loss is not a mere latency, as some psychologists, on metaphysical grounds[1] or from a mistaken use of physical analogies, have been led to suppose. There is no real resemblance between the action, or rather inaction, of a particle obedient to the first law of motion and the persistence of a presentation,[2] which is not even the psychical equivalent of an atom.

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[1] This connexion of association with continuous movements of attention makes it easier to understand the difficulty above referred to, viz. that in a series *A B C D . . . B* revives *C* but not *A*, and so on—a difficulty that the analogy of adhesiveness or links leaves unaccountable. To ignore the part played by attention in association, to represent the memory-continuum as due solely to the concurrence of presentations, is perhaps the chief defect of the associationist psychology, both English and German. Mr Spencer's endeavour to show "that psychical life is distinguished from physical life by consisting of successive changes only instead of successive and simultaneous changes" (*Principles of Psychology*, pt. iv. ch. ii., in particular pp. 403, 406) is really nothing but so much testimony to the work of attention in forming the memory continuum, especially when, as there is good reason to do, we reject his assumption that this growing seriality is physically determined.

[2] A term borrowed from Lotze (*Metaphysik*, 1st ed., p. 295), but the present writer is alone responsible for the sense here given to it and the hypothesis in which it is used.

[3] Apart, that is to say, of course from the reduplications of the memory-train spoken of below.

More important changes are produced by the repetition of parts of the memory-train. The effect of this is not merely to prevent the evanescence of the particular image or series of images, but by partial and more or less frequent reduplications of the train upon itself to convert it into a partially new continuum, which we might perhaps call the "ideational continuum." The reduplicated portions of the train are strengthened, while at the points of divergence it becomes comparatively weakened, and this apart from the effects of obliviscence. One who had seen the queen but once would scarcely be likely to think of her without finding the attendant circumstances recur as well; this could not happen after seeing her in a hundred different scenes. The central representation of the whole complex would have become more distinct, whereas the several diverging lines would tend to dissipate attention and, by involving opposing representations, to neutralize each other, so that probably no definite background would be reinstated. Even this central representation would be more or less generalized. It has been often remarked that one's most familiar friends are apt to be mentally pictured less concretely and vividly than persons seen more seldom and then in similar attitudes and moods; in the former case a "generic image" has grown out of such more specific representations as the latter affords. Still further removed from memory-images are the images that result from such familiar percepts as those of horses, houses, trees, &c.

Thus as the joint effect of obliviscence and reduplication we are provided with a flow of ideas distinct from the memory-train and thereby with the material, already more or less organized, for intellectual and volitional manipulation. We do not experience this flow—save very momentarily and occasionally—altogether undisturbed; even in dreams and reverie it is continually interrupted and diverted. Nevertheless it is not difficult to ascertain that, so far as it is left to itself, it takes a very different course from that which we should have to retrace if bent on reminiscence and able to recollect perfectly. The readiness and steadiness of this flow are shown by the extremely small effort necessary in order to follow it. Nevertheless from its very nature it is liable, though not to positive breaches of continuity from its own working, yet to occasional blocks or impediments to the smooth succession of images at points where reduplications diverge, and either permanently or at the particular time neutralize each other.[3]

The flow of ideas is, however, exposed to positive interruptions from two distinct sides,—by the intrusion of new presentations and by voluntary interference. The only result of such interruptions which we need here consider is *the conflict of presentations* that may ensue. Herbart and his followers have gone so far as to elaborate a complete system of psychical statics and dynamics, based on the conception of presentations as forces and on certain more or less improbable assumptions as to the modes in which such forces interact. Since our power of attention is limited, it continually happens that attention is drawn off by new presentations at the expense of old ones. But, even if we regard this non-voluntary redistribution of attention as implying a struggle between presentations, still such conflict to secure a place in consciousness is very different from a conflict between presentations that are already there. Either may be experienced to any degree possible without the other appearing at all; as, absorbed in watching a starry sky, one might be unaware of the chilliness of the air, though recognizing at once, as soon as the cold is felt, that, so far from being incompatible, the clearness and the coldness are causally connected. This difference between a conflict of presentations to enter consciousness, if we allow for a moment the propriety of the expression, and that opposition or incompatibility of presentations which is only possible when they are in consciousness has been strangely confused by the Herbartians. In the former the intensity of the presentation is primarily alone of account; in the latter, on the contrary, quality and content are mainly concerned. Only the last requires any notice here, since such opposition arises when the ideational continuum is interrupted in the ways just mentioned, and apparently arises in no other way. Certainly there is no such opposition between primary presentations: there we have the law of incopresentability preventing the presentation of opposites with the same local sign; and their presentation with different local signs involves, on this level at all events, no conflict. But what has never been presented could hardly be represented, if the ideational process were undisturbed: even in our dreams white negroes or round squares, for instance, never appear. In fact, absurd and bizarre as dream-imagery is, it never at any moment entails overt contradictions, though contradiction may be implicit.

But between ideas and percepts actual incompatibility is frequent. In the perplexity of Isaac, *e.g.*—"The voice is Jacob's voice, but the hands are the hands of Esau"—we have such a case in a familiar form. There is here not merely mental arrest but actual conflict: the voice perceived identifies Jacob, at the same time the hands identify Esau. The images of Esau and Jacob by themselves are different, but do not conflict; neither is there any strain, quite the contrary, in recognizing a person partly like Jacob and partly like Esau. For there is no direct incompatibility between smooth and rough, so long as one pertains only to voice and the other only to hands, but the same hands and voice cannot be both smooth and rough. Similar incompatibilities may arise without the intrusion of percepts, as when, in trying to guess a riddle or to solve a problem, or generally to eliminate intellectual differences, we have images which in themselves are only logically opposite, psychologically opposed, or in conflict, because each strives to enter the same complex. In all such conflicts alike we find, in fact, a relation of presentations the exact converse of that which constitutes similarity. In the latter we have two complete presentations, $a\,b\,x$ and $a\,b\,y$, as similar, each including the common part $a\,b$; in the former we have two partial presentations, x and y, as contraries, each excluding the other from the incomplete $a\,b$—. And this $a\,b$, it is to be noted, is not more essential to the similarity than to the conflict. But in the one case it is a generic image (and can logically be predicated of two subjects); in the other it is a partially determined individual (and cannot be subject to opposing predicates). Except as thus supplementing $a\,b$, x and y do not conflict; black and white are not incompatible save as attributes of the same thing. The possibility of most of these conflicts—of all, indeed, that have any logical interest—lies in that reduplication of the memory-continuum which gives rise to these new complexes, generic images, or general ideas.

Having thus attempted to ascertain the formation of the ideational continuum out of the memory-train, the question arises: How now are we to distinguish between imagining and remembering, and again, between imagining and expecting? It is plainly absurd to make the difference depend on the presence of belief in memory and expectation and on its absence in mere imagination; for the belief itself depends on the difference instead of constituting it. One real and obvious distinction, however, which Hume pointed out as regards memory, is the fixed order and position of the ideas of what is remembered or expected as contrasted with "the liberty" of the imagination to transpose and change its ideas. This order and position in the case of memory are, of course, normally those of the original impressions, but it seems rather naive of Hume to tell us that memory "is tied down to these without any power of variation," while imagination has liberty to transpose as it pleases, as if the originals sat to memory for their portraits, while to imagination they were but studies. Such correspondence being out of the question—as Hume takes care to state as soon as it suits him—all we have, so far, is this fixity and definiteness as contrasted with the kaleidoscopic instability of ideation. In this respect what is remembered or expected resembles what is perceived: the grouping not only does not change capriciously and spontaneously, but resists any mental efforts to change it. But, provided these characteristics are there, we should be apt to believe that we are remembering, just as, *mutatis mutandis*, with like characteristics we might believe that we were perceiving: hallucination is possible in either case.

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[1] So, *e.g.*, Hamilton (following H. Schmid), *Lect. on Met.*, ii. p. 2[illegible] *sq.*

[2] Cf. Lotze, *Metaphysik*, p. 518.

[3] It is a mark of the looseness of much of our psychological terminology that facts of this kind are commonly described as cases of association. Dr Bain calls them "obstructive association," which is about on a par with "progress backwards"; Mr Sully's "divergent association" is better. But it is plain that what we really have is an arrest or inhibition consequent on association, and nothing that is either itself association or that leads to association.

This fixity of order and position is, however, not sufficient to constitute a typical remembrance where the term is exactly used. But remembering is often regarded as equivalent to knowing and recognizing, as when on revisiting some once familiar place one remarks, "How well I remember it!" What is meant is that the place is recognized, and that its recognition awakens memories. Memory includes recognition; recognition as such does not include memory. In human consciousness, as we directly observe it, there is, perhaps, no pure recognition: here the new presentation is not only assimilated to the old, but the former framing of circumstance is reinstated, and so perforce distinguished from the present. It may be there is no warrant for supposing that such redintegration of a preceding field is ever absolutely *nil*, still we are justified in regarding it as extremely vague and meagre, both where mental evolution is but slightly advanced and where frequent repetition in varying and irrelevant circumstances has produced a blurred and neutral zone. The last is the case with a great part of our knowledge; the writer happens to know that *bos* is the Latin for "ox" and *bufo* the Latin for "toad," and may be said to remember both items of knowledge, if "remember" is only to be synonymous with "retain." But if he came across *bos* in reading he would think of an ox and nothing more; *bufo* would immediately call up not only "toad" but Virgil's *Georgics*, the only place in which he has seen the word, and which he never read but once. In the former there is so far nothing but recognition (which, however, of course rests upon retentiveness); in the latter there is also remembrance of the time and circumstances in which that piece of knowledge was acquired. Of course in so far as we are aware that we recognize we also think that remembrance is at any rate possible, since what we know we must previously have learned,—recognition excluding novelty. But the point here urged is that there is an actual remembrance only when the recognition is accompanied by a reinstatement of portions of the memory train continuous with the previous presentation of what is now recognized. Summarily stated, we may say that between knowing and remembering on the one hand and imagining on the other the difference primarily turns on the fixity and completeness of the grouping in the former; in the latter there is a shifting play of images more or less "generic," reminding one of "dissolving views." Hence the first two approximate in character to perception, and are rightly called recognitions. Between them, again, the difference turns primarily on the presence or absence of temporal signs. In what is remembered these are still intact enough to ensure a localization in the past of what is recognized; in what is known merely such localization is prevented, either because of the obliviscence of temporal connexions or because the reduplications of the memory-train that have consolidated the central group have entailed their suppression. There is further the difference first mentioned, which is often only a difference of degree, viz., that remembrances have more circumstantiality, so to say, than mere recognitions have: more of the collateral constituents of the original concrete field of consciousness are reinstated. But of the two characteristics of memory proper—(*a*) concreteness or circumstantiality, and (*b*) localization in the past—the latter is the more essential It sometimes happens that we have the one with little or nothing of the other. For example, we may have but a faint and meagre representation of a scene, yet if it falls into and retains a fixed place in the memory-train we have no doubt that some such experience was once actually ours On the other hand, as in certain so-called illusions of memory, we may suddenly find ourselves reminded by what is happening at the moment of a preceding experience exactly like it—some even feel that they know from what is thus recalled what will happen next; and yet, because we are wholly unable to assign such representation a place in the past, instead of a belief that it happened, there arises a most distressing sense of bewilderment, as if one were haunted and had lost one's personal bearings.[1] It has been held by some psychologists[2] that memory proper includes the representation of one's past self as agent or patient in the event or situation recalled And this is true as regards all but the earliest human experience, at any rate; still whereas it is easy to see that memory is essential to any development of self-consciousness, the converse is not at all clear, and would involve us in a needless circle.

Expectation.

Intimately connected with memory is expectation. We may as the result of reasoning conclude that a certain event will happen; we may also, in like manner, conclude that a certain other event has happened. But as we should *not* call the latter memory, so it is desirable to distinguish such indirect anticipation as the former from that expectation which is directly due to the interaction of ideas. Any man knows that he will die, and may make a variety of arrangements in anticipation of death, but he cannot with propriety be said to be expecting it unless he has actually present to his mind a series of ideas ending in that of death, such series being due to previous associations, and unless, further, this series owes its representation at this moment to the actual recurrence of some experience to which that series succeeded before. And as familiarity with an object or event in very various settings may be a bar to recollection, so it may be to expectation: the average Englishman, *e.g.*, is continually surprised without his umbrella, though only too familiar with rain, since in his climate one not specially attentive to the weather obtains no clear representation of its successive phases. But after a series of events *A B C D E* . . . has been once experienced we instinctively expect the recurrence of BC . . . on the recurrence of A, *i.e.*, provided the memory-train continues so far intact. Such expectation, at first perhaps slight—a mere tendency easily overborne—becomes strengthened by every repetition of the series in the old order, till eventually, if often fulfilled and never falsified, it becomes certain and, as we commonly say, irresistible. To have a clear case of expectation, then, it is not necessary that we should distinctly remember any previous experience like it, but only that we should have actually present some earlier member of a series which has been firmly associated by such previous experiences, the remaining members, or at least the next, if they continue serial, being revived through that which is once again realized. This expectation may be instantly checked by reflexion, just as it may of course be disappointed in fact; but these are matters which do not concern the inquiry as to the nature of expectation while expectation lasts.

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[1] Any full discussion of these very interesting states of mind belongs to mental pathology

[2] As, *e.g.*, James Mill (*Analysis of the Human Mind*, ch. x.), who treats this difficult subject with great acuteness and thoroughness

We shall continue this inquiry to most advantage by now widening it into an examination of the distinction of present, past, and future. To a being whose presentations never passed through the transitions which ours undergo—first divested of the strength and vividness of impressions, again reinvested with them and brought back from the faint world of ideas—the sharp contrasts of "now" and "then," and all the manifold emotions they occasion, would be quite unknown. Even we, so far as we confine our activity and attention to ideas, are almost without them. Time-order, succession, antecedence and consequence, of course, there might be still, but in that sense of events as "past and gone for ever," which is one of the melancholy factors in our life; and in the obligation to wait and work in hope or dread of what is "still to come" there is much more than time-order. It is to presentations in their primary stage, to impressions, that we owe what real difference we find between now and then, whether prospective or retrospective, as it is to them also that we directly owe our sense of the *real*, of what *is* and exists as opposed to the non-existent that is not. But the present alone and life in a succession of presents, or, in other words, continuous occupation with impressions, give us no knowledge of the present as present. This we first obtain when our present consciousness consists partly of memories or partly of expectations as well. An event expected differs from a like event remembered chiefly in two ways—in its relation to present impressions and images and in the active attitude to which it leads. The diverse feelings that accompany our intuitions of time and contribute so largely to their colouring are mainly consequences of these differences. Let us take a series of simple and familiar events $ABCDE$, representing ideas by small letters and perceptions by capitals whenever it is necessary to distinguish them. Such series may be present in consciousness in such wise that $a\,b\,c\,d$ are imaged while E is perceived anew, *i.e.*, the whole symbolized as proposed would be $abcdE$; such would be, *e.g.*, the state of a dog which had just finished his daily meal. Again, there may be a fresh impression of A which revives $b\,c\,d\,e$, we should have then (1) $Abcde$—the state of our dog when he next day gets sight of the dish in which his food is brought to him. A little later we may have (2) $a\,b\,C\,d\,e$. Here $a\,b$ are either after-sensations or primary memory-images, or have at any rate the increased intensity due to recent impression; but this increased intensity will be rapidly on the wane even while C lasts, and $a\,b$ will pale still further when C gives place to D, and we have (3) $a\,b\,c\,D\,e$. But, returning to (2), we should find de to be increasing in intensity and definiteness, as compared with their state in (1), now that C, instead of A, is the present impression. For, when A occupied this position, not only was e raised less prominently above the threshold of consciousness by reason of its greater distance from A in the memory-continuum, but, owing to the reduplications of this continuum, more lines of possible revival were opened up, to be successively negatived as B succeeded to A and C to B; even dogs know that "there is many a slip 'twixt the cup and the lip." But, where $A\,B\,C\,D\,E$ is a series of percepts such as we have here supposed—and a series of simpler states would hardly afford much ground for the distinctions of past, present, and future—there would be a varying amount of active adjustment of sense-organs and other movements supplementary to full sensation. In (2), the point at which we have $a\,b\,C\,d\,e$, for instance, such adjustments and movements as were appropriate to b would cease as B lapsed and be replaced by those appropriate to C. Again, as C succeeded to B, and d in consequence increased in intensity and definiteness, the movements adapted to the reception of D would become nascent, and so on. Thus, psychologically regarded, the distinction of past and future and what we might call the oneness of direction of time depend, as just described, (1) upon the continuous sinking of the primary memory-images on the one side, and the continuous rising of the ordinary images on the other side, of that member of a series of percepts then repeating which is actual at the moment; and (2) on the prevenient adjustments of attention, to which such words as "expect," "await," "anticipate," all testify by their etymology. These conditions in turn will be found to depend upon all that is implied in the formation of the memory-train and upon that recurrence of like series of impressions which we attribute to the "uniformity of nature." If we never had the same series of impressions twice, knowledge of time would be impossible, as indeed would knowledge of any sort.

Succession.

This is perhaps the fittest point at which to inquire into the character and origin of our knowledge of succession and duration, so far, that is, as such an inquiry belongs to psychology. We have not to ask how time itself comes to be; but, assuming it to be, we ask how the individual comes to know it. Time is often figuratively represented as a line, and we may perhaps utilize this figure to make clear the relation of our intuition of time to what we call time itself. Time, then, we say, stretches backwards and forwards from the present moment. But the present, though a point of time, is still such that we can and do in that moment attend to a plurality of presentations to which we might otherwise have attended severally in successive moments. Granting this implication of simultaneity and succession, we may, if we represent succession as a line, represent simultaneity as a second line at right angles to the first; empty time—or time-length without time-breadth, we may say—is a mere abstraction. Now it is with the former line that we have to do in treating of time as it is, and with the latter in treating of our intuition of time, where, just as in a perspective representation of distance, we are confined to lines in a plane at right angles to the actual line of depth. In a succession of events, say of sense-impressions, $A\ B\ C\ D\ E$ . . . the presence of B means the absence of A and of C, but the presentation of this succession involves the simultaneous presence, in some mode or other, of two or more of the presentations $A\ B\ C\ D$. In presentation, as we have seen, all that corresponds to the differences of past, present, and future is in consciousness simultaneously. This truism —or paradox—that all we know of succession is but an interpretation of what is really simultaneous or coexistent, we may then concisely express by saying that we are aware of time only through time-perspective, and experience shows that it is a long step from a succession of presentations to such presentation of succession The first condition is that we should have represented together presentations that were in the first instance attended to successively, and this we have both in the persistence of primary memory-images and in the simultaneous reproduction of longer or shorter portions of the memory-train. In a series thus secured there may be time-marks, though no time, and by these marks the series must be distinguished from other simultaneous series. To ask which is first among a number of simultaneous presentations is unmeaning; one might be logically prior to another, but in time they are together and priority is excluded. Nevertheless after each distinct representation a, b, c, d there probably follows, as we have supposed, some trace of that movement of attention of which we are aware in passing from one presentation to another. In our present reminiscences we have, it must be allowed, little direct proof of this interposition, though there is strong indirect evidence of it in the tendency of the flow to follow the order in which the presentations were first attended to. With the movements themselves we are familiar enough, though the residua of such movements are not ordinarily conspicuous. These residua, then, are our temporal signs, and, together with the representations connected by them, constitute the memory-continuum. But temporal signs alone will not furnish all the pictorial exactness of the time-perspective. They give us only a fixed series; but the working of obliviscence, by insuring a progressive variation in intensity and distinctness as we pass from one member of the series to the other, yields the effect which we call time-distance. By themselves such variations would leave us liable to confound more vivid representations in the distance with fainter ones nearer the present, but from this mistake the temporal signs save us; and, as a matter of fact, where the memory-train is imperfect such mistakes continually occur. On the other hand, where these variations are slight and imperceptible, though the memory-continuum preserves the order of events intact, we have still no such distinct appreciation of comparative distance in time as we have nearer the present where these perspective effects are considerable.

When in retrospect we note that a particular presentation X has had a place in the field of consciousness, while a series of objects $A\ B\ C\ D$ . . . have succeeded each other, then we may be said in observing this relation of the two to perceive the duration of X. And it is in this way that we do subjectively estimate longer periods of time. But first, it is evident that we cannot apply this method to indefinitely short periods without passing beyond the region of distinct presentation; and, since the *knowledge* of duration implies a relation between distinguishable presentations $A\ B\ C\ D$ and X, the case is one in which the hypothesis of subconsciousness can hardly help any but those who confound the fact of time with the knowledge of it. Secondly, if we are to compare different durations at all, it is not enough that one of them should last out a series $A\ B\ C\ D$, and another a series $L\ M\ N\ O$; we also want some sort of common measure of those series. Locke was awake to this point, though he expresses himself vaguely (*Essay*, ii. 14, §§ 9-12). He speaks of our ideas succeeding each other "at certain distances not much unlike the images in the inside of a lantern turned round by the heat of a candle," and "guesses" that "this appearance of theirs in train varies not very much in a waking man." Now what is this "distance" that separates A from B, B from C, and so on, and what means have we of knowing that it is tolerably constant in waking life? It is probably, that the residuum of which we have called a temporal sign; or, in other words, it is the movement of attention from A to B. But we must endeavour here to get a more exact notion of this movement. Everybody knows what it is to be distracted by a rapid succession of varied impressions, and equally what it is to be wearied by the slow and monotonous recurrence of the same impressions. Now these "feelings" of distraction and tedium owe their characteristic qualities to movements of attention. In the first, attention is kept incessantly on the move: before it is accommodated to A, it is disturbed by the suddenness, intensity, or novelty of B; in the second, it is kept all but stationary by the repeated presentation of the same impression. Such excess and defect of surprises make one realize a fact which in ordinary life is so obscure as to escape notice. But recent experiments have set this fact in a more striking light, and made clear what Locke had dimly before his mind in talking of a certain distance between the presentations of a waking man. In estimating very short periods of time, of a second or less, indicated say by the beats of a metronome, it is found that there is a certain period for which the mean of a number of estimates is correct, while shorter periods are on the whole overestimated, and longer periods underestimated. This we may perhaps take to be evidence of the time occupied in accommodating or fixing attention. Whether the "point of indifference" is determined by the rate of usual bodily movement, as Spencer asserts and Wundt conjectures, or conversely, is a question we need not discuss just now. But, though the fixation of attention does of course really occupy time, it is probably not in the first instance perceived as time, *i.e.*, as continuous "protensity," to use a term of Hamilton's, but as intensity. Thus, if this supposition be true, there is an element in our concrete time-perceptions which has no place in our abstract conception of time. In time conceived as physical there is no trace of intensity; in time psychically experienced duration is primarily an intensive magnitude, witness the comparison of times when we are "bored" with others when we are amused. It must have struck every one as strange who has reflected upon it that a period of time which seems long in retrospect—such as an eventful excursion—should have appeared short in passing; while a period, on the contrary, which in memory has dwindled to a wretched span seemed everlasting till it was gone. But, if we consider that in retrospect length of time is represented primarily and chiefly by impressions that have survived, we have an explanation of one-half; and in the intensity of the movements of attention we shall perhaps find an explanation of the other. What tells in retrospect is the series $a\ b\ c\ d\ e$, &c.; what tells in the present is the intervening $t_1 t_2 t_3$, &c., or rather the original accommodation of which these temporal signs are the residuum. For, as we have seen elsewhere, the intensity of a presentation does not persist, so that in memory the residuum of the most intense feeling of tedium may only be so many t's in a memory-continuum whose surviving members are few and uninteresting. But in the actual experience, say, of a wearisome sermon, when the expectation of release is continually balked and attention forced back upon a monotonous dribble of platitudes, the one impressive fact is the hearer's impatience. On the other hand, so long as we are entertained, attention is never involuntary, and there is no continually deferred expectation. Just as we are said to walk with least effort when our pace accords with the rate of swing of our legs regarded as pendulums, so in pastimes impressions succeed each other at the rate at which attention can be most easily accommodated, and are such that we attend willingly. We are absorbed in the present without being unwillingly confined to it; not only is there no motive for retrospect or expectation, but there is no feeling that the present endures. Each impression lasts as long as it is interesting, but does not continue to monopolize the focus of consciousness till attention to it is fatiguing, because uninteresting. In such facts, then, we seem to have proof that our perception of duration rests, ultimately upon quasi-motor objects of varying intensity, the duration of which we do not directly experience as duration at all. They do endure and their intensity is a function of their duration; but the intensity is all that we directly perceive. In other words, it is here contended that what Locke called an instant or moment—"the time of one idea in our minds without the succession of another, wherein therefore we perceive no succession at all"—is psychologically not "a part in duration" in that sense in which, as he says, "we cannot conceive any duration without succession" (*Essay*, ii. 16, 12).

How do we know that the distance between our ideas cannot vary beyond certain bounds? This is not altogether a psychological question; but we are perhaps entitled to note some interesting facts bearing upon it which may also serve to connect the perceptions of duration and succession. If we make a Savart's wheel with a single tooth revolve slowly, say in three-quarters of a second, it will be found that in the long-run we estimate this interval correctly,—slight overestimates and slight underestimates occurring indifferently. If we next place a second tooth opposite the first, letting the wheel revolve as before, so as to divide the three-quarters of a second into two intervals, we shall on the average overestimate it, and must increase the whole period to reach a new point of indifference. With two other teeth at right angles to the first two, the three-quarters of a second will appear longer still, and the time of a revolution must be still more increased before we shall cease to overestimate it. If we next employ, say, six teeth, 60° apart, the wheel revolving as at first, we shall detect ourselves attending to the alternate strokes, say to the first, third, and fifth, or perhaps to the third and the sixth; in this way, though we continue to overestimate the total period, we can note the number and regularity of the subdivisions. If these, however, be yet further increased, we can no longer reproduce them, though still aware that the whole period is divided into parts. But by the time we have introduced about fifteen equidistant teeth, although there is physically an alternation of noise and silence as before, we perceive only a continuous hum, which steadily changes in quality as the number of teeth is further increased. Facts like these not only show that we estimate duration primarily by the effects of attention, but also make it probable that such estimate is fairly constant, since it is always approximately the same physical interval that becomes blurred. Further, we see that, where the distance between successive presentations is too short for a separate fixation of attention upon each, we proceed to take them in groups. This procedure is facilitated by differences in the quality and intensity of the objects as well as by differences in the intervals between them; hence among other things the æsthetic properties of modulation and rhythm.

But, if our experience of time depends primarily upon acts of attention to a succession of distinct objects, it would seem that time, subjectively regarded, must be discrete and not continuous. This, which is the view steadily maintained by the psychologists of Herbart's school, was implied if not stated by Locke, Berkeley, and Hume. Locke hopelessly confuses time as perceived and time as conceived, and can only save himself from pressing objections by the retort, "It is very common to observe intelligible discourses spoiled by too much subtlety in nice divisions." But Berkeley and Hume with the mathematical discoveries of Newton and Leibnitz before them could only protest that there was nothing answering to mathematical continuity in our experience. And, whereas Locke had tried to combine with his general psychological account the inconsistent position that "none of the distinct ideas we have of either [space or time] is without all manner of composition," Berkeley declares, "For my own part, whenever I attempt to frame a simple idea of time, abstracted from the succession of ideas in my mind, which flows uniformly and is participated by all beings, I am lost and embrangled in inextricable difficulties. I have no notion of it at all, only I hear others say it is infinitely divisible, and speak of it in such a manner as leads me to harbour odd thoughts of my existence. . . . Time therefore being nothing, abstracted from the succession of ideas in our minds, it follows that the duration of any finite spirit must be estimated *by the number of ideas or actions* succeeding each other in that same spirit or mind" (*Principles of Knowledge*, i. § 98). Hume, again, is at still greater pains to show that "the *idea* which we form of any finite quality is not infinitely divisible, but that by proper distinctions and separations we may run this idea up to inferior ones, which will be perfectly simple and indivisible . . . that the imagination reaches a *minimum*, and may raise up to itself an idea of which it cannot conceive any subdivision, and which cannot be diminished without a total annihilation" (*Human Nature*, pt. ii. § 1, Green's ed., p. 335).

At the first blush we are perhaps disposed to accept this account of our time-perception, as Wundt, *e.g.*, does, and to regard the attribution of continuity as wholly the result of after-reflexion.[1] But it may be doubted if this is really an exact analysis of the case. Granted that the impressions to which we chiefly attend are distinct and discontinuous in their occupation of the focus of consciousness, and that, so far, the most vivid element in our time-experience is discrete; granted further that in recollection and expectation such objects are still distinct—all which seems to imply that time is a mere plurality—yet there is more behind. The whole field of consciousness is not occupied by distinct objects, neither are the changes in this field discontinuous. The experimental facts above-mentioned illustrate the transition from a succession the members of which are distinctly attended to to one in which they are indistinctly attended to, *i.e.*, are not discontinuous enough to be separately distinguished. Attention does not move by hops from one definite spot to another, but, as Wundt himself allows, by alternate diffusion and concentration, like the foot of a snail, which never leaves the surface it is traversing. We have a clear presentation discerned as *A* or *B* when attention is gathered up; and, when attention spreads out, we have confused presentations not admitting of recognition. But, though not recognizable, such confused presentations are represented, and so serve to bridge over the comparatively empty interval during which attention is unfocused. Thus our perception of a period of time is not comparable to so many terms in a series of finite units any more than it is to a series of infinitesimals. When attention is concentrated in expectation of some single impression, then, no doubt, it is brought to a very fine point ("zugespitzt," as Herbart would say); and a succession of such impressions would be represented as relatively discrete compared with the representation of the scenery of a day-dream. But absolutely discrete it is not and cannot be. In this respect the truth is rather with Herbert Spencer, who, treating of this subject from another point of view, remarks, "When the facts are contemplated objectively, it becomes manifest that, though the changes constituting intelligence approach to a single succession, they do not absolutely form one" (*Psychology*, i. § 180, p. 403).

On the whole, then, we may conclude that our concrete time-experiences are due to the simultaneous representation of a series of definite presentations both accompanied and separated by more or fewer indefinite presentations more or less confused; that, further, the definite presentations have certain marks or temporal signs due to the movements of attention; that the rate of these movements or accommodations is approximately constant; and that each movement itself is primarily experienced as an intensity.

Feeling.

Such summary survey as these limits allow of the more elementary facts of cognition is here at an end; so far the most conspicuous factors at work have been those of what might be termed our ideational mechanism. In the higher processes of thought we have to take more account of mental activity and of the part played by language. But it seems preferable, before entering upon this, to explore also the emotional and active constituents of mind in their more elementary phases.

In our preliminary survey we have seen that psychical life consists in the main of a continuous alternation of receptive and reactive consciousness, *i.e.*, in its earliest form, of alternations of sensation and movement. At a later stage we find that in the receptive phase ideation is added to sensation, and that in the active phase thought and fancy, or the voluntary manipulation and control of the ideational trains, are added to the voluntary manipulation and control of the muscles. At this higher level also it is possible that either form of receptive consciousness may lead to either form of active: sensations may lead to thought rather than to action in the restricted sense, and ideas apart from sensations may prompt to muscular exertion. There is a further complication still: not only may either sensations or ideas lead to either muscular or mental movements, but movements themselves, whether of mind or limb, may as mere presentations determine other movements of either kind. In this respect, however, movements and thoughts either in themselves or through their sensational and ideational accompaniments may be regarded as pertaining to the receptive side of consciousness. With these provisos, then, the broad generalization may hold that receptive states lead through feeling to active states, and that presentations that give neither pleasure nor pain meet with no responsive action. But first the objection must be met that presentations that are in themselves purely indifferent lead continually to very energetic action, often the promptest and most definite action. To this there are two answers. First, on the higher levels of psychical life presentations in themselves indifferent are often indirectly interesting as signs of, or as means to, other presentations that are more directly interesting. It is enough for the present, therefore, if it be admitted that all such indifferent presentations are without effect as often as they are *not* instrumental in furthering the realization of some desirable end. Secondly, a large class of movements, such as those called sensori-motor and ideo-motor, are initiated by presentations that are frequently, it must be allowed, neither pleasurable nor painful. In all such cases, however, there is probably only an apparent exception to the principle of subjective selection. They may all be regarded as instances of another important psychological principle which we have to deal with more fully by and by, viz., that voluntary actions, and especially those that either only avert pain or are merely subsidiary to pleasure-giving actions, tend at length, as the effect of habit in the individual and of heredity in the race, to become "secondarily automatic," as it has been called. Such mechanical or instinctive dexterities make possible a more efficient use of present energies in securing pleasurable and interesting experiences, and, like the rings of former growths in a tree, afford a basis for further advance, as old interests pall and new ones present themselves. Here, again, it suffices for our present purpose if it be granted that there is a fair presumption in favour of supposing all such movements to have been originally initiated by feeling, as certainly very many of them were.

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[1] Comp. Wundt, *Logik*, vol. i. p. 432.

Of the feeling itself that intervenes between these sensory and motor presentations there is but little to be said. The chief points have been already insisted upon, viz., that it is not itself a presentation, but a purely subjective state, at once the effect of a change in receptive consciousness and the cause of a change in motor consciousness; hence its continual confusion either with the movements, whether ideational or muscular, that are its expression, or with the sensations or ideas that are its cause. For feeling as such is, so to put it, matter of *being* rather than of direct knowledge; and all that we know about it we know from its antecedents or consequents in presentation.

Causes of Feeling.

Pure feeling, then, ranging solely between the opposite extremes of pleasure and pain, we are naturally led to inquire whether there is any corresponding contrast in the causes of feeling on the one hand, and on the other in its manifestations and effects. To begin with the first question, which we may thus formulate: What, if any, are the invariable differences characteristic of the presentations or states of mind we respectively like and dislike; or, taking account of the diverse sources of feeling—sensuous, æsthetic, intellectual, active—is there anything that we can predicate alike of all that are pleasurable and deny of all that are painful, and *vice versa*? It is at once evident that at least in presentations objectively regarded no such common characters will be found; if we find them anywhere it must be in some relation to the conscious subject, *i.e.*, in the fact of presentation itself. There is one important truth concerning pleasures and pains that may occur at once as an answer to our inquiry, and that is often advanced as such, viz., that whatever is pleasurable tends to further and perfect life, and whatever is painful to disturb or destroy it. The many seeming exceptions to this law of self-conservation, as it has been called, probably all admit of explanation in conformity with it, so as to leave its substantial truth unimpeached.[1] But this law, however stated, is too teleological to serve as a purely psychological principle, and, as generally formulated and illustrated, it takes account of matters quite outside the psychologist's ken. We are not now concerned to know *why* a bitter taste, *e.g.*, is painful or the gratification of an appetite pleasant, but *what* marks distinctive of all painful presentations the one has and the other lacks. From a biological standpoint it may be true enough that the final cause of sexual and parental feelings is the perpetuation of the species; but this does not help us to ascertain what common character they have as actual sources of feeling for the individual. From the biological standpoint even the senile decadence and death of the individual may be shown to be advantageous to the race; but it would certainly be odd to describe this as advantageous to the individual, so different are the two points of view. What we are in search of, although a generalization, has reference to something much more concrete than conceptions like race or life, and does not require us to go beyond the consciousness of the moment to such ulterior facts as they imply.

Were it possible it would be quite unnecessary to examine in detail every variety of pleasurable and painful consciousness in connexion with a general inquiry of this sort. It will be best to enumerate at the outset the only cases that specially call for investigation. Feeling may arise mainly from (1) single sensations or movements, including in these what recent psychologists call their *tone*; or it may be chiefly determined by (2) some combination or arrangement of these primary presentations,—hence what might be styled the lower æsthetic feelings. We have thus among primary presentations a more material and a more formal cause or ground of feeling. The mere representation of these sources of feeling involves nothing of moment: the idea of a bright colour or a bitter taste has not definiteness or intensity enough to produce feeling; and the ideal presentation of a harmonious arrangement of sounds or colours does not in itself differ essentially as regards the feeling it occasions from the actual presentation. When we advance to the level at which there occur ideas more complex and more highly representative—or re-representative, as Mr Spencer would say—than any we have yet considered we can again distinguish between material and formal grounds of feeling. To the first we might refer, *e.g.*, (3) the egoistic, sympathetic, and religious feelings; this class will probably require but brief notice. The second, consisting of (4) the intellectual and (5) the higher æsthetic feelings, is more important. There is a special class of feelings, which might be distinguished from all the preceding as *reflex*, since they arise from the memory or expectation of feelings; but in fact these are largely involved in all the higher feelings, and this brief reference to them will suffice; of such hope, fear, regret, are examples.

1. The quality and intensity as well as the duration and frequency of a sensation or movement all have to do with determining to what feeling it gives rise. It will be best to leave the last two out of account for a time. Apart from these, the pleasantness or painfulness of a movement appears to depend solely upon its intensity, that is to say, upon the amount of effort necessary to effect it, in such wise that a certain amount of exertion is agreeable and any excess disagreeable. Some sensations also, such as light and sound, are agreeable if not too intense, their pleasantness increasing with their intensity up to a certain point, on nearing which the feeling rapidly changes and becomes disagreeable or even painful. Other sensations, as bitter tastes, *e.g.*, are naturally unpleasant, however faint,—though we must allow the possibility of an acquired liking for moderately bitter or pungent flavours. But in every case such sensations produce unmistakable

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[1] See Spencer, *Data of Ethics*, chaps. i.-iv.; G. H. Schneider, *Freud und Leid des Menschengeschlechts*, chap. i.

manifestations of disgust, if at all intense. Sweet tastes, on the other hand, however intense, are pleasant to an unspoiled palate, though apt before long to become mawkish, like "sweetest honey, loathsome in his own deliciousness," as confectioners' apprentices are said soon to find. The painfulness of all painful sensations or movements increases with their intensity without any assignable maximum being reached.

A comparison of examples of this kind, which it would be tedious to describe more fully and which are indeed too familiar to need much description, seems to show (1) that, so far as feeling is determined by the intensity of a presentation, there is pleasure so long as attention can be adapted or accommodated to the presentation, and pain so soon as the intensity is too great for this; and (2) that, so far as feeling is determined by the quality of a presentation, those that are pleasurable enlarge the field of consciousness and introduce or agreeably increase in intensity certain organic sensations, while those that are painful contract the field of consciousness and introduce or disagreeably increase in intensity certain organic sensations. There are certain other hedonic effects due to quality the examination of which we must for the present defer. Meanwhile as to the first point it may be suggested, as at any rate a working hypothesis, that in itself any and every simple sensation or movement is pleasurable if there is attention forthcoming adequate to its intensity. In the earliest and simplest phases of life, in which the presentation-continuum is but little differentiated, it is reasonable to suppose that variation in the intensity of presentation preponderates over changes in the quality of presentation, and that to the same extent feeling is determined by the former and not by the latter. And, whereas this dependence on intensity is invariable, there is no ground for supposing the quality of any primary presentation, when not of excessive intensity, to be invariably disagreeable; the changes above-mentioned in the hedonic effects of bitter tastes, sweet tastes, or the like tend rather to prove the contrary. This brings us to the second point, and it requires some elucidation. We need here to call to mind the continuity of our presentations and especially the existence of a background of organic sensations or somatic consciousness, as it is variously termed. By the time that qualitatively distinct presentations have been differentiated from this common basis it becomes possible for any of these, without having the intensity requisite to affect feeling directly, to change it indirectly by means of the systemic sensations accompanying them, or, in other words, by their tone. The physiological concomitants of these changes of somatic tone are largely reflex movements or equivalents of movements, such as alterations in circulatory, respiratory, and excretory processes. Such movements are psychologically movements no longer, and are rightly regarded as pertaining wholly to the sensory division of presentations. But originally it may have been otherwise. To us now, these organic reflexes seem but part and parcel of the special sensation whose tone they form, and which they accompany even when that sensation, so far as its mere intensity goes, might be deemed indifferent. But perhaps at first the special qualities that are now throughout unpleasant may have been always presented with an excessive intensity that would be painful on this score alone, and the reflexes that at present pertain to them may then have been psychologically the expression of this pain.[1] At any rate it is manifestly unfair to refuse either to seek out the primitive effects of the sensations in question and allow for the workings of heredity, or to reckon this accompanying systemic feeling as part of them. The latter seems the readier and perhaps, too, the preferable course. A word will now suffice to explain what is meant by enlarging and contracting the field of consciousness and agreeably increasing or decreasing certain elements therein.

The difference in point is manifest on comparing the flow of spirits, buoyancy, and animation which result from a certain duration of pleasurable sensations with the lowness or depression of spirits, the gloom and heaviness of heart, apt to ensue from prolonged physical pain. Common language, in fact, leaves us no choice but to describe these contrasted states by figures which clearly imply that they differ in the range and variety of the presentations that make up consciousness, and in the quickness with which these succeed each other.[2] It is not merely that in hilarity as contrasted with dejection the train of ideas takes a wider sweep and shows greater liveliness, but as it were at the back of this, on the lower level of purely sensory experience, certain organic sensations which are ordinarily indifferent acquire a gentle intensity, which seems by flowing over to quicken and expand the ideational stream, as we see, for instance, in the effects of mountain air and sunshine. Or, on the other hand, these sensations become so violently intense as to drain off and ingulf all available energy in one monotonous corroding care, an oppressive weight which leaves no place for free movement, no life or leisure to respond to what are wont to be pleasurable solicitations.[3]

As regards the duration and the frequency of presentation, it is in general true that the hedonic effect soon attains its maximum, and then, if pleasant, rapidly declines, or even changes to its opposite. Pains in like manner decline, but more slowly, and without in the same sense changing to pleasures. The like holds of too frequent repetition. Physiological explanation of these facts, good as far as it goes, is, of course, at once forthcoming: sensibility is blunted, time is required for restoration, and so forth; but at least we want the psychological equivalent of all this. In one respect we find nothing materially new: so far as continued presentation entails diminished intensity we have nothing but diminished feeling as a consequence; so far as its continued presentation entails satiety the train of agreeable accompaniments ceases in which the pleasurable tone consisted. But in another way long duration and frequent repetition produce indirectly certain characteristic effects on feeling in consequence of habituation and accommodation. We may get used to a painful presentation in such wise that we cease to be conscious of it as positively disagreeable, though its cessation is at once a source of pleasure; in like manner we come to require things simply because it is painful to be without them, although their possession has long ceased to be a ground of positive enjoyment. This loss (or gain) consequent on accommodation[1] has a most important effect in changing the sources of feeling: it helps to transfer attention from mere sensations to what we may distinguish as interests.

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[1] In the lowly organisms that absorb food directly through the skin such bitter juices as exist naturally might at once produce very violent effects,—comparable, say, to scalding; and the reflexes then established may have been continued by natural selection so as to save from poisoning the higher organisms, whose absorbent surfaces are internal and only guarded in this way by the organ of taste. Some light is thrown on questions of this kind by the very interesting experiments of Dr Romanes; for a general account of these see his *Jelly-fish, Star-fish, and Sea-urchins*, chap. ix.

[2] This is one among many cases in which the study of a vocabulary is full of instruction to the psychologist. The reader who will be at the trouble to compare the parallel columns under the heading "Passive Affections," in Roget's *Thesaurus of English Words and Phrases*, will find ample proof both of this general statement and of what is said above in the text.

[3] Observation and experiment show that the physical signs of pain in the higher animals consist in such changes as a lowered and weaker pulse, reduction of the surface temperature, quickened respiration, dilatation of the iris, and the like. And so far as can be ascertained these effects are not altogether the emotional reaction to pain but in large measure its actual accompaniments, the physical side of what we have called its *tone*. The following is a good description of these general characteristics of feeling:—"En même temps, il se fait une série de mouvements généraux de flexion, comme si l'animal voulait se rendre plus petit, et offrir moins de surface à la douleur. Il est intéressant de remarquer que, pour l'homme comme pour tous les animaux, on retrouve ces mêmes mouvements généraux de flexion et d'extension répondant aux sentiments différents de plaisir et de la douleur. Le plaisir répond à un mouvement d'épanouissement, de dilatation, d'extension. Au contraire, dans la douleur, on se rapetisse, on se referme sur soi; c'est un mouvement général de flexion" (C. Richet, *L'Homme et l'Intelligence: La Douleur*, p. 9).

2. Certain sensations or movements not separately unpleasant become so when presented together or in immediate succession; and contrariwise, some combinations of sensations or of movements may be such as to afford pleasure distinct from, and often greater than, any that they separately yield. Here again we find that in some cases the effect seems mainly to depend on intensity, in others mainly on quality. (i.) As instances of the former may be mentioned the pleasurableness of a rhythmic succession of sounds or movements, of symmetrical forms and curved outlines, of gentle crescendos and diminuendos in sound, and of gradual variations of shade in colour, and the painfulness of flickering lights, "beats" in musical notes, false time, false steps, false quantities, and the like. In all these, whenever the result is pleasurable, attention can be readily accommodated,—is, so to say, economically meted out; and, whenever the result is painful, attention is surprised, balked, wasted. Thus we can make more movements and with less expenditure of energy when they are rhythmic than when they are not, as the performances of a ballroom or of troops marching to music amply testify. Of this economy we have also a striking proof in the ease with which rhythmic language is retained. (ii.) As instances of the latter may be cited those arrangements of musical tones and of colours that are called harmonious or the opposite. Harmony, however, must be taken to have a different meaning in the two cases. When two or three tones harmonize there results, as is well known, a distinct pleasure over and above any pleasure due to the tones themselves. On the other hand, tones that are discordant are unpleasant in spite of any pleasantness they may have singly. Besides the negative condition of absence of beats, a musical interval to be pleasant must fulfil certain positive conditions, sufficiently expressed for our purpose by saying that two tones are pleasant when they give rise to few combination-tones, and when among these there are several that coincide, and that they are unpleasant when they give rise to many combination-tones, and when among these there are few or none that coincide. Too many tones together prevent any from being distinct. But where tones coincide the number of tones actually present is less than the number of possible tones, and there is a proportionate simplification, so to put it: more is commanded and with less effort. A recent writer[2] on harmony, in fact, compares the confusion of a discord to that of "trying to reckon up a sum in one's head and failing because the numbers are too high." A different explanation must be given of the so-called harmonies of colour. The pleasurable effect of graduations of colour or shade—to which, as Ruskin tells us, the rose owes its victorious beauty when compared with other flowers—has been already mentioned: it is rather a quantitative than a qualitative effect. What we are now concerned with are the pleasurable or painful combinations of different ungraduated colours. A comparison of these seems to justify the general statement that those colours yield good combinations that are far apart in the colour circle, while those near together are apt to be discordant. The explanation given, viz., that the one arrangement secures and the other prevents perfect retinal activity, seems on the whole satisfactory,—especially if we acknowledge the tendency of all recent investigations and distinguish sensibility to colour and sensibility to mere light as both psychologically and physiologically two separate facts. Thus, when red and green are juxtaposed, the red increases the saturation of the green and the green that of the red, so that both colours are heightened in brilliance. But such an effect is only pleasing to the child and the savage; for civilized men the contrast is excessive, and colours less completely opposed, as red and blue, are preferred, each being a rest from the other, so that as the eye wanders to and fro over their border different elements are active by turns. Red and orange, again, are bad, in that both exhaust in a similar manner and leave the remaining factors out of play.

3. The more or less spontaneous workings of imagination, as well as that direct control of this working necessary to thinking in the stricter sense, are always productive of pain or pleasure in varying degrees. Though the exposition of the higher intellectual processes has not yet been reached, there will be no inconvenience in at once taking account of their effects on feeling, since these are fairly obvious and largely independent of any analysis of the processes themselves. It will also be convenient to include under the one term "intellectual feelings," not only the feelings connected with certainty, doubt, perplexity, comprehension, and so forth, but also what the Herbartian psychologists—whose work in this department of psychology is classical—have called *par excellence* the formal feelings,—that is to say, feelings which they regard as entirely determined by the form of the flow of ideas, and not by the ideas themselves. Thus, be the ideas what they may, when their onward movement is checked by divergent or obstructing lines of association, and especially when in this manner we are hindered, say, from recollecting a name or a quotation (as if, *e.g.*, the names of Archimedes, Anaximenes, and Anaximander each arrested the clear revival of the other), we are conscious of a certain strain and oppressiveness, which give way to momentary relief when at length what is wanted rises into distinct consciousness and our ideas resume their flow. Here again, too, as in muscular movements, we have the contrast of exertion and facility, when "thoughts refuse to flow" and we work "invita Minerva," or when the appropriate ideas seem to unfold and display themselves before us like a vision before one inspired. To be confronted with propositions we cannot reconcile—*i.e.*, with what is or appears inconsistent, false, contradictory—is apt to be painful; the recognition of truth or logical coherence, on the other hand, is pleasurable. The feeling in either case is, no doubt, greater the greater our interest in the subject-matter; but the mere conflict of ideas as such is in itself depressing, and the discernment of agreement, of the one in the many, in like manner a distinct satisfaction. Now in the one case we are conscious of futile efforts to comprehend as one ideas which the more distinctly we apprehend them for the purpose only prove to be the more completely and diametrically opposed; we can only affirm and mentally envisage the one by denying and suppressing the representation of the other, and yet we have to strive to predicate both and to embody them together in the same mental image. Attention is like a house divided against itself: there is effort but it is not effective, for the field of consciousness is narrowed and the flow of ideas

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[1] It has been definitely formulated, but in physiological language, by Dr Bain as the Law of Novelty: "No second occurrence of any great shock or stimulus, whether pleasure, pain, or mere excitement, is ever fully equal to the first, notwithstanding that full time has been given for the nerves to recover from their exhaustion" (*Mind and Body*, p. 51). Comp. also his *Emotions and Will*, 3d ed., p. 83.

[2] Preyer, *Akustische Untersuchungen*, p. 59.

arrested. When, on the other hand, we discern a common principle among diverse and apparently disconnected particulars, instead of all the attention we can command being taxed in the separate apprehension of these "disjecta membra," they become as one, and we seem at once to have at our disposal resources for the command of an enlarged field and the detection of new resemblances.

4. Closely related to these formal intellectual feelings are certain of the higher æsthetic feelings. A reference to some of the commonplaces of æsthetical writers may be sufficient briefly to exhibit the leading characteristics of these feelings. There is a wide agreement among men in general as to what is beautiful and what is not, and it is the business of a treatise on empirical æsthetics from an analysis of these matters of fact to generalize the principles of taste,—to do, in fact, for one source of pleasure and pain what we are here attempting in a meagre fashion for all. And these principles are the more important in their bearing upon the larger psychological question, because among æsthetic effects are reckoned only such as are pleasing or otherwise in themselves, apart from all recognition of utility, of possession, or of ulterior gratification of any kind whatever. Thus, if it should be objected that the intellectual satisfaction of consistency is really due to its utility, to the fact that what is incompatible and incomprehensible is of no avail for practical guidance, at least this objection will not hold against the æsthetic principle of *unity in variety*. In accordance with this primary maxim of art criticism, at the one extreme art productions are condemned for monotony, as incapable of sustaining interest because "empty," "bald," and "poor"; at the other extreme they are condemned as too incoherent and disconnected to furnish a centre of interest. And those are held as so far praiseworthy in which a variety of elements, be they movements, forms, colours, or incidents, instead of conflicting, all unite to enhance each other and to form not merely a mass but a whole. Another principle that serves to throw light on our inquiry is that which has been called the principle of *economy*,[1] viz., that an effect is pleasing in proportion as it is attained by little effort and simple means. The brothers Weber in their classic work on human locomotion discovered that those movements that are æsthetically beautiful are also physiologically correct; grace and ease, in fact, are wellnigh synonymous, as Herbert Spencer points out, and illustrates by apt instances of graceful attitudes, motions, and forms. The same writer,[2] again, in seeking for a more general law underlying the current maxims of writers on composition and rhetoric is led to a special formulation of this principle as applied to style, viz., that "economy of the recipient's attention is the secret of effect."

Perhaps of all æsthetical principles the most wide-reaching, as well as practically the most important, is that which explains æsthetic effects by association. Thus, to take one example where so many are possible, the croaking of frogs and the monotonous ditty of the cuckoo owe their pleasantness, not directly to what they are in themselves, but entirely to their intimate association with spring-time and its gladness. At first it might seem, therefore, that there is nothing fresh in this principle relevant to our present inquiry, since a pleasure that is only due to association at once carries back the question to its sources, so that in asking why the spring, for example, is pleasant we should be returning to old ground. But this is not altogether true: æsthetic effects call up not merely ideas but ideals. A great work of art improves upon the real in two respects: it intensifies and it transfigures. It is for art to gather into one focus, cleared from dross and commonplace, the genial memories of a lifetime, the instinctive memories of a race; and, where theory can only classify and arrange what it receives, art—in a measure free from "the literal unities of time and place"—creates and glorifies. Still art eschews the abstract and speculative; however plastic in its hands, the material wrought is always that of sense. We have already noticed more than once the power which primary presentations have to sustain vivid re-presentations, and the bearing of this on the æsthetic effects of works of art must be straightway obvious. The notes and colours, rhymes and rhythms, forms and movements, which produce the lower æsthetic feelings also serve as the means of bringing into view, and maintaining at a higher level of vividness, a wider range and flow of pleasing ideas than we can ordinarily command.

Egoistic and socialistic feelings

5. When we reach the level at which there is distinct self-consciousness (comp. p. 84), we have an important class of feelings determined by the relation of the presentation of self to the other contents of consciousness. And as the knowledge of other selves advances *pari passu* with that of one's own self, so along with the egoistic feelings appear certain social or altruistic feelings. The two have much in common; in pride and shame, for example, account is taken of the estimate other persons form of us and of our regard for them; while, on the other hand, when we admire or despise, congratulate or pity another, we have always present to our mind a more or less definite conception of self in like circumstances. It will therefore amply serve all the ends of our present inquiry if we briefly survey the leading characteristics of some contrasted egoistic feelings, such as self-complacency and disappointment. When a man is pleased with himself, his achievements, possessions, or circumstances, such pleasure is the result of a comparison of his present position in this respect with some former position or with the position of some one else. Without descending to details, we may say that two prospects are before him, and the larger and fairer is recognized as his own. Under disappointment or reverse the same two pictures may be present to his mind, but accompanied by the certainty that the better is not his or is his no more. So far, then, it might be said that the contents of his consciousness are in each case the same, the whole difference lying in the different relationship to self. But this makes all the difference even to the contents of his consciousness, as we shall at once see if we consider its active side. Even the idlest and most thoughtless mind teems with intentions and expectations, and in its prosperity, like the fool in the parable, thinks to pull down its barns and build greater to take its ease, eat, drink, and be merry. The support of all this pleasing show and these far-reaching aims is, not the bare knowledge of what abundance will do, but the reflexion—These many goods are mine. In mind alone final causes have a place, and the end can produce the beginning; the prospect of a summer makes the present into spring. But action is paralysed or impossible when the means evade us—

> "Now drops at once the pride of awful state,
> The golden canopy, the glittering plate."

and a bleak and wintry barrenness is filled with the emptiness of despair. In so far as a man's life consists in the abundance of the things he possesseth, we see then why it dwindles with these. The like holds where self-complacency or displicency rests on a sense of personal worth or on the honour or affection of others.

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[1] Compare Fechner, *Vorschule der Aesthetik*, ii. p. 263. Fechner's full style for it is "Princip der okonomischen Verwendung der Mittel oder des kleinsten Kraftmasses."

[2] *Essays, Scientific, Political, and Speculative*, vol. ii. Ess. I. and VIII.

We are now at the end of our survey of certain typical pleasurable and painful states. The answer to our inquiry which it seems to suggest is that there is pleasure in proportion as a maximum of attention is effectively exercised, and pain in proportion as such effective attention is frustrated by distractions, shocks, or incomplete and faulty adaptations, or fails of exercise, owing to the narrowness of the field of consciousness and the slowness and smallness of its changes. Something must be said in explication of this formula, and certain objections that might be made to it must be considered. First of all, it implies that feeling is determined partly by quantitative, or, as we might say, material, conditions, and partly by conditions that are formal or qualitative. As regards the former, both the intensity or concentration of attention and its diffusion or the extent of the field of consciousness have to be taken into account. Attention, whatever else it is, is a limited quantity—

Pluribus intentus minor est ad singula sensus—

to quote Hamilton's pet adage. Moreover, as we have seen, attention requires time. If, then, attention be distributed over too wide a field, there is a corresponding loss of intensity, and so of distinctness: we tend towards a succession of indistinguishables—indistinguishable, therefore, from no succession. We must not have more presentations in the field of consciousness than will allow of some concentration of attention: a maximum diffusion will not do. A maximum concentration, in like manner—even if there were no other objection to it—would seem to conflict with the general conditions of consciousness, inasmuch as a single simple presentation, however intense, would admit of no differentiation, and any complex presentation is in some sort a plurality. The most effective attention, then, as regards its quantitative conditions, must lie somewhere between the two zeros of complete indifference and complete absorption. If there be an excess of diffusion, effective attention will increase up to a certain point as concentration increases, but beyond that point will decrease if this intensification continues to increase; and *vice versa*, if there be an excess of concentration. But, inasmuch as these quantitative conditions involve a plurality of distinguishable presentations or changes in consciousness, the way is open for formal conditions as well. Since different presentations consort differently when above the threshold of consciousness together, one field may be wider and yet as intense as another, or intenser and yet as wide, owing to a more advantageous arrangement of its constituents.[1]

Negative pleasures.

The doctrine here developed, viz., that feeling depends on efficiency, is in the main as old as Aristotle; all that has been done is to give it a more accurately psychological expression, and to free it from the implications of the faculty theory, in which form it was expounded by Hamilton. Of possible objections there are at least two that we must anticipate, and the consideration of which will help to make the general view clearer. First, it may be urged that, according to this view, it ought to be one continuous pain to fall asleep, since in this state consciousness is rapidly restricted both as to intensity and range. This statement is entirely true as regards the intensity and substantially true as regards the range, at least of the higher consciousness: certain massive and agreeable organic sensations pertain to falling asleep, but the variety of presentations at all events grows less. But then the capacity to attend is also rapidly declining: even a slight intruding sensation entails an acute sense of strain in one sense, in place of the massive pleasure of repose throughout; and any voluntary concentration either in order to move or to think involves a like organic conflict, futile effort, and arrest of balmy ease. There is as regards the more definite constituents of the field of consciousness a close resemblance between natural sleepiness and the state of monotonous humdrum we call tedium or ennui; and yet the very same excitement that would relieve the one by dissipating the weariness of inaction would disturb the other by renewing the weariness of action: the one is commensurate with the resources of the moment, the other is not. Thus the maximum of effective attention in question is, as Aristotle would say, a maximum "relative to us." It is possible, therefore, that a change from a wider to a narrower field of consciousness may be a pleasurable change, if attention is more effectively engaged. Strictly speaking, however, the so-called negative pleasures of rest do not consist in a mere narrowing of the field of consciousness so much as in a change in the amount of concentration. Massive organic sensations connected with restoration take the place of the comparatively acute sensations of jaded powers forced to work. We have, then, in all cases to bear in mind this subjective relativity of all pleasurable or painful states of consciousness.

Do plea sures differ qualit tive

But there is still another and more serious difficulty to face. It has long been a burning question with theoretical moralists whether pleasures differ only quantitatively or differ qualitatively as well, whether psychological analysis will justify the common distinction of higher and lower pleasures or force us to recognize nothing but differences of degree, of duration, and so forth,—as expounded, *e.g.*, by Bentham, whose cynical *mot*, "Pushpin is as good as poetry provided it be as pleasant," was long a stumbling block in the way of utilitarianism. The entire issue here is confused by an ambiguity in terms that has been already noticed: pleasure and pleasures have not the same connotation. By *a* pleasure or pleasures we mean some assignable presentation or presentations which are pleasant,—*i.e.* afford pleasure; by pleasure simply is meant this subjective state of feeling itself. The former, like other objects of knowledge, admit of classification and comparison: we may distinguish them as coarse or as noble, or, if we will, as cheap and wholesome. But, while the *causes* of feeling are manifold, the feeling itself is a subjective state, varying only in intensity and duration. The best evidence of this lies in the general character of the actions that ensue through feeling,—the matter which has next to engage us. Whatever be the variety in the sources of pleasure, whatever be the moral or conventional estimate of their worthiness, if a given state of consciousness is pleasant we seek to retain it, if painful to be rid of it: we prefer greater pleasure before less, less pain before greater. This is, in fact, the whole meaning of preference as a psychological term. Wisdom and folly prefer each the course which the other rejects. Both courses cannot, indeed, be objectively preferable; that, however, is not a matter for psychology. But, as soon as reflexion begins, exceptions to this primary principle of action seem to arise continually, even though we regard the individual as a law to himself. Such excep tions, however, we may presently find to be apparent only. At any rate the principle is obviously true before reflexion begins,—true so long as we are dealing with actually present sources of feeling, and not with their re-presentations. But to admit this is psychologically to admit everything, at least if mind is to be genetically explained. Assuming, then, that we start with only quantitative variations of feeling, we have to attempt to explain the development of formal and qualitative differences in the grounds of feeling. But, if aversions and pursuits result from incommensurable states of pain and pleasure, there seems no other way of saving the unity and continuity of the subject except by a speculative assumption,—the doctrine known as the freedom of the will. The one position involves the other, and the more scientific course is to avoid both as far as we can.

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[1] As it is impossible to say that any distinguishable presentation is absolutely simple, the hypothesis of subconsciousness would leave us free to assume that any pleasantness or unpleasantness that cannot be explained on the score of intensity is due to some obscure harmony or discord, compatibility or incompatibility, of elements not separately discernible. But this, though tempting, is not really a very scientific procedure. If a particular presentation is pleasurable or painful in such wise as to lead to a redistribution of attention, it is reasonable to look for an explanation primarily in its connexion with the rest of the field of consciousness. Moreover, it is obvious—since what takes place in subconsciousness can only be explained in analogy with what takes place in consciousness—that, if we have an inexplicable in the one, we must have a corresponding inexplicable in the other. If the feeling produced by what comports itself as a simple presentation cannot be explained by what is in consciousness, we should be forced to admit that some presentations are unpleasant simply because they are unpleasant—an inexplicability which the hypothesis of subconsciousness might push farther back but would not remove.

The question, then, is: How, if action depends in the last resort on a merely quantitative difference, could it ever come about that what we call the higher sources of feeling should supersede the lower? If it is only quantity that turns the scales, where does quality come in, for we cannot say, *e.g.*, that the astronomer experiences a greater thrill of delight when a new planet rewards his search than the hungry savage in finding a clump of pig-nuts? *Tempora mutantur, nos et mutamur in illis* contains the answer in brief. We shall understand this answer better if we look at a parallel case, or what is really our own from another point of view. We distinguish between higher and lower forms of life: we might say there is more life in a large oyster than in a small one, other things being equal, but we should regard a crab as possessing not necessarily more life—as measured by waste of tissue—but certainly as manifesting life in a higher form. How, in the evolution of the animal kingdom, do we suppose this advance to have been made? The tendency at any one moment is simply towards more life, simply growth; but this process of self-preservation imperceptibly but steadily modifies the self that is preserved. The creature is bent only on filling its skin; but in doing this as easily as may be it gets a better skin to fill, and accordingly seeks to fill it differently. Though cabbage and honey are what they were before, they have changed relatively to the grub now it has become a butterfly. So, while we are all along preferring a more pleasurable state of consciousness before a less, the content of our consciousness is continually changing; the greater pleasure still outweighs the less, but the pleasures to be weighed are either wholly different, or at least are the same for us no more. What we require, then, is not that the higher pleasures shall always afford greater pleasure than the lower did, but that to advance to the level of life on which pleasure is derived from higher objects shall on the whole be more pleasurable and less painful than to remain behind. And this condition seems provided in the fact of accommodation above referred to (p. 69) and in the important fact that attention can be more effectively expended by what we may therefore call improvements in the form of the field of consciousness. But when all is said and done a certain repugnance is apt to arise against any association of the differences between the higher and lower feelings with differences of quantity. Yet such repugnance is but another outcome of the common mistake of supposing that the real is obtained by pulling to pieces rather than by building up.

> "Do not all charms fly
> At the mere touch of cold philosophy?"

But no logical analysis—nay, further, no logical synthesis—is adequate to the fulness of things. For the rest, such aversion is wholly emotional, and has no more an intellectual element in it than has the disgust we feel on first witnessing anatomical dissections.[1]

Emotional and Conative Action.

Effects of feeling.

We turn now from the causes of feeling to its manifestations or effects, and have here in like manner to inquire whether there is in these also any contrast corresponding to the opposing extremes of pleasure and pain. We have already seen reasons for dismissing reflex movements or movements not determined by feeling as psychologically secondary, the effects of habit and heredity, and for regarding those diffusive movements that are immediately expressive of feeling as primordial,—such movements as are strictly purposive being gradually selected or elaborated from them. But some distinction is called for among the various movements expressive of emotion; for there is more in these than the direct effect of feeling regarded as merely pleasure or pain. It has been usual with psychologists to confound emotions with feeling, because intense feeling is essential to emotion. But, strictly speaking, a state of emotion is a complete state of mind, a psychosis, and not a psychical element, if we may so say. Thus in anger we have over and above pain a more or less definite object as its cause, and a certain characteristic reactive display—frowns, compressed lips, erect head, clenched fists, in a word, the combative attitude—as its effect, and similarly of other emotions; so that generally in the particular movements indicative of particular emotions the primary and primitive effects of feeling are overlaid by what Darwin has called serviceable associated habits. The purposive actions of an earlier stage of development become, though somewhat atrophied as it were, the emotive outlet of a later stage: in the circumstances in which our ancestors worried their enemies we only show our teeth. We must, therefore, leave aside the more complex emotional manifestations and look only to the simplest effects of pleasure and of pain, if we are to discover any fundamental contrast between them.[2]

Emotional expression.

Joy finds expression in dancing, clapping the hands, and meaningless laughter, and these actions are not only pleasurable in themselves but such as increase the existing pleasure. Attention is not drafted off or diverted; but rather the available resources seem reinforced, so that the old expenditure is supported as well as the new. To the pleasure on the receptive side is added pleasure on the active side. The violent contortions due to pain, on the other hand, are painful in themselves, though less intense than the pains from which they withdraw attention: they are but counter-irritants that arrest or inhibit still more painful thoughts or sensations. Thus, according to Darwin, "sailors who are going to be flogged sometimes take a piece of lead into their mouths in order to bite it with their utmost force, and thus to bear the pain." When in this way we take account of the immediate effects as well as of the causes of feeling, we find it still more strikingly true that only in pleasurable states is there an efficient expenditure of attention. It is needless now to dwell upon this point, although any earlier mention of it would hardly have been in place. But we should fail to realize the contrast between the motor effects of pleasure and of pain if we merely regarded them as cases of diffusion. The intenser the feeling the intenser the reaction, no doubt, whether it be smiles or tears, jumping for joy, or writhing in agony; but in the movements consequent on pleasure the diffusion is the result of mere exuberance, an overflow of good spirits, as we sometimes say, and these movements, as already remarked, are always comparatively purposeless or playful. Even the earliest expressions of pain, on the contrary, seem but so many efforts to escape from the cause of it; in them there is at least the blind purpose to flee from a definite ill, but in pleasure only the enjoyment of present fortune.

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[1] "To look at anything in its elements makes it appear inferior to what it seems as a whole. Resolve the statue or the building into stone and the laws of proportion, and no worthy causes of the former beautiful result seem now left behind. So, also, resolve a virtuous act into the passions and some quantitative law, and it seems to be rather destroyed than analysed, though after all what was there else it could be resolved into?" Sir A. Grant, *Aristotle's Ethics*, Essay IV., "The Doctrine of the Mean," vol. i. p. 210 (2d ed.).

[2] Of the three principles Darwin advances in explanation of emotional expression that which he places last—perhaps because it admits of less definite illustration—seems both psychologically and physiologically more fundamental than the more striking principle of serviceable associated habits which he places first; indeed the following, which is his statement of it, implies as much: "Certain actions which we recognize as expressive of certain states of mind are the direct result of the constitution of the nervous system, and have been from the first independent of the will, and to a large extent of habit" (*Expression of the Emotions*, p. 66). It is in illustration of this principle too that Darwin describes the movements expressive of joy and grief, emotions which in some form or other are surely the most primitive of any.

From Plato downwards psychologists and moralists have been fond of discussing the relation of pleasure and pain. It has been maintained that pain is the first and more fundamental fact, and pleasure nothing but relief from pain; and, again, on the other side, that pleasure is prior and positive, and pain only the negation of pleasure. So far as the mere change goes, it is obviously true that the diminution of pain is *pro tanto* pleasant, and the diminution of pleasure *pro tanto* unpleasant; and if relativity had the unlimited range sometimes assigned to it this would be all we could say. But we must sooner or later recognize the existence of a comparatively fixed neutral state, deviations from which, of comparatively short duration and of sufficient intensity, constitute distinct states of pleasure or pain. Such states, if not of liminal intensity, may then be further diminished without reversing their pleasurable or painful character. The turning-point here implied may, of course, gradually change too,—as a result, in fact, of the law of accommodation. Thus a long run of pleasure would raise "the hedonistic zero," while—to the small extent to which accommodation to pain is possible—a continuance of pain would lower it. But such admission makes no material difference where the actual feeling of the moment is alone concerned and retrospect out of the question. On the whole it seems, therefore, most reasonable to regard pleasure and pain as emerging out of a neutral state, which is prior to and distinct from both,—not a state of absolute indifference, but of simple contentment, marked by no special active display. But it is by reference to such state of equilibrium or *ἀπαθία* that we see most clearly the superior volitional efficacy of pain upon which pessimists love to descant. "Nobody," says Von Hartmann, "who had to choose between no taste at all for ten minutes or five minutes of a pleasant taste and then five minutes of an unpleasant taste, would prefer the last." Most men and all the lower animals are content "to let well alone."

Purposive action.

To ascertain the origin and progress of purposive action it seems, then, that we must look to the effects of pain rather than to those of pleasure. Necessity is the mother of invention, and all things are full of labour. It is true that psychologists not unfrequently describe the earliest purposive movements as appetitive; or at least they treat appetitive and aversive movements as co-ordinate and equally primitive, pleasures being supposed to lead to actions for their continuance as much as pains to actions for their removal. No doubt, as soon as the connexion between a pleasurable sensation and the appropriate action is completely established, as in the case of imbibing food, the whole process is then self-sustaining till satiety begins. But the point is that such facility was first acquired under the teaching of pain,—the pain of unsatisfied hunger. The term "appetite" is apt both by its etymology and its later associations to be misleading. What are properly called the "instinctive" appetites are—when regarded from their active side—movements determined by some existing uneasy sensation. So far as their earliest manifestation in a particular individual is concerned, this urgency seems almost entirely of the nature of a *vis a tergo*; and the movements are only more definite than those simply expressive of pain because of inherited pre-adaptation, on which account, of course, they are called "instinctive." But what one inherits another must have acquired, and we have agreed here to leave heredity on one side and consider only the original evolution.

But if none but psychological causes were at work this evolution would be very long and in its early stages very uncertain. At first, when only random movements ensue, we may fairly suppose both that the chance of at once making a happy hit would be small and that the number of chances, the space for repentance, would also be small. Under such circumstances natural selection would have to do almost everything and subjective selection almost nothing. So far as natural selection worked, we should have, not the individual subject making a series of tries and perfecting itself by practice, as in learning to dance or swim, but we should have those individuals whose stuff or structure happened to vary for the better surviving, increasing, and displacing the rest. How much natural selection, apparently unaided, can accomplish in the way of complicated adjustment we see in the adaptation of the form and colour of plants and animals to their environment. Both factors, in reality, operate at once, and it would be hard to fix a limit to either, though to our minds natural selection seems to lose in comparative importance as we advance towards the higher stages of life.

But psychologically we have primarily to consider subjective selection, *i.e.*, first of all, the association of particular movements with particular sensations through the mediation of feeling. The sensations here concerned are mainly painful excitations from the environment, the recurring pains of innutrition, weariness, &c., and pleasurable sensations due to the satisfaction of these organic wants—pleasures which, although not a mere "filling up," as Plato at one time contended, are still preceded by pain, but imply over and above the removal of this a certain surplus of positive good. There seem only a few points to notice. (*a*) When the movements that ensue through pleasure are themselves pleasurable there is ordinarily no ground for singling out any one; such movements simply enhance the general enjoyment, which is complete in itself and so far contains no hint of anything beyond. (*b*) Should one of these spontaneous movements of pleasure chance to cause pain, no doubt such movement is speedily arrested. Probably the most immediate connexion possible between feeling and purposive action is that in which a painful movement leads through pain to its own suppression. But such connexion is not very fruitful of consequences, inasmuch as it only secures what we may call internal training and does little to extend the relation of the individual to its environment. (*c*) Out of the irregular, often conflicting movements which indirectly relieve pain some one may chance to remove the cause of it altogether. Upon this movement, the last of a tentative series, attention, released from the pain, is concentrated; and in this way the evil and the remedy become so far associated that on a recurrence of the former the many diffused movements become less, and the one purposive movement more, pronounced; the one effectual way is at length established and the others, which were but palliatives, disappear. (*d*) When things have advanced so far that some one definite movement is definitely represented along with the painful sensation it remedies, it is not long before a still further advance is possible and we have *preventive movements*. Thanks to the orderliness of things, dangers have their premonitions. After a time, therefore, the occurrence of some signal sensation revives the image of the harm that has previously followed in its wake, and a movement—either like the first, or another that has to be selected from the random tries of fear—occurs in time to avert the impending ill. (*e*) In like manner, provided the cravings of appetite are felt, any signs of the presence of pleasurable objects prompt to movements for their enjoyment or appropriation. In these last cases we have action determined by perceptions. The cases in which the subject is incited to action by ideas as distinct from perceptions require a more detailed consideration; such are the facts mainly covered by the term "desire."

By the time that ideas are sufficiently self-sustaining to form trains that are not wholly shaped by the circumstances of the present, entirely new possibilities of action are opened up. We can desire to live again through experiences of which there is nothing actually present to remind us, and we can desire a new experience which as yet we only imagine. We often, no doubt, apply the term to the simpler states mentioned under (*e*) in the last paragraph: the fox in the fable is said to have desired the grapes he vilified because out of his reach. Again, at the other extreme it is usual to speak of a desire for honour, or for wealth, and the like; but such are not so much single states of mind as inclinations or habitual desires. Moreover, abstractions of this kind belong to a more advanced stage of development than that at which desire begins, and of necessity imply more complicated grounds of action than we can at present examine. The essential characteristics of desire will be more apparent if we suppose a case somewhere between these extremes. A busy man reads a novel at the close of the day, and finds himself led off by a reference to angling or tropical scenery to picture himself with his rods packed *en route* for Scotland, or booked by the next steamer for the fairyland of the West Indies. Presently, while the ideas of Jamaica or fishing are at least as vividly imagined as before, the fancied preparations receive a rude shock as the thought of his work recurs. Some such case we may take as typical and attempt to analyse it.

First of all it is obviously true, at least of such more concrete desires, that what awakens desire at one time fails to do so at another, and that we are often so absorbed or content with the present as not to be amenable to (new) desires at all. A given X or Y cannot, then, be called desirable *per se*, it is only desirable by relation to the contents of consciousness at the moment. Of what nature is this relation? (1) At the level of psychical life that we have now reached very close and complete connexions have been formed between ideas and the movements necessary for their realization, so that when the idea is vividly present these movements are apt to be nascent. This association is the result of subjective selection—*i.e.*, of feeling—but, being once established, it persists like other associations independently of it. (2) Those movements are especially apt to become nascent which have not been recently executed, which are therefore fresh and accompanied by the organic sensations of freshness, but also those which are frequently executed, and so from habit readily aroused. The latter fact, which chiefly concerns habitual desires, may be left aside for a time. (3) At times, then, when there is a lack of present interests, or when these have begun to wane, or when there is positive pain, attention is ready to fasten on any new suggestion that calls for more activity, requires a change of active attitude, or promises relief. Such spontaneous concentration of attention ensures greater vividness to the new idea, whatever it be, and to its belongings. In some cases this greater vividness may suffice. This is most likely to happen when the new idea affords intellectual occupation, and this is at the time congenial, or with indolent and imaginative persons who prefer dreaming to doing. (4) But when the new idea does not lead off the pent-up stream of action by opening out fresh channels, when, instead of this, it is one that keeps them intent upon itself in an attitude comparable to expectation, then we have desire. In such a state the intensity of the re-presentation is not adequate to the intensity of the incipient actions it has aroused. This is most obvious when the latter are directed towards sensations or percepts, and the former remains only an idea. If it were possible by concentrating attention to convert ideas into percepts, there would be an end of most desires: "if wishes were horses beggars would ride." (5) But our voluntary power over movements is in general of this kind: here the fiat may become fact. When we cannot hear we can at least listen, and, though there be nothing to fill them, we can at least hold out our hands. It would seem, then, that the source of desire lies essentially in this excess of the active reaction above the intensity of the re-presentation (the one constituting the "impulse," the other the "object" of desire, or the desideratum), and that this disparity rests ultimately on the fact that movements have, and sensations have not, a subjective initiative. (6) The impulse or striving to act will, as already hinted, be stronger the greater the available energy, the fewer the present outlets, and, habits apart, the fresher the new opening for activity. (7) Finally, it is to be noted that, when such inchoate action can be at once consummated, desire ends where it begins: to constitute a definite state of desire there must be not only an obstacle to the realization of the desideratum—if this were all we should rather call the state one of wishing—but an obstacle to its realization by means of the actions its representation has aroused.

Relation of desire to feeling.

However the desire may have been called forth, its intensity is primarily identical with the strength of this impulse to action, and has no definite or constant relation to the amount of pleasure that may result from its satisfaction. The feeling directly consequent on desire as a state of want and restraint is one of pain, and the reaction which this pain sets up may either suppress the desire or prompt to efforts to avoid or overcome the obstacles in its way. To inquire into these alternatives would lead us into the higher phases of voluntary action; but we must first consider the relation of desire to feeling more closely.

Instances are by no means wanting of very imperious desires accompanied by the clear knowledge that their gratification will be positively distasteful.[1] On the other hand it is possible to recollect or picture circumstances known or believed to be intensely pleasurable without any desire for them being awakened at all: we can regret or admire without desiring. Yet there are many psychologists who maintain that desire is excited only by the prospect of the pleasure that may arise through its gratification, and that the strength of the desire is proportional to the intensity of the pleasure thus anticipated. *Quidquid petitur, petitur sub specie boni* is their main formula. The plausibility of this doctrine rests partly upon a seemingly imperfect analysis of what strictly pertains to desire and partly on the fact that it is substantially true both of what we may call "presentation-prompted" action, which belongs to an earlier stage than desire, and of the more or less rational action that comes later. In the very moment of enjoyment it may be fairly supposed that action is sustained solely by the pleasure received and is proportional to the intensity of that pleasure. But there is here no re-presentation and no seeking; the conditions essential to desire, therefore, do not apply. Again, in rational action, where both are present, it may be true —to quote the words of an able advocate of the view here controverted—that "our character as rational beings is to desire everything exactly according to its pleasure value."[2] But consider what such conceptions as the good, pleasure value, and rational action involve. Here we have foresight and calculation, regard for self as an object of permanent interest,—Butler's cool self-love; but desire as such is blind, without either the present certainty of sense or the assured prevision of reason. Pleasure in the past, no doubt, has usually brought about the association between the representation of the desired object and the movement for its realization; but neither the recollection of this pleasure nor its anticipation is necessary to desire, and even when present they do not determine what urgency it will have. The best proof of this lies in certain habitual desires. Pleasures are diminished by repetition, whilst habits are strengthened by it; if the intensity of desire, therefore, were proportioned to the "pleasure value" of its gratification, the desire for renewed gratification should diminish as this pleasure grows less; but, if the present pain of restraint from action determines the intensity of desire, this should increase as the action becomes habitual. And observation seems to show that, unless prudence suggest the forcible suppression of belated desires or the active energies themselves fail, desires do in fact become more imperious, although less productive of positive pleasure, as time goes on.

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[1] As such an instance may be cited Plato's story of Leontius, the son of Aglæon, in *Rep.*, iv. 439 *fin.*

[2] Bain *Emotions and Will*, 3d ed., p. 438.

In this there is, of course, no exception to the general principle that action is consequent on feeling,—a greater pleasure being preferred before a less, a less pain before a greater; for, though the feeling that follows upon its satisfaction be less or even change entirely, still the pain of the unsatisfied desire increases as the desire hardens into habit. It is also a point in favour of the position here taken that appetites, which may be compared to inherited desires, certainly prompt to action by present pain rather than by prospective pleasure.

Intellection.

Desire naturally prompts to the search for the means to its satisfaction and frequently to a mental rehearsal of various possible courses of action, their advantages and disadvantages. Thus, by the time the ideational continuum has become, mainly by the comparatively passive working of association, sufficiently developed to furnish thinking material, motives are forthcoming for thinking to begin. It is obviously impossible to assign any precise time for this advance; like all others, it is gradual. Fitfully, in strange circumstances and under strong excitement, the lower animals give unmistakable signs that they can understand and reason. But thought as a permanent activity may be fairly said to originate in and even to depend upon the acquisition of speech. This indispensable instrument, which more than anything else enables our psychological individual to advance to the distinctly human or rational stage, consists of gestures and vocal utterances, which were originally—and indeed are still to a large extent—emotional expressions.[1] It is a question of the highest interest to ascertain the general mode of its elaboration; but as to this the reader must consult the article PHILOLOGY (vol. xviii. p. 766 *sq.*) Our space will only allow us to note in what way language, when it already exists, is instrumental in the development as distinct from the communication of thought. But, first of all, what in general is thinking, of which language is the instrument?

In entering upon this inquiry we are really passing one of the hardest and fastest lines of the old psychology,—that between sense and understanding. So long as it was the fashion to assume a multiplicity of faculties the need was less felt for a clear exposition of their connexion. A man had senses and intellect much as he had eyes and ears; the heterogeneity in the one case was no more puzzling than in the other. But for psychologists who do not cut the knot in this fashion it is confessedly a hard matter to explain the relation of the two. The contrast of receptivity and activity hardly avails, for all presentation involves activity and essentially the same activity, that of attention. Nor can we well maintain that the presentations attended to differ in kind, albeit such a view has been held from Plato downwards. *Nihil est in intellectu quod non fuerit prius in sensu*: the blind and deaf are necessarily without some concepts that we possess. If pure being is pure nothing, pure thought is equally empty. Thought consists of a certain elaboration of sensory and motor presentations and has no content apart from these. We cannot even say that the forms of this elaboration are psychologically *a priori*; on the contrary, what is epistemologically the most fundamental is the last to be psychologically realized. This is not only true as a fact; it is also true of necessity, in so far as the formation of more concrete concepts is an essential preliminary to the formation of others more abstract, —those most abstract, like the Kantian categories, &c., being thus the last of all to be thought out or understood. And though this formative work is substantially voluntary, yet, if we enter upon it the form at each step is determined by the so-called matter, and not by us; in this respect "the spontaneity of thought" is not really freer than the receptivity of sense.[2] It is sometimes said that thought is synthetic, and this is true; but imagination is synthetic also; and the processes which yield the ideational train are the only processes at work in intellectual synthesis. Moreover, it would be arbitrary to say at what point the mere generic image ceases and the true concept begins,—so continuous are the two. No wonder, therefore, that English psychology has been prone to regard thought as only a special kind of perception—perceiving the agreement or disagreement of ideas—and the ideas themselves as mainly the products of association. Yet this is much like confounding observation with experiment or invention,—the act of a cave-man in betaking himself to a drifting tree with that of Noah in building himself an ark. In reverie, and even in understanding the communications of others, we are comparatively passive spectators of ideational movements, non-voluntarily determined. But in thinking or "intellection," as it has been conveniently termed, there is always a search for something more or less vaguely conceived, for a clue which will be known when it occurs by seeming to satisfy certain conditions. Thinking may be broadly described as solving a problem,—finding an AX that is B. In so doing we start from a comparatively fixed central idea or intuition and work along the several diverging lines of ideas associated with it,—hence far the aptest and in fact the oldest description of thought is that it is *discursive*. Emotional excitement—and at the outset the natural man does not think much in cold blood—quickens the flow of ideas: what seems relevant is at once contemplated more closely while what seems irrelevant awakens little interest and receives little attention. At first the control acquired is but very imperfect: the actual course of thought of even a disciplined mind falls far short of the clearness, distinctness, and coherence of the logician's ideal. Familiar associations hurry attention away from the proper topic, and thought becomes not only discursive but wandering; in place of concepts of fixed and crystalline completeness, such as logic describes, we may find a congeries of ideas but imperfectly compacted into one generic idea, subject to continual transformation and implicating much that is irrelevant and confusing.

Thus, while it is possible for thought to begin without language, just as arts may begin without tools, yet language enables us to carry the same process enormously farther. In the first place it gives us an increased command of even such comparatively concrete generic images as can be formed without it. The name of a thing or action becomes for one who knows the name as much an objective mark or attribute as any quality whatever can be. The form and colour of what we call an "orange" are perhaps even more intimately combined with the sound and utterance of this word than with the taste and fragrance which we regard as strictly essential to the thing. But, whereas its essential attributes often evade us, we can always command its nominal attribute, in so far as this depends upon movements of articulation. By uttering the name (or hearing it uttered) we have secured to us, in a greater or less degree, that superior vividness and definiteness that pertain to images reinstated by impressions: our idea approximates to the fixity and independence of a percept (comp. p. 57 above). With young children and uncultured minds—who, by the way, commonly "think aloud"—the gain in this respect is probably more striking than those not confined to their mother-tongue or those used to an analytical handling of language at all realize.[1] When things are thus made ours by receiving names from us and we can freely manipulate them in idea, it becomes easier mentally to bring together facts that logically belong together, and so to classify and generalize. For names set us free from the cumbersome tangibility and particularity of perception, which is confined to just what is presented here and now. But as ideas increase in generality they diminish in definiteness and unity; they not only become less pictorial and more schematic, but they become vague and unsteady as well, because formed from a number of concrete images only related as regards one or two constituents, and not assimilated as the several images of the same thing may be. The mental picture answering to the word "horse" has, so to say, body enough to remain a steady object when under attention from time to time; but that answering to the word "animal" is perhaps scarcely twice alike. The relations of things could thus never be readily recalled or steadily controlled if the names of those relations, which as words always remain concrete, did not give us a definite hold upon them,—make them comprehensible. Once these "airy nothings" have a name, we reap again the advantages a concrete constituent affords: by its means that which is relevant becomes more closely associated, and that which is irrelevant—abstracted from—falls off. When what answers to the logical connotation or meaning of a concept is in this way linked with the name, it is no longer necessary that such "matter or content" should be distinctly present in consciousness. It takes time for an image to raise its associates above the threshold; and, when all are there, there is more demand upon attention in proportion. There is thus a manifest economy in what Leibnitz happily styled "symbolic," in contrast to "intuitive" thinking. Our power of efficient attention is limited, and with words for counters we can, as Leibnitz remarks, readily perform operations involving very complex presentations, and wait till these operations are concluded before realizing and spreading out the net result in sterling coin.

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[1] It must here be noted that, though we still retain our psychological standpoint, the higher development of the individual is only possible through intercourse with other individuals, that is to say, through society. Without language we should be mutually exclusive and impenetrable, like so many physical atoms; with it each several mind may transcend its own limits and share the minds of others. As a herd of individuals mankind would have a natural history as other animals have; but personality can only emerge out of intercourse with persons, and of such intercourse language is the means. But, important as is this addition of a transparent and responsive world of minds to the dead opaqueness of external things, the development of our psychological individual still remains a purely individual development. The only new point is—and it is of the highest importance to keep it in sight—that the materials of this development no longer consist of nothing but presentations elaborated by a single mind in accordance with psychical laws. But that combination of individual experiences that converts subjective idiosyncrasy and isolation into the objectivity and solidarity of Universal Mind only affects the individual in accordance with psychical laws, and we have no need therefore to overstep our proper domain in studying the advance from the non-rational phase to the phase of reason.

[2] Locke, so often misrepresented, expressed this truth according to his lights in the following:—"The earth will not appear painted with flowers nor the fields covered with verdure whenever we have a mind to it. . . . Just thus is it with our understanding: all that is voluntary in our knowledge is the employing or withholding any of our faculties from this or that sort of objects and a more or less accurate survey of them [illegible] iv. 13.

But this simile must not mislead us. In actual thinking there never is any complete separation between the symbol and the ideas symbolized: the movements of the one are never entirely suspended till those of the other are complete. "Thus," says Hume, "if, instead of saying, that in war the weaker have always recourse to negotiation, we should say, that they have always recourse to conquest, the custom which we have acquired of attributing certain relations to ideas still follows the words and makes us immediately perceive the absurdity of that proposition."[2] How intimately the two are connected is shown by the surprises that give what point there is to puns, and by the small confusion that results from the existence of homonymous terms. The question thus arises—What are the properly ideational elements concerned in thought? Over this question psychologists long waged fight as either nominalists or conceptualists. The former maintain that what is imaged in connexion with a general concept, such as triangle, is some individual triangle "taken in a certain light,"[3] while the latter maintain that an "abstract idea" is formed embodying such constituents of the several particulars as the concept connotes, but dissociated from the specific or accidental variations that distinguish one particular from another. As often happens in such controversies, each party saw the weak point in the other. The nominalists easily showed that there was no distinct abstract idea representable apart from particulars; and the conceptualists could as easily show that a particular presentation "considered in a certain light" is no longer merely a particular presentation nor yet a mere crowd of presentations. The very thing to ascertain is what this consideration in a certain light implies. Perhaps a speedier end might have been put to this controversy if either party had been driven to define more exactly what was to be understood by image or idea. Such ideas as are possible to us apart from abstraction are, as we have seen, revived percepts, not revived sensations, are complex total re-presentations made up of partial re-presentations (comp. p. 57). Reproductive imagination is so far but a faint rehearsal of actual perceptions, and constructive imagination but a faint anticipation of possible perceptions. In either case we are busied with elementary presentations complicated or synthesized to what are tantamount to intuitions, in so far as the forms of intuition remain in the idea, though the fact, as tested by movement, &c., is absent. The several partial re-presentations, however, which make up an idea might also be called ideas, not merely in the wide sense in which every mental object may be so called, but also in the narrower sense as secondary presentations, *i.e.*, as distinguished from primary presentations or impressions. But such isolated images of an impression, even if possible, would no more be intuitions than the mere impression itself would be one: taken alone the one would be as free of space and time as is the other Till it is settled, therefore, whether the ideational elements concerned in conception are intuitive complexes or something answering to the ultimate elements of these, nothing further can be done.

In the case of what are specially called "concrete" as distinct from "abstract" conceptions—if this rough-and ready, but unscientific, distinction may be allowed—the idea answering to the concept differs little from an intuition and we have already remarked that the generic image (*Gemeinbild* of German psychologists) constitutes the connecting link between imagination and conception. But even concerning these it is useless to ask what does one imagine in thinking, *e.g.*, of triangle or man or colour. We never—except for the sake of this very inquiry—attempt to fix our minds in this manner upon some isolated conception; in actual thinking ideas are not in consciousness alone and disjointedly but as part of a context. When the idea "man" is present, it is present in some proposition or question, as—Man is the paragon of animals; In man there is nothing great but mind; and so on. It is quite clear that in understanding or mentally verifying such statements very different constituents out of the whole complex "man" are prominent in each. Further, what is present to consciousness when a general term is understood will differ, not only with a different context, but also the longer we dwell upon it: we may either analyse its connotation or muster its denotation, as the context or the cast of our minds may determine. Thus what is relevant is alone prominent, and the more summary the attention we bestow the less the full extent and intent of the concept are displayed. To the nominalist's objection, that it is impossible to imagine a man without imagining him as either tall or short, young or old, dark or light, and so forth, the conceptualist might reply that at all events percepts may be clear without being distinct, that we can recognize a tree without recognizing what kind of tree it is, and that, moreover, the objection proves too much: for, if our image is to answer exactly to fact, we must represent not only a tall or a short man but a man of definite nature,—one not merely either light or dark, but of a certain precise complexion. But the true answer rather is that in conceiving as such we do not necessarily imagine *a* man or *a* tree at all, any more than—if such an illustration may serve—in writing the equation to the parabola we necessarily draw a parabola as well.

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[1] Ruskin, in his *Fors Clavigera*, relates that the sight of the word "crocodile" used to frighten him as a child so much that he could not feel at ease again till he had turned over the page on which it occurred.

[2] *Treatise of Human Nature*, pt. i. § vii. (Green and Grose's ed.) p. 331.

[3] So Hume, *op. cit.*, p. 456.

The individuality of a concept is thus not to be confounded with the sensible concreteness of an intuition either distinct or indistinct, and "the pains and skill" which Locke felt were required in order to frame what he called an abstract idea are not comparable to the pains and skill that may be necessary to discriminate or decipher what is faint or fleeting. The material "framed" consists no doubt of ideas, if by this is meant that in thinking we work ultimately with the ideational continuum, but what results is never a mere intuitive complex nor yet a mere group of such. The concept or "abstract idea" only emerges when a certain intelligible relation is established among the members of such a group; and the very same intuition may furnish the material for different concepts as often as a different *geistiges Band* is drawn between them. The stuff of this bond, as we have seen, is the word, and this brings into the foreground of consciousness when necessary those elements—whether they form an intuition or not—which are relevant to the concept. Conception, then, is not identical with imagination, although the two terms are still often, and were once generally, regarded as synonymous. The same ultimate materials occur in each; but in the one they start with and retain a sensible form, in the other they are elaborated into the form which is called "intelligible."

General character and growth of intellection.

The distinctive character of this intellectual synthesis lies, we have seen, in the fact that it is determined entirely by what is synthesized, whether that be the elementary constituents of intuitions or general relations of whatever kind among these. It differs, therefore, in being selective from the synthesis of ideation, which rests upon contiguity and unites together whatever occurs together. It differs also from any synthesis, though equally voluntary in its initiation, which is determined by a purely subjective preference, in that intellection depends upon objective relations alone. Owing to the influence of logic, which has long been in a much more forward state than psychology, it has been usual to resolve intellection into comparison, abstraction, and classification, after this fashion: ABCM and ABCN are compared, their differences M and N left out of sight, and the class notion ABC formed including both; the same process repeated with ABC and ABD yields a higher class notion AB; and so on. But our ideational continuum is not a mere string of ideas of concrete things, least of all such concrete things as this view implies. Not till our daily life resembles that of a museum porter receiving specimens will our higher mental activity be comparable to that of the savant who sorts such specimens into cases and compartments. What we perceive is a world of things in continual motion, waxing, waning, the centres of manifold changes, affecting us and apparently affected by each other, amenable to our action and, as it seems, continually interacting among themselves. Even the individual thing, as our brief analysis of perception attempts to show (comp. pp. 55, 56), is not a mere sum of properties which can be taken to pieces and distributed like type, but a whole combined of parts very variously related. To understand intellection we must look at its actual development under the impetus of practical needs, rather than to logical ideals of what it ought to be. Like other forms of purposive activity, thinking is primarily undertaken as a means to an end, and especially the end of economy. It is often easier and always quicker to manipulate ideas than to manipulate real things; to the common mind the thoughtful man is one who "uses his head to save his heels." In all the arts of life, in the growth of language and institutions, in scientific explanation, and even in the speculations of philosophy, we may remark a steady simplification in the steps to a given end or conclusion, or—what is for our present inquiry the same thing—the attainment of better results with the same means. The earliest machines are the most cumbrous and clumsy, the earliest speculations the most fanciful and anthropomorphic. Gradually imitation yields to invention, the natural fallacy of *post hoc, ergo propter hoc* to methodical induction, till what is essential and effective is realized and appreciated and what is accidental and inert is discarded and falls out of sight. In this way man advances in the construction of a complete mental clue or master-key to the intricacies of the real world, but this key is still the counterpart of the world it enables us to control and explain.

To describe the process by which such insight is attained as a mere matter of abstraction deserves the stigma of "soulless blunder" which Hegel applied to it. Of course if attention is concentrated on X it must *pro tanto* be abstracted from Y, and such command of attention may require "some pains and skill." But to see in this invariable accompaniment of thinking its essential feature is much like the schoolboy's saying that engraving consists in cutting fine shavings out of a hard block. The great thing is to find out what are the light-bearing and fruit-bearing combinations. Moreover, thinking does not begin with a conscious abstraction of attention from recognized differences in the way logicians describe. The actual process of generalization, for the most part at all events, is much simpler. The same name is applied to different things or events because only their more salient features are perceived at all. Their differences, so far from being consciously and with effort left out of account, often cannot be observed when attention is directed to them: to the inexperienced all *is* gold that glitters. Thus, and as an instance of the principle of progressive differentiation already noted (p. 42), we find genera recognized before species, and the species obtained by adding on differences, not the genus by abstracting from them. Of course such vague and indefinite concepts are not at first logically general: they only become so when certain common elements are consciously noted as pertaining to presentations in other respects qualitatively different, as well as numerically distinct. But actually thinking starts from such more potential generality as is secured by the association of a generic image with a name. So far the material of thought is always general,—is freed, that is, from the local and temporal and other defining marks of percepts.

The process of thinking itself is psychologically much better described as (1) an analysis and (2) a re-synthesis of ought ana- tic.

this material already furnished by the ideational trains. The logical resolution of thought into hierarchies of concepts arranged like Porphyry's tree, into judgments uniting such concepts by means of a logical copula, &c., is the outcome of later reflexion—mainly for technical purposes—upon thought as a completed product, and entirely presupposes all that psychology has to explain. The logical theory of the formation of concepts by generalization (or abstraction) and by determination (or concretion)—*i.e.*, by the removal or addition of defining marks—assumes the previous existence of the very things to be formed, for these marks or attributes—X's and Y's, A's and B's—are themselves already concepts. Moreover, the act of generalizing or determining is really an act of judgment, so that the logician's account of conception presupposes judgment, while at the same time his account of judgment presupposes conception. But this is no evil; for logic does not essay to exhibit the actual genesis of thought but only an ideal for future thinking. Psychologically—that is to say, chronologically—the judgment is first. The growing mind, we may suppose, passes beyond simple perception when some striking difference in what is at the moment perceived is the occasion of a conflict of presentations (comp. p. 62). The stalking hunter is not instantly recognized as the destroying biped, because he crawls on all fours; or the scarecrow looks like him, and yet not like him; for, though it stands on two legs, it never moves. There is no immediate assimilation: percept and idea remain distinct till, on being severally attended to and compared, what is there is known in spite of the differences. Recognition under such circumstances is in itself a judgment; but of more account is the further judgment involved in it or accompanying it—that which connects the new fact with the old idea. Though actually complex, as the result of a combination of impressions, generic images are not necessarily known as complexes when they first enter into judgments; as the subjects of such judgments they are but starting-points for predication,—It crawls; It does not move; and the like. Such impersonal judgments, according to most philologists, are in fact the earliest; and we may reasonably suppose that by means of them our generic images have been partially analysed, and have attained to something of the distinctness and constancy of logical concepts. But the analysis is rarely complete: a certain confused and fluctuating residuum remains behind. The psychological concept merges at sundry points into those cognate with it,—in other words, the continuity of the underlying memory-train still operates; only the ideal concepts of logic are in all respects *totus, teres, atque rotundus.* Evidence of this, if it seem to any to require proof, is obtainable on all sides, and, if we could recover the first vestiges of thinking, would be more abundant still.

But, if we agree that it is through acts of judgment which successively resolve composite presentations into elements that concepts first arise, it is still very necessary to inquire more carefully what these elements are. On the one side we have seen logicians comparing them to so many letters, and on the other psychologists enumerating the several sensible properties of gold or wax—their colour, weight, texture, &c.—as instances of such elements. In this way formal logic and sensationalist psychology have been but blind leaders of the blind. Language, which has enabled thought to advance to the level at which reflexion about thought can begin, is now an obstacle in the way of a thorough analysis of it. A child or savage would speak only of "red" and "hot," but we of "redness" and "heat." They would probably say, "Swallows come when the days are lengthening and snipe when they are shortening": we say, "Swallows are spring and snipe are winter migrants." Instead of "The sun shines and plants grow," we should say, "Sunlight is the cause of vegetation." In short, there is a tendency to resolve all concepts into substantive concepts; and the reason of this is not far to seek. Whether the subject or starting-point of our discursive thinking be actually what we perceive as a thing, or whether it be a quality, an action, an effectuation (*i.e.*, a transitive action), a concrete spatial or temporal relation, or finally, a resemblance or difference in these or in other respects, it becomes by the very fact of being the central object of thought *pro tanto* a unity, and all that can be affirmed concerning it may so far be regarded as its property or attribute. It is, as we have seen, the characteristic of every completed concept to be a fixed and independent whole, as it were, crystallized out of the still-fluent matrix of ideas. Moreover, the earliest objects of thought and the earliest concepts must naturally be those of the things that live and move about us; hence, then—to seek no deeper reason for the present—this natural tendency, which language by providing distinct names powerfully seconds, to reify or personify not only things but every element and relation of things which we can single out, or, in other words, to concrete our abstracts.[1] It is when things have reached this stage that logic begins. But ordinary, so-called formal, logic, which intends to concern itself not with thinking but only with the most general structure of thought, is debarred from recognizing any difference between concepts that does not affect their relations as terms in a proposition. As a consequence it drifts inevitably into that compartmental logic or logic of extension which knows nothing of categories or predicables, but only of the one relation of whole and part qualitatively considered. It thus pushes this reduction to a common denomination to the utmost: its terms, grammatically regarded, are always names and symbolize classes or compartments of things. From this point of view all disparity among concepts, save that of contradictory exclusion, and all connexion, save that of partial coincidence, are at an end.

Of a piece with this are the logical formula for a simple judgment, X is Y, and the corresponding definitions of judgment as the comparison of two concepts and the recognition of their agreement or disagreement.[2] It certainly is possible to represent every judgment as a comparison, although the term is strictly adequate to only one kind and is often a very artificial description of what actually happens. But for a logic mainly concerned with inference—*i.e.*, with explicating what is implicated in any given statements concerning classes—there is nothing more to be done but to ascertain agreements or disagreements; and the existence of these, if not necessarily, is at least most evidently represented by spatial relations. Such representation obviously implies a single ground of comparison only and therefore leaves no room for differences of category. The resolution of all concepts into class concepts and that of all judgments into comparisons thus go together. On this view if a concept is complex it can only be so as a class combination; and, if the mode of its synthesis could be taken account of at all, this could only be by treating it as an element in the combination like the rest:—iron is a substance, &c., virtue a quality, &c., distance a relation, &c., and so on. There is much of directly psychological interest in this thoroughgoing reduction of thought to a form which makes its consistency and logical concatenation conspicuously evident. But of the so-called matter of thought it tells us nothing. And, as said, there are many forms in that matter of at least equal moment, both for psychology and for epistemology; these formal logic has tended to keep out of sight.

It has generally been under the bias of such a formal or computational logic that psychologists, and especially English psychologists, have entered upon the study of mind. They have brought with them an analytic scheme which affords a ready place for sensations or "simple ideas" as the elements of thought, but none for any differences in the combinations of these elements. Sensations being in their very nature concrete, all generality becomes an affair of names; and, as Sigwart has acutely remarked, sensationalism and nominalism always go together. History would have borne him out if he had added that a purely formal logic tends in like manner to be nominalistic (see LOGIC, vol. xiv. p. 791)

Forms of synthesis.

If we are still to speak of the elements of thought, we must extend this term so as to include not only the sensory elements we are said to receive but three distinct ways in which this pure matter is combined:—(1) the forms of intuition,[3]—Time and Space; (2) the real categories,—Substance, Attribute, State, Act, Effect, End or Purpose, &c.—the exact determination of which is not here in place; and (3) certain formal (logical and mathematical) categories,—as Unity, Difference, Identity, Likeness. These can no more be obtained by such a process of abstraction and generalization as logicians and psychologists alike have been wont to describe than the melody could be obtained by suppressing all the several notes in a tune. They are not primarily concepts more general than all others in the sense in which animal is more general than man, but rather distinct methods of relating or synthesizing presentations. Kant, though he accepted almost unquestioned the logic and psychology current in his day, has yet been the occasion, in spite of himself, of materially advancing both, and chiefly by the distinction he was led to make between formal and transcendental logic. In his exposition of the latter he brings to light the difference between the "functions of the understanding" in synthesizing—or, as we might say, organizing—percepts into concepts and the merely analytic subsumption of *abc* and *abd* under *ab*,—*a*, *b*, *c*, and *d* being what they may. Unlike other concepts, categories as such do not in the first instance signify objects of thought however general, but these functions of the understanding in constituting objects. In fine, they all imply some special process, and into these processes it is the business of psychology to inquire. But only the briefest attempt at such inquiry is here possible.

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[1] See Wundt, *Logik*, i. p. 107 *sq.*, where this process is happily styled "die kategoriale Verschiebung der Begriffe."

[2] Comp. Hamilton: "To judge (*κρίνειν*, *judicare*) is to recognize the relation of congruence or of confliction in which two concepts, two individual things, or a concept and an individual, compared together, stand to each other" (*Lectures on Logic*, i. p. 225).

[3] As to these it must suffice to refer to what has been already said; comp. pp. 53 and 64 *sq.*

To begin with what are *par excellence* formal categories, and among these with that which is the most fundamental and formal of all—How do we come by the conception of unity? "Amongst all the ideas we have," says Locke, "as there is none suggested to the mind by more ways, so there is none more simple than that of unity, or one. It has no shadow of variety or composition in it; every object our senses are employed about, every idea in our understandings, every thought of our minds, brings this idea along with it."[1] And the like with painful iteration has been said by almost all English psychologists since. Such consensus notwithstanding, to assign a sensible origin to unity is certainly a mistake,—one of a class of mistakes already more than once referred to, which consist in transferring to the data of sense all that is implied in the language necessarily used in speaking of them. The *term* "a sensation" no doubt carries along with it the idea of unity, but the bare sensation as received brings along with it nothing but itself. And, if we consider sensory consciousness merely, we do not receive a sensation, and then another sensation, and so on *seriatim*; but we have always a continuous diversity of sensations even when these are qualitatively sharply differentiated. Moreover, if unity were an impression of sense and passively received, it would, in common with other impressions, be unamenable to change. We cannot see red as blue, but we can resolve many (parts) into one (whole), and *vice versa*.[2] Unity, then, is the result of an act the occasions for which, no doubt, are at first non-voluntarily determined; but the act is still as distinct from them as is attention from the objects attended to. It is to that movement of attention already described in dealing with ideation (p. 61) that we must look as the source of this category. This same movement, in like manner, yields us temporal signs; and the complex unity formed by a combination of these is what we call number. When there is little or no difference between the field and the focus of attention, unifying is an impossibility, whatever the impressions received may be. On the other hand, as voluntary acts of concentration become more frequent and distinct the variegated continuum of sense is shaped into intuitions of definite things and events. Also, as soon as words facilitate the control of ideas, it becomes possible to single out special aspects and relations of things as the subjects or starting-points of our discursive thinking. Thus the forms of unity are manifold: every act of intuition or thought, whatever else it is, is an act of unifying.

It is obvious that the whole field of consciousness at any moment can never be actually embraced as one. What is unified becomes thereby the focus of consciousness and so leaves an outlying field; so far unity may be held to imply plurality. But it cannot with propriety be said that in a simple act of attention the field of consciousness is analysed into two distinct parts, *i.e.*, two unities,—*this* (now attended to) and *the other* or the rest (abstracted from). For the not-this is but the rest of a continuum and not itself a whole; it is left out but not determined, as the bounding space is left out when a figure is drawn. To know two unities we must connect both together; and herein comes to light the difference between the unity which is the form of the concept or subject of discourse and the unity of a judgment. The latter is of necessity complex; the former may or may not be. But in any case the complexity of the two is different. If the subject of thought is not only clear but distinct—*i.e.*, not merely defined as a whole but having its constituents likewise more or less defined—such distinctness is due to previous judgments. At any future time these may of course be repeated; such are the analytical or explicative judgments of logic. As the mere subject of discourse it is, however, a single unity simultaneously apprehended; the relation ascertained between it and its predicate constitutes the unity of judgment, a unity which is comprehended only when its parts are successively apprehended.

Law of dichotomy or duality.

But, though a judgment is always a complex unity, the extent of this complexity seems at first sight to vary as the form of synthesis varies. Formal logic, as we have seen, by throwing the form of synthesis into the predicate has no difficulty in reducing every judgment to an S is P. But, if we at all regard the matter thought, it is certain, for example, that "It is an explosion" is less complex than "The enemy explodes the mine." The first answers one question; the second answers three. But as regards the more complex judgment both the process of ascertaining the fact and the language in which it is expressed show that the three elements concerned in it are not synthesized at once. Suppose we start from the explosion,—and changes or movements are not only apt to attract attention first, but, when recognized as events and not as abstracts personified, they call for some supplementing beyond themselves—then in this case we may search for the agent at work or for the object affected, but not for both at once. Moreover, if we find either, a complete judgment at once ensues: "The enemy explodes," or "The mine is exploded." The original judgment is really due to a synthesis of these two. But, when the results of former judgments are in this manner taken up into a new judgment, a certain "condensation of thought" ensues. Of this condensation the grammatical structure of language is evidence, though logical manipulation—with great pains—obliterates it. Thus our more complex judgment would take the form—"The enemy is now mine-exploding" or "The mine is enemy-exploded," according as one or other of the simpler judgments was made first. An examination of other cases would in like manner tend to show that intellectual synthesis is always—in itself and apart from implications—a binary synthesis. Wundt, to whom belongs the merit of first explicitly stating this "law of dichotomy or duality"[3] as the cardinal principle of discursive thinking, contrasts it with synthesis by mere association. This, as running on continuously, he represents thus—$A^-B^-C^-D^-$ . . . ; the synthesis of thought, on the other hand, he symbolizes by forms such as the following :—

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[1] *Essay concerning Human Understanding*, II. xvi. § 1.

[2] "Wir konnen eines der hier gedruckten Worter als *Eins* ansehen, indem wir eine Mannigfaltigkeit von Buchstaben doch in einem abschliessenden Acte zu einem Bilde vereinigen und es von den benachbarten Bildern trennen; wir können es als *Vielheit* ansehen, wenn wir auf den Uebergang von einem Buchstaben zum andern, jeden Schritt absetzend, achten" (Sigwart, *Logik*, ii. p. 41).

[3] Wundt, *Logik: eine Untersuchung der Principien der Erkenntniss*, i. p. 53 *sq*.

$$\overgroup{AB} \qquad \overgroup{\overgroup{AB}\;\overgroup{CD}} \qquad \overgroup{\overgroup{AB}\;\overgroup{C\,\overgroup{DE}}} \qquad \text{\&c.}$$

In explanation of this law as a law of intellection it is hardly sufficient to rest it ultimately on the fact "that in a given moment of time only a single act of apperception is possible."[1] This applies to all syntheses alike. The point surely is that the one thing attended to in an intellective act is the synthesis of two things, and of two things only, because, as only one movement of attention is possible at a time, only two things at a time can be synthesized. In that merely associative synthesis by which the memory-continuum is produced attention moves from A to B and thence to C without any relation between A and B being attended to at all, although they must have relations, that of sequence, *e.g.*, at least. The intellective synthesis which follows upon this first resolves the $A^{\frown}B$ into its elements, and then, if there be any ground for so doing, re-synthesizes them with a consciousness of what the synthesis means.[2]

Formal categories.

Passing now to the remaining formal categories—Difference, Likeness, Identity—all of which come under the law of duality so far as they imply not a single presentation but some relation between two presentations, we have to seek out the characteristics of the states of mind in which these relations become objects of consciousness. The so-called *fundamentum relationis*, of course, can be nothing but the two presentations concerned. Just as certain, however, is it that the relation itself involves something more than these. Two equal triangles may be made to coincide, but are not necessarily coincident: Dromio of Ephesus might be mistaken for Dromio of Syracuse, but at least they never mistook each other. And this brings us to the point. As Lotze puts it, "Two impressions *a* and *b* are never to be regarded as more than *stimuli* which, by affecting the conscious subject—in its very nature individual and *sui generis*—incite to reaction that *activity* by means of which there arise the new presentations, such as similarity, equality, contrast, &c."[3] The activity thus stimulated is what in other words we call the voluntary concentration of attention; to ascertain, then, what these "new presentations" of difference, likeness, and so forth are, we must analyse carefully what takes place when two impressions *a* and *b* are expressly compared.

Difference and likeness.

"Difference," says Hume, "I consider rather as a negation of relation than as anything real or positive. Difference is of two kinds, as opposed either to identity [unity?] or resemblance. The first is called a difference of *number*, the other of *kind*." The truth seems rather to be that difference in the sense of numerical difference is so far an element in all relations as all imply distinct correlatives. To this extent even identity—or at least the recognition of it—rests on difference, that form of difference, viz., which is essential to plurality. But absolute difference of kind may be considered tantamount not, indeed, to the negation, but at least to the absence, of all formal relation. That this absolute difference—or disparateness, as we may call it—affords no ground for relations becomes evident when we consider (1) that, if we had only a plurality of absolutely different presentations, we should have no consciousness at all (comp. p. 45); and (2) that we never compare—although we distinguish, *i.e.*, recognize, numerical difference—where presentations seem absolutely or totally different, as are, *e.g.*, a thunderclap and the taste of sugar, or the notion of free trade and that of the Greek accusative. All actual comparison of what is qualitatively different rests upon opposition or contrariety, *i.e.*, upon at least partial likeness (comp. p. 46). This being understood, it is noteworthy that the recognition of such unlikeness is, if anything, more "real or positive" than that of likeness, and is certainly the simpler of the two. In the comparison of sensible impressions—as of two colours, two sounds, the lengths or the directions of two lines, &c.—we find it easier in some cases to have the two impressions that are compared presented together, in others to have first one presented and then the other. But either way the essential matter is to secure the most effective presentation of their difference, which in every case is something positive and, like any other impression, may vary in amount from bare perceptibility to the extremest distance that the continuum to which it belongs will admit. Where no difference or distance at all is perceptible, there we say there is likeness or equality. Is the only outcome, then, that when we pass from *ab* to *ac* there is a change in consciousness, and that when *ab* persists there is none? To say this is to take no account of the operations (we may symbolize them as $ac - ab = cb$, $ab - ab = 0$) by which the difference or the equality results. The change of presentation (*bc*) and absence of change (0) are not here what they are when merely passive occurrences, so to put it. This is evident from the fact that the former is but a single presentation and the latter no presentation at all. The relation of unlikeness, then, is distinguished from the mere "position" of change by (1) the voluntary concentration of attention upon *ab* and *ac* with a view to the detection of this change as *their* difference, and by (2) the act, relating them through it, in that they are judged unlike to that extent. The type of comparison is such superposition of geometrical lines or figures (as, *e.g.*, in Euclid I. iv.): if they coincide we have concrete equality; if they do not their difference is a line or figure. All sensible comparisons conform essentially to this type. In comparing two shades we place them side by side, and passing from one to the other seek to determine not the absolute shade of the second but its shade relative to the first,—in other words, we look out for contrast. We do not say of one "It is dark," for in the scale of shades it may be light, but "It is darker"; or *vice versa*. Where there is no distance or contrast we simply have not *two* impressions, and, as said—if we consider the difference by itself—no impression at all. Two coincident triangles must be perceived as one. The distinction between the one triangle thus formed by two coinciding and the single triangle rests upon something extraneous to this bare presentation of a triangle that is one and the same in both cases. The marks of this numerical distinctness may be various: they may be different temporal signs, as in reduplications of the memory-continuum; or they may be constituents peculiar to each, from which attention is for the moment abstracted, any one of which suffices to give the common or identical constituent a new setting. In general, it may be said (1) that the numerical distinctness of the related terms is secured in the absence of all qualitative difference solely by the intellectual act which has so unified each as to retain what may serve as an individual mark; and (2) that they become related as "like" either in virtue of the active adjustment to a change of impression which their partial assimilation defeats, or in virtue of an anticipated continuance of the impression which this assimilation confirms.

It is in keeping with this analysis that we say in common speech that two things in any respect similar are so far the same; that, *e.g.*, the two Dromios—

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[1] Wundt, *op. cit.*, i. p. 58.

[2] It need not, of course, be maintained that in every act of thought, no matter how abstract, the ideas related have been previously connected by association. But certainly at the outset this is the case, in such wise that all the forms of intellectual synthesis are prefigured in the connexions of the ideational train or its reduplications.

[3] *Grundzüge der Psychologie*, p. 24.

> "The one so like the other
> As could not be distinguished but by names"—

had the same complexion and the same stature just as we say they had the same mother. This ambiguity in the word "same," whereby it means either individual identity or indistinguishable resemblance, has been often noticed, and from a logical or objective point of view justly complained of as "engendering fallacies in otherwise enlightened understandings." But apparently no one has inquired into its psychological basis, although more than one writer has admitted that the ambiguity is one "in itself not always to be avoided."[1] It is not enough to trace the confusion to the existence of common names and to cite the forgotten controversies of scholastic realism. We are not now concerned with the conformity of thought to things or with logical analysis, but with the analysis of a psychological process. The tendency to treat presentations as if they were copies of things—the objective bias, as we may call it—is the one grand obstacle to psychological observation. Some only realize with an effort that the idea of extension is not extended; no wonder, then, if it should seem "unnatural" to maintain that the idea of two like things does not consist of two like ideas. But, assuming that both meanings of identity have a psychological justification, it will be well to distinguish them and to examine their connexion. Perhaps we might term the one "material identity" and the other "individual identity,"—following the analogy of expressions such as "different things but all made of the same stuff," "the same person but entirely changed." Thus there is unity and plurality concerned in both, and herein identity or sameness differs from singularity or mere oneness, which entails no relation. But the unity and the plurality are different in each, and each is in some sort the converse of the other. In the one, two different individuals partially coincide; in the other, one individual is partially different; the unity in the one case is an individual presentation, in the other is the presentation of an individual.

In material identity the unity is that of a single presentation, whether simple or complex, which enters as a common constituent into two or more others. It may be possible of course to individualize it, but as it emerges in a comparison it is a single presentation and nothing more. On account of this absence of individual marks this single presentation is what logicians call "abstract"; but this is not psychologically essential. It may be a generic image which has resulted from the neutralization of individual marks, but it may equally well be a simple presentation, like red, to which such marks never belonged. We come here from a new side upon a truth which has been already expounded at length, viz., that presentations are not given to us as individuals but as changes in a continuum. Time and space—the instruments, as it were, of individualization, which are presupposed in the objective sciences—are psychologically later than this mere differentiation.

The many vexed questions that arise concerning individual identity are metaphysical rather than psychological. But it will serve to bring out the difference between the two forms of identity to note that an identification cannot be established solely by qualitative comparison; an *alibi* or a breach of temporal continuity will turn the flank of the strongest argument from resemblance. Moreover, resemblance itself may be fatal to identification when the law of being is change. But, while temporal and spatial determinations are essential to individual identity, they have, strictly speaking, no individual identity of their own. When we speak of two impressions occurring at the same time, or localize or project them into the same place, a careful analysis shows only that we detect no difference of temporal and local signs respectively,—in other words, have only special cases of comparison.

As regards the real categories, it may be said generally that these owe their origin in large measure to the anthropomorphic or mythical tendency of human thought,—*τὸ ὅμοιον τῷ ὁμοίῳ γινώσκεσθαι*. Into the formation of these conceptions two very distinct factors enter—(1) the facts of what in the stricter sense we call "self-consciousness," and (2) certain spatial and temporal relations among our presentations themselves. On the one hand, it has to be noted that these spatial and temporal relations are but the occasion or motive—and ultimately perhaps, we may say, the warrant—for the analogical attribution to things of selfness, efficiency, and design, but are not directly the source of the forms of thought that thus arise. On the other hand, it is to be noted also that such forms, although they have an independent source, would never apart from suitable material come into actual existence. If the followers of Hume err in their exclusive reliance upon "associations naturally and even necessarily generated by the order of our sensations" (J. S. Mill), the disciple of Kant errs also who relies exclusively on "the synthetic unity of apperception." The truth is that we are on the verge of error in thus sharply distinguishing the two at all; if we do so momentarily for the purpose of exposition it behoves us here again to remember that mind grows and is not made. The use of terms like "innate," "a priori," "necessary," "formal," &c., without further qualification leads only too easily to the mistaken notion that all the mental facts so named are alike underived and original, independent not only of experience but of each other; whereas but for the forms of intuition the forms of thought would be impossible,—that is to say, we should never have a self-consciousness at all if we had not previously learnt to distinguish occupied and unoccupied space, past and present in time, and the like. But, again, it is equally true that, if we could not feel and move as well as receive impressions, and if experience did not repeat itself, we should never attain even to this level of spatial and temporal intuition. Kant shows a very lame and halting recognition of this dependence of the higher forms on the lower both in his schematism of the categories, and again in correcting in his Analytic the opposition of sense and understanding as respectively receptive and active with which he set out in his Æsthetic. Still, although what are called the subjective and objective factors of real knowledge advance together, the former is in a sense always a step ahead. We find *again* without us the permanence, individuality, efficiency, and adaptation we have found *first of all* within (comp. p. 56, *b* and *d*). But such primitive imputation of personality, though it facilitates a first understanding, soon proves itself faulty and begets the contradictions which have been one chief motive to philosophy. We smile at the savage who thinks a magnet must need food and is puzzled that the horses in a picture remain for ever still; but few consider that underlying all common-sense thinking there lurks the same natural precipitancy. We attribute to extended things a unity which we know only as the unity of an unextended subject; we attribute to changes among these extended things what we know only when we act and suffer ourselves; and we attribute further both to them and their changes a striving for ends which we know only because we feel. In asking what they are, how they act, and why they are thus and thus, we assimilate them to ourselves, in spite of the differences which lead us by and by to see a gulf between mind and matter. Such instinctive analogies have, like other analogies, to be confirmed, refuted, or modified by further knowledge, i.e.

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[1] Comp. J. S. Mill, *Logic*, bk. i. ch. iii. § 11, and *Examination of Hamilton*, 3d ed., ch. xiv. p. 306, note; also Meinong, "Hume-Studien" II., *Wiener Sitzungberichte* (*Phil. Hist. Cl.*), vol. ci. p. 709.

by the very insight into things which these analogies have themselves made possible. That in their first form they were mythical, and that they could never have been at all unless originated in this way, are considerations that make no difference to their validity,—assuming, that is, that they admit, now or hereafter, of a logical transformation which renders them objectively valid. This legitimation is of course the business of philosophy; we are concerned only with the psychological analysis and origin of the conceptions themselves.

As it must here suffice to examine one of these categories, let us take that which is the most important and central of the three, viz., causality or the relation of cause and effect, as that will necessarily throw some light upon the constitution of the others. To begin, we must distinguish three things, which, though very different, are very liable to be confused. (1) Perceiving in a definite case, *e.g.*, that on the sun shining a stone becomes warm, we may say the sun makes the stone warm. This is a concrete instance of predicating the causal relation. In this there is, explicitly at all events, no statement of a general law or axiom, such as we have when we say (2) "Every event must have a cause,"—a statement commonly known as the principle of causality. This again is distinct from what is on all hands allowed to be an empirical generalization, viz., (3) that such and such particular causes have invariably such and such particular effects. With these last psychology is not directly concerned at all: it has only to analyse and trace to its origin the bare conception of causation as expressed in (1) and involved in both these generalizations. Whether only some things have causes, as the notion of chance implies, whether all causes are uniform in their action or some capricious and arbitrary, as the unreflecting suppose,—all this is beside the question for us.

One point in the analysis of the causal relation Hume may be said to have settled once for all: it does not rest upon or contain any immediate intuition of a causal nexus. The two relations that Hume allowed to be perceived (or "presumed to exist"), viz., contiguity in space of the objects causally related and priority in time of the cause before the effect, are the only relations directly discernible. We say indeed "The sun warms the stone" as readily as we say "The sun rises and sets," as if both were matters of direct observation then and there. But that this is not so is evident from the fact that only in some cases when one change follows upon another do we regard it as following from the other: casual coincidence is at least as common as causal connexion. Whence the difference, then, if not from perception? Hume's answer,[1] repeated in the main by English psychologists since, is, as all the world knows, that the difference is the result of association, that when a change β in an object B has been frequently observed to succeed a change a in another object A, the frequent repetition *determines* the mind to a transition from the one to the other. It is this determination, which could not be present at first, that constitutes "the third relation betwixt these objects." This "internal impression" generated by association is then projected; "for 'tis a common observation that the mind has a great propensity to spread itself on external objects."

The subjective origin and the after-projection we must admit, but all else in Hume's famous doctrine seems glaringly at variance with facts. In one respect it proves too much, for all constant sequences are not regarded as causal, as according to his analysis they ought to be; again, in another respect it proves too little, for causal connexion is continually predicated on a first occurrence. The natural man has always distinguished between causes and signs or portents; but there is nothing to show that he produced an effect many times before regarding himself as the cause of it. J. S. Mill has indeed obviated the first objection epistemologically by adding to constant conjunction the further characteristic of "unconditionality." But this is a conception that cannot be psychologically explained from Hume's premisses, unless perhaps by resolving it into the qualification that the invariability must be complete and not partial, whereupon the second objection applies. "Unconditional" is a word for which we can find no meaning as long as we confine our attention to temporal succession. It will not do to say both that an invariable succession generates the idea, and that such invariable succession must be not only invariable but also unconditional in order to generate it. We may here turn the master against the disciple: "the same principle," says Hume, "cannot be both the cause and the effect of another, and this is perhaps the only proposition concerning that relation which is either intuitively or demonstratively certain" (*op. cit.*, p. 391). Unconditionality is then part of the causal relation and yet not the product of invariable repetition.

Perhaps the source of this element in the relation will become clear if we examine more closely the internal impression of the mind which according to Hume constitutes the whole of our idea of power or efficacy. To illustrate the nature of this impression Hume cites the instant passage of the imagination to a particular idea on hearing the word commonly annexed to it, when "'twill scarce be possible for the mind by its utmost efforts to prevent that transition" (*op. cit.*, p. 393). It is this determination, then, which is felt internally, not perceived externally, that we mistakenly transfer to objects and regard as an intelligible connexion between them. But, if Hume admits this, must he not admit more? Can it be pretended that it is through the workings of association among our ideas that we first feel a determination which our utmost efforts can scarce resist, or that we feel such determination under no other circumstances? If it be allowed that the natural man is irresistibly determined to imagine an apple when he hears its name or to expect thunder when he sees lightning, must it not also be allowed that he is irresistibly determined much earlier and in a much more impressive way when overmastered by the elements or by his enemies? But further, such instances bring to light what Hume's "determination" also implies, viz., its necessary correlative, effort or action. Even irresistible association can only be known as such by efforts to resist it. Hume allows this when he says that his principles of association "are not infallible causes; for one may fix his attention during some time on any one object without looking farther" (*op. cit.*, p. 393). But the fact is, we know both what it is to act and what it is to suffer, to go where we would and to be carried where we would not, quite apart from the workings of association. And, had Hume not confused the two different inquiries, that concerning the origin of the idea of causation and that concerning the ground of causal inference or law of causation, it could never have occurred to him to offer such an analysis of the former as he does.

Keeping to the former and simpler question, it would seem that when in ordinary thinking we say A causes this or that in B we project or analogically attribute to A what we experience in acting, and to B what we experience in being acted on; and the structure of language shows that such projection was made long before it was suspected that what A once did and B once suffered must happen in like manner again. The occasions suitable for this projection are determined by the temporal and spatial relations of the objects concerned, which relations are matter of intuition. These are of no very special interest from a psychological point of view, but the subjective elements we shall do well to consider further. First of all, we must note the distinction of immanent action and transitive action; the former is what we call action simply, and implies only a single thing, the agent; the latter, which we might with advantage call effectuation, implies two things, *i.e.*, a patient distinct from the agent. In scientific language the agent in an intransitive act is called a *causa immanens* and so distinguished from the agent in effectuation or *causa transiens*. Common thought, however, does not regard mere action as caused at all; and we shall find it, in fact, impossible to resolve action into effectuation. But, since the things with which we ordinarily deal are complex, have many parts, properties, members, phases, and in consequence of the analytic procedure of thought, there ensues, indeed, a continual shifting of the point of view from which we regard any given thing, so that what is in one aspect one thing, is in another many (comp. p. 56 *c*). So it comes about that, when regarding himself as one, the natural man speaks of himself as walking, shouting, &c.; but, when distinguishing between himself and his members, he speaks of raising his voice, moving his legs, and so forth. Thus no sooner do we resolve any given action into an effectuation, by analytically distinguishing within the original agent an agent and a patient, than a new action appears. Action is thus a simpler notion than causation and inexplicable by means of it. It is certainly no easy problem in philosophy to determine where the resolution of the complex is to cease, at what point we must stop, because in the presence of an individual thing and a simple activity. At any rate, we reach such a point psychologically in the conscious subject, and that energy in consciousness we call attention. If this be allowed, Hume's critique of the notion of efficacy is really wide of the mark. "Some,"[2] he says, "have asserted that we feel an energy or power in our own mind; and that, having in this manner acquir'd the idea of power, we transfer that quality to matter, where we are not able immediately to discover it. . . . But to convince us how fallacious this reasoning is, we need only consider that the will, being here consider'd as a cause, has no more a discoverable connexion with its effects than any material cause has with its proper effect. . . . The effect is there [too] distinguishable and separable from the cause, and cou'd not be foreseen without the experience of their constant conjunction" (*op. cit.*, p. 455). This is logical analysis, not psychological; the point is that the will is not considered as a cause and distinguished from its effects, nor in fact considered at all. It is not a case of sequence between two separable impressions; for we cannot really make the indefinite regress that such logical distinctions as that between the conscious subject and its acts implies. Moreover, our activity as such is not directly presented at all: we *are*, being active; and further than this psychological analysis will not go. There are, as we have seen, two ways in which this activity is manifested, the receptive or passive and the motor or active in the stricter sense—(comp. p. 44) and our experience of these we project in predicating the causal relation. But two halves do not make a whole; so we have no complete experience of effectuation, for the simple reason that we cannot be two things at once. We are guided in piecing it together by the temporal and spatial relations of the things concerned. Hence, perhaps, some of the antinomies that beset this conception. In its earliest form, then, the so-called necessary connexion of cause and effect is perhaps nothing more than that of physical constraint. To this, no doubt, is added the strength of expectation—as Hume supposed—when the same effect has been found invariably to follow the same cause. Finally, when upon a basis of associated uniformities of sequence a definite intellectual elaboration of such material ensues, the logical necessity of reason and consequent finds a place, and so far as deduction is applicable cause and reason become interchangeable ideas.[1]

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[1] *Treatise of Human Nature*, pt. iii., § xiv., "Of the idea of necessary connexion."

[2] Hume here has Locke and Berkeley specially in view. Locke as a patient and acute inquirer was incomparably better as a psychologist than a man addicted to literary foppery like Hume, for all his genius, could possibly be. On the particular question, see Locke, ii. 21. 3-5.

The mention of logical necessity brings up a topic already incidentally noticed, viz., the objectivity of thought and cognition generally (comp pp. 55, 77). The psychological treatment of this topic is tantamount to an inquiry into the characteristics of the states of mind we call certainty, doubt, belief—all of which centre round the one fact of *evidence*. Between the certainty that a proposition is true and the certainty that it is not there may intervene continuous grades of uncertainty. We may know that A is sometimes B, or sometimes not; or that some at least of the conditions of B are present or absent; or the presentation of A may be too confused for distinct analysis. This is the region of probability, possibility, more or less obscurity. Leaving this aside, it will be enough to notice those cases in which certainty may be complete. With that certainty which is absolutely objective, *i.e.*, with knowledge, psychology has no direct concern; it is for logic to furnish the criteria by which knowledge is ascertained.

Emotion and desire are frequent indirect *causes* of subjective certainty, in so far as they determine the constituents and the grouping of the field of consciousness at the moment—"pack the jury" or "suborn the witnesses," as it were. But the *ground* of certainty is in all cases some quality or some relation of these presentations *inter se*. In a sense, therefore, the ground of all certainty is objective—in the sense, that is, of being something at least directly and immediately determined for the subject and not by it. But, though objective, this ground is not itself—at least is not ultimately—an object or presentation. Where certainty is mediate, one judgment is often spoken of as the ground of another; but a syllogism is still psychologically a single, though not a simple, judgment, and the certainty of it as a whole is immediate. Between the judgment A is B and the question Is A B? the difference is not one of content nor scarcely one of form: it is a difference which depends upon the effect of the proposition on the subject judging. (i.) We have this effect before us most clearly if we consider what is by common consent regarded as the type of certainty and evidence, the certainty of present sense-impressions whence it is said, "Seeing is believing." The evident is here the actual, and the "feeling or consciousness" of certainty is in this case nothing but the sense of being taken fast hold of and forced to apprehend what is there. (ii.) The like is true of memory and expectation: in these also there is a sense of being tied down to what is given, whereas in mere imagination, however lively, this non-voluntary determination is absent (comp. p. 63). Hume saw this at times clearly enough, as, *e.g.*, when he says, "An idea assented to *feels* different from a fictitious idea that the fancy alone presents to us." But unfortunately he not only made this difference a mere difference of intensity, but spoke of belief itself as "an operation of the mind" or "manner of conception that bestowed on our ideas this additional force or vivacity."[2] In short, Hume confounded one of the indirect causes of belief with the ground of it, and again, in describing this ground committed the *ὕστερον πρότερον* of making the mind determine the ideas instead of the ideas determine the mind. (iii.) In speaking of intellection he is clearer: "The answer is easy with regard to propositions that are prov'd by intuition or demonstration. In that case, the person who assents not only conceives the ideas according to the proposition, but is necessarily determin'd to conceive them in that particular manner" (*op. cit.*, p. 395). It has been often urged—as by J. S. Mill, for example—that belief is something "ultimate and primordial." No doubt it is; but so is the distinction between activity and passivity, and it is not here maintained that certainty can be analysed into something simpler, but only that it is identical with what is of the nature of passivity—objective determination. As Dr Bain puts it, "The leading fact in belief . . . is our primitive credulity. We begin by believing everything: whatever is is true" (*Emotions and Will*, 3d ed., p. 511). But the point is that in this primitive state there is no act answering to "believe" distinct from the non-voluntary attention answering to "perceive," and no reflexion such as a middle term like "true" implies. With eyes open in the broad day no man says, "I am certain there is light": he simply sees. He may by and by come absolutely to disbelieve much that he sees—*e.g.*, that things are nearer when viewed through a telescope—just as he will come to disbelieve his dreams, though while they last he is certain in these too. The limits of this article forbid any attempt to deal specially with the intellectual aspects of such conflicts of presentations (comp. p. 62) or with their resolution and what is meant by saying that reason turns out superior to sense. The consistency we find it possible to establish among certain of our ideas becomes an ideal, to which we expect to find all our experience conform. Still the intuitive evidence of logical and mathematical axioms is psychologically but a new form of the actual; we are only certain that two and two make four and we are not less certain that we see things nearer through a telescope.[3]

Presentation of Self, Self-Consciousness, and Conduct.

The conception of self we have just seen underlying and to a great extent shaping the rest of our intellectual furniture; on this account it is at once desirable and difficult to analyse it and ascertain the conditions of its development.[4] In attempting this we must carefully distinguish between the bare presentation of self and that reference of other presentations to it which is often called specially self-consciousness, "inner sense," or internal perception. Concerning all presentations whatever—that of self no less than the rest—it is possible to reflect, "This presentation is mine; it is my object; I am the subject attending to it." Self, then, is one presentation among others, the result, like them, of the differentiation of the original continuum. But it is obvious that this presentation must be in existence first before other presentations can be related to it. On the other hand, it is only in and by means of such relations that the conception of self is completed. We begin, therefore, with self simply as an object, and end with the conception of that object as the subject or "myself" that knows itself. Self has, in contradistinction from all other presentations, first of all (*a*) a unique interest and (*b*) a certain inwardness; (*c*) it is an individual that (*d*) persists, (*e*) is active, and finally (*f*) knows itself. These several characteristics of self are intimately involved; so far as they appear at all they advance in definiteness from the lowest level of mere sentience to those moments of highest self-consciousness in which conscience approves or condemns volition.

The earliest and to the last the most important element in self—what we might perhaps term its root or material element—is that variously styled the organic sensations, vital sense, cœnæsthesis, or somatic consciousness. This largely determines the tone of the special sensations and enters, though little suspected, into all our higher feelings. If, as sometimes happens in serious nervous affections, the whole body or any part of it should lose common sensibility, the whole body or that part is at once regarded as strange and even as hostile. In some forms of hypochondria, in which this extreme somatic insensibility and absence of zest leave the intellect and memory unaffected, the individual doubts his own existence or denies it altogether. Ribot cites the case of such a patient who, declaring that he had been dead for two years, thus expressed his perplexity:—"J'existe, mais en dehors de la vie reelle, matérielle, et, malgré moi, rien ne m'ayant donné la mort. Tout est mécanique chez moi et se fait inconsciemment."[1] It is not because they accompany physiological functions essential to the efficiency of the organism as an organism, but simply because they are the most immediate and most constant sources of feeling, that these massive but ill-defined organic sensations are from the first the objects of the directest and most unreflecting interest. Other objects have at the outset but a mediate interest through subjective selection in relation to these, and never become so instinctively and inseparably identified with self, never have the same inwardness. This brings us to a new point. As soon as definite perception begins, the body as an extended thing is distinguished from other bodies, and such organic sensations as can be localized at all are localized within it. At the same time the actions of other bodies upon it are accompanied by pleasures and pains, while their action upon each other is not. The body also is the only thing directly set in motion by the reactions of these feelings, the purpose of such movements being to bring near to it the things for which there is appetite and to remove from it those towards which there is aversion. It is thus not merely the type of occupied space and the centre from which all positions are reckoned, but it affords us an unfailing and ever-present intuition of the actually felt and living self, to which all other things are external, more or less distant, and at times absent altogether. The body then first of all gives to self a certain measure of individuality, permanence, and inwardness.

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[1] Comp. Wundt, *Logik*—"Das Causal-Gesetz und Satz vom Grunde," vol. i. p. 544.

[2] *Treatise of Human Nature*, Green and Grose's ed., i. p. 396.

[3] See Belief, vol. iii. p. 532.

[4] A large, though certainly diminishing, school of thinkers would entirely demur to such a proposal. "This personality," says one, "like all other simple and immediate presentations, is indefinable . . . it can be analysed into no simpler elements: for it is revealed to us in all the clearness of an original intuition" (Mansel, *Metaphysics*, p. 182). Such an objection arises from that confusion between psychology and epistemology which we have met already several times before (as, *e.g.*, in the case of space, p. 53, and of unity, p. 79). The fact is that a conception that is logically "simple and immediate," in such wise as to be underivable from others, and therefore indefinable, may be—we might almost say will be—psychologically the result of a long process of development; for the more abstract a concept is, *i.e.*, the more fundamental in epistemological structure, the more thinking there has been to elaborate it. The most complex integrations of experience are needed to furnish the ideas of its ultimate elements. Such ideas when reached have *intellectually* all the clearness of an original intuition, no doubt; but they are not therefore to be confounded with what is psychologically a simple and immediate presentation. It was in this last sense that idealists like Berkeley and Kant denied any presentation of self as much as sceptics like Hume. Self is psychologically a product of thought, not a datum of sense; hence, while Berkeley called it a "notion" and Kant an "idea of the reason," Hume treated it as a philosophical fiction.

But with the development of ideation there arises within this what we may call an inner zone of self, having still more unity and permanence. We have at this stage not only an intuition of the bodily self doing or suffering here and now, but also memories of what it has been and done under varied circumstances in the past. External impressions have by this time lost in novelty and become less absorbing, while the train of ideas, largely increased in number, distinctness, and mobility, diverts attention and often shuts out the things of sense altogether. In all such reminiscence or reverie a generic image of self is the centre, and every new image as it arises derives all its interest from relation to this; and so apart from bodily appetites new desires may be quickened and old emotions stirred again when all that is actually present is dull and unexciting. But desires and emotions, it must be remembered, though awakened by what is only imaginary, invariably entail actual organic perturbations, and with these the generic image of self comes to be intimately combined. Hence arises a contrast between the inner self, which the natural man locates in his breast or φρήν, the chief seat of these emotional disturbances, and the whole visible and tangible body besides. Although from their nature they do not admit of much ideal representation, yet, when actually present, these organic sensations exert a powerful and often irresistible influence over other ideas; they have each their appropriate train, and so heighten in the very complex and loosely compacted idea of self those traits they originally wrought into it, suppressing to an equal extent all the rest. Normally there is a certain equilibrium to which they return, and which, we may suppose, determines the so-called temperament, *naturel*, or disposition, thus securing some tolerable uniformity and continuity in the presentation of self. But even within the limits of sanity great and sudden changes of mood are possible, as, *e.g.*, in hysterical persons or those of a "mercurial temperament," or among the lower animals at the onset of parental or migratory instincts. Beyond those limits—as the concomitant apparently of serious visceral derangements or the altered nutrition of parts of the nervous system itself—complete "alienation" may ensue. A new self may arise, not only distinct from the old and devoid of all save the most elementary knowledge and skill that the old possessed, but diametrically opposed to it in tastes and disposition,—obscenity, it may be, taking the place of modesty and cupidity or cowardice succeeding to generosity or courage. The most convincing illustrations of the psychological growth and structure of the presentation of self on the lower levels of sensation and ideation are furnished by these melancholy spectacles of minds diseased; but it is impossible to refer to them in detail here.

Passing to the higher level of intellection, we come at length upon the concept which every intelligent being more or less distinctly forms of himself as a person, M. or N., having such and such a character, tastes, and convictions, such and such a history, and such and such an aim in life. The main instrument in the formation of this concept, as of others, is language, and especially the social intercourse that language makes possible. Up to this point the presentation of self has shaped that of not-self,—that is to say, external things have been comprehended by the projection of its characteristics. But now the order is in a sense reversed: the individual advances to a fuller self-knowledge by comparing the self within with what is first discernible in other persons without. So far *avant l'homme est la société*; it is through the "us" that we learn of the "me" (comp. p. 75 note 1). Collective action for common ends is of the essence of society, and in taking counsel together for the good of his tribe each one learns also to take counsel with himself for his own good on the whole; with the idea of the common weal arises the idea of happiness as distinct from momentary gratification. The extra-regarding impulses are now confronted by a reasonable self-love, and in the deliberations that thus ensue activity attains to its highest forms, those of thought and volition. In the first we have a distinctly active manipulation of ideas as compared with the more passive spectacle of memory and imagination. Thereby emerges a contrast between the thinker and these objects of his thought, including among them the mere generic image of self, from which is now formed this conception of self as a person. A similar, even sharper, contrast also accompanies the exercise of what is very misleadingly termed "self-control," *i.e.*, control by this personal self of "the various natural affections," to use Butler's phrase, which often hinder it as external objects hindered them. It is doubtful whether the reasoning, regulating self is commonly regarded as definitely localized. The effort of thinking and concentrating attention upon ideas is no doubt referred to the brain, but this is only comparable with the localization of other efforts in the limbs; when we think we commonly feel also, and the emotional basis is of all the most subjective and inalienable. If we speak of this latest phase of self as *par excellence* "the inner self" such language is then mainly figurative, inasmuch as the contrasts just described are contrasts into which spatial relations do not enter.

The term "reflexion" or internal perception is applied to that state of mind in which some particular presentation or group of presentations (x or y) is not simply in the field of consciousness but there as consciously related to self, which is also presented at the same time. Self here may be symbolized by M, to emphasize the fact that it is in like manner an object in the field of consciousness. The relation of the two is commonly expressed by saying, "This (x or y) is my (M's) percept, idea, or volition; I (M) it is that perceive, think, will it." Self-consciousness, in the narrowest sense, as when we say, "I know myself, I am conscious that I am," &c., is but a special, though the most important, instance of this internal perception: here self (M) is presented in relation to self (with a difference, M'); the subject itself—at least so we say—is or appears as its own object.

It has been often maintained that the difference between consciousness and reflexion is not a real difference, that to know and to know that you know are "the same thing considered in different aspects."[2] But different aspects of the same thing are *not* the same thing, for psychology at least. Not only is it not the same thing to feel and to know that you feel; but it might even be held to be a different thing still to know that you feel and to know that you know that you feel,—such being the difference perhaps between ordinary reflexion and psychological introspection.[3] The difficulty of apprehending these facts and keeping them distinct seems obviously due to the necessary presence of the earlier along with the later; that is to say, we can never know that we feel without feeling. But the converse need not be true. How distinct the two states are is shown in one way by their notorious incompatibility, the direct consequence of the limitation of attention: whatever we have to do that is not altogether mechanical is ill done unless we lose ourselves in the doing of it. This mutual exclusiveness receives a further explanation from the fact so often used to discredit psychology, viz., that the so-called introspection and indeed all reflexion are really retrospective. It is not while we are angry or lost in reverie that we take note of such states, but afterwards, or by momentary side glances intercepting the main interest, if this be not too absorbing.

But we require an exacter analysis of the essential fact in this retrospect—the relation of the presentation x or y to that of self or M. What we have to deal with, it will be observed, is, implicitly at least, a judgment. First of all, then, it is noteworthy that we are never prompted to such judgments by every-day occurrences or acts of routine, but only by matters of interest, and, as said, generally when these are over or have ceased to be all-engrossing. Now in such cases it will be found that some effect of the preceding state of objective absorption persists, like wounds received in battle unnoticed till the fight is over,—such, *e.g.*, as the weariness of muscular exertion or of long concentration of attention; some pleasurable or painful after-sensation passively experienced, or an emotional wave subsiding but not yet spent; "the jar of interrupted expectation," or the relief of sudden attainment after arduous striving, making prominent the contrast of contentment and want in that particular; or, finally, the quiet retrospect and mental rumination in which we note what time has wrought upon us and either regret or approve what we were and did. All such presentations are of the class out of which, as we have seen, the presentation of self is built up, and so form in each case the concrete bond connecting the generic image of self with its object.[1] In this way and in this respect each is a concrete instance of what we call a state, act, affection, &c., and the judgments in which such relations to the standing presentation of self are recognized are the original and the type of all real predications (comp. p. 81). The opportunities for reflexion are at first few, the materials being as it were thrust upon attention, and the resulting "percepts" are but vague. By the time, however, that a clear conception of self has been attained the exigencies of life make it a frequent object of contemplation, and as the abstract of a series of instances of such definite self-consciousness we reach the purely formal notion of a subject or pure ego. For empirical psychology this notion is ultimate; its speculative treatment falls altogether—usually under the heading "rational psychology"—to metaphysics.

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[1] "Bases affectives de la Personnalité," in *Revue philosophique*, xviii. p. 149.

[2] So—misled possibly by the confusions incident to a special faculty of reflexion, which they controvert—James Mill, *Analysis*, i. p. 224 *sq.* (corrected, however, by both his editors, pp. 227 and 230), and also Hamilton, *Lect.*, i. p. 192.

[3] It has been thought a fatal objection to this view that it implies the possibility of an indefinite regress; but why should it not? We reach the limit of our experience in reflexion or at most in deliberate introspection, just as in space of three dimensions we reach the limit of our experience in another respect. But there is no absurdity in supposing a consciousness more evolved and explicit than our self-consciousness and advancing on it as it advances on that of the unreflecting brutes.

The growth of intellection and self-consciousness reacts powerfully upon the emotional and active side of mind. To describe the various sources of feeling and of desire that thus arise—æsthetic, social and religious sentiments, pride, ambition, selfishness, sympathy, &c.—is beyond the scope of systematic psychology and certainly quite beyond the limits of an article like the present.[2] But at least a general *résumé* of the characteristics of activity on this highest or rational level is indispensable. If we are to gain any oversight in a matter of such complexity it is of the first importance to keep steadily in view, as a fundamental principle, that as the causes of feeling become more complex, internal, and representative the consequent actions change in like manner. We have noted this connexion already in the case of the emergence of desires, and seen that desire in prompting to the search for means to its end is the *primum movens* of intellection (pp. 73-75). But intellect does much more than devise and contrive in unquestioning subservience to the impulse of the moment, like some demon of Eastern fable; even the brutes, whose cunning is on the whole of this sort, are not without traces of self-control. As motives conflict and the evils of hasty action recur to mind, deliberation succeeds to mere invention and design. In moments of leisure, the more imperious cravings being stilled, besides the rehearsal of failures or successes in the past, come longer and longer flights of imagination into the future. Both furnish material for intellectual rumination, and so we have at length (1) conceptions of general and distant ends, as wealth, power, knowledge, and—self-consciousness having arisen—the conception also of the happiness or perfection of self, and (2) maxims or practical generalizations as to the best means to these ends. Instead of actions determined by the *vis a tergo* of blind passion we have conduct shaped by what is literally prudence or foresight, the pursuit of ends that are not esteemed desirable till they are judged to be *good*. The good, it is truly urged, is not to be identified with the pleasant, for the one implies a standard and a judgment and the other nothing but a bare fact of feeling; thus the good is often not pleasant and the pleasant not good; in talking of the good, in short, we are passing out of the region of nature into that of character. It is so, and yet this progress is itself so far natural as to admit of psychological explication. As already urged (p. 72), the causes of feeling change as the constituents of consciousness change and depend more upon the form of that consciousness as that increases in complexity. When we can deliberately range to and fro in time and circumstances, the good that is not directly pleasant may indeed be preferred to what is only pleasant while attention is confined to the seen and sensible; but then the choice of such good is itself pleasant,—pleasanter than its rejection would have been. Freedom of will in the sense of absolute arbitrariness or "causeless volition," then, is at least without support from experience. The immediate affirmation of self-consciousness that in the moment of action we are free must be admitted indeed, but it does not prove what it is supposed to prove—the existence of a *liberum arbitrium indifferentiæ*—but only that the relation of the end approved to the empirical self as then presented was the determining motive. This freedom of this empirical self is in all cases a relative freedom; hence at a later time we often come to see that in some past act of choice we were not our true selves, not really free. Or perhaps we hold that we *were* free and could have acted otherwise; and this also is true if we suppose the place of the purely formal and abstract conception of self had been occupied by some other mood of that empirical self which is continuously, but at no one moment completely, presented. It must, however, be admitted that psychological analysis in such cases is not only actually incomplete but in one respect must necessarily always remain so; and that for the simple reason that all we discern by reflexion must ever be less than all we are. That empirical self that the subject sees and even fashions is after all only its object and workmanship, not itself. If this be so, the indeterminist position, that particular acts are not fully determined by aught in consciousness, can neither be certainly established nor finally overthrown on scientific grounds; but the presumption is against it. In another sense, however, it may be allowed that freedom is possible, if not actual, viz., as synonymous with self-rule or autonomy. Freedom applies not to the ultimate source of an activity but to execution; that man is free "externally" who can do what he pleases, and when we talk of internal freedom the same meaning holds.[3]

BIBLIOGRAPHY.—A. *Historical.*—There are few good works on the history of psychology; the only one in English (R. Blakey, *History of the Philosophy of Mind from the Earliest Period to the Present Time*, London, 1848) is said to be worthless. F. A. Carus's *Geschichte der Psychologie* (Leipsic, 1808) is at least useful for reference. A work bearing the same title by H. Siebeck, of which only the first part has yet appeared (consisting of two divisions—(i.) *Die Psychologie von Aristoteles*, (ii.) *Die Psychologie von Aristoteles bis zu Thomas von Aquino*, Gotha, 1880 and 1884) is thoroughly and carefully done. *Die Philosophie in ihrer Geschichte* (*I. Psychologie*), by the late Professor Harms (Berlin, 1878), is also good. Ribot's *La Psychologie Anglaise contemporaine* (2d ed., Paris, 1875) and *La Psychologie Allemande contemporaine* (Paris, 1879) are lucid and concise in style, though the latter work in places is superficial and inaccurate.

B. *Positive.*—The most useful and complete work as an introduction, and for the English reader, is Mr Sully's well-arranged and well-written *Outlines of Psychology* (2d ed., London, 1885). Of more advanced text-books the late Professor Volkmann's *Lehrbuch der Psychologie* (2 vols., 3d ed., Köthen, 1885, edited by Cornelius) is a monument worthy the lifelong labours it entailed. Written in the main from a Herbartian standpoint, it is still the work of one who not only had read and thought over all that was worth reading by psychologists of every school but was unusually gifted with the qualities that make a good investigator and a good expositor. The importance of the Herbartian psychology to English students has been too long overlooked; while it has much in common with the English preference for empirical methods, it is in aim, if not in attainment, greatly in advance of English writers in exactness and system. Other excellent works of the same school are M. W. H. Drobisch's *Empirische Psychologie* (Leipsic, 1842), T. Waitz's *Lehrbuch der Psychologie als Naturwissenschaft* (Brunswick, 1849), and Steinthal's *Einleitung in die Psychologie und Sprachwissenschaft* (Berlin, 1871). To the honoured name of Lotze belongs a distinguished place in any enumeration of recent productions in philosophy; his *Medicinische Psychologie* (Göttingen, 1852) is still valuable; but it is out of print and scarce. A large part of his *Mikrokosmos* (3 vols., 3d ed., 1876-80; translated into English, 2 vols., 1885) and one book of his *Metaphysik* (2d ed., 1884; also translated into English) are, however, devoted to psychology. The close connexion between the study of mind and the study of the organism has been more and more recognized as the present century has advanced, and the doctrine of evolution in particular has been as fruitful in this study as in other sciences that deal with life. In this respect Mr Herbert Spencer's *Principles of Psychology* (2 vols., 2d ed., 1870) and *Data of Ethics* (1879) occupy a foremost place. Dr Bain's standard volumes, *The Senses and the Intellect* (3d ed., 1873) and *The Emotions and the Will* (3d ed., 1875), contain a good deal of "physiological psychology," but no adequate recognition of the importance of the modern theory of development; still, with the exception of Locke, perhaps no English writer has made equally important contributions to the science of mind. It is very questionable whether the time has yet come for a systematic treatment of the connexions of mind and body. Wundt's *Physiologische Psychologie* (2 vols., 2d ed., 1880) is rather a physiology added to a psychology than an attempt at such a systematic treatment. It is, however, a thoroughly able work by one who *is* both a good psychologist and a good physiologist. (J. W*.)

PSYCHOPHYSICS. See WEBER'S LAW.

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[1] They have thus a certain analogy to the presentative element in external perception, the re-presentative elements being furnished by the rest of the generic image of self. But, as this generic image is combined with and primarily sustained by a continuous stream of organic sensations, the analogy is not very exact.

[2] The psychology of a century or so ago, like the biology of the same period, was largely of the "natural history" type and was much occupied with such descriptions; writers like Dugald Stewart, Brown, and Abercrombie, *e.g.*, draw freely from biography (and even from fiction) illustrations of the popularly received mental faculties and affections. A very complete and competent handling of the various emotions and springs of action will be found in Bain, *The Emotions and the Will*; Nahlowsky, *Das Gefühlsleben*, 2d ed., 1884, is also good.

[3] See ETHICS, to which these questions more fitly belong.

PTARMIGAN. See GROUSE, vol. xi. p. 222.

PTERODACTYLE. The extinct flying reptiles known as "pterodactyles" are among the most aberrant forms of animals, either living or extinct. Since the beginning of this century, when Blumenbach and Cuvier first described the remains of these curious creatures, they have occupied the attention of naturalists, and various opinions have been expressed as to their natural affinities. The general proportions of their bodies (excepting the larger head and neck) and the modification of the forelimb, to support a membrane for flight, remind one strongly of the bats, but the resemblance is only superficial; a closer inspection shows that their affinities are rather with reptiles and birds.

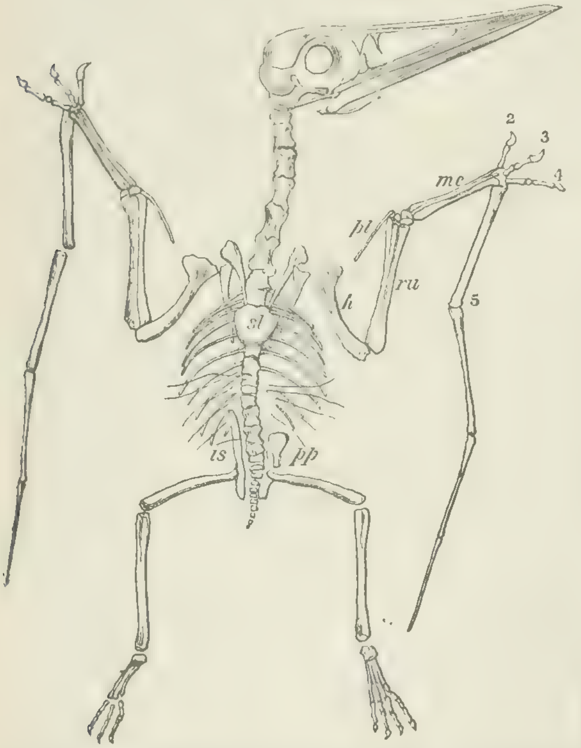

FIG. 1.—*Pterodactylus spectabilis*, Von Meyer, natural size, from the lithographic slate. *h*, humerus; *ru*, radius and ulna; *mc*, metacarpals; *pt*, pteroid bone; 2, 3, 4, digits with claws; 5, elongated digit for support of wing membrane; *st*, sternum, crest not shown; *is*, ischium; *pp*, prepubis. The teeth are not shown.

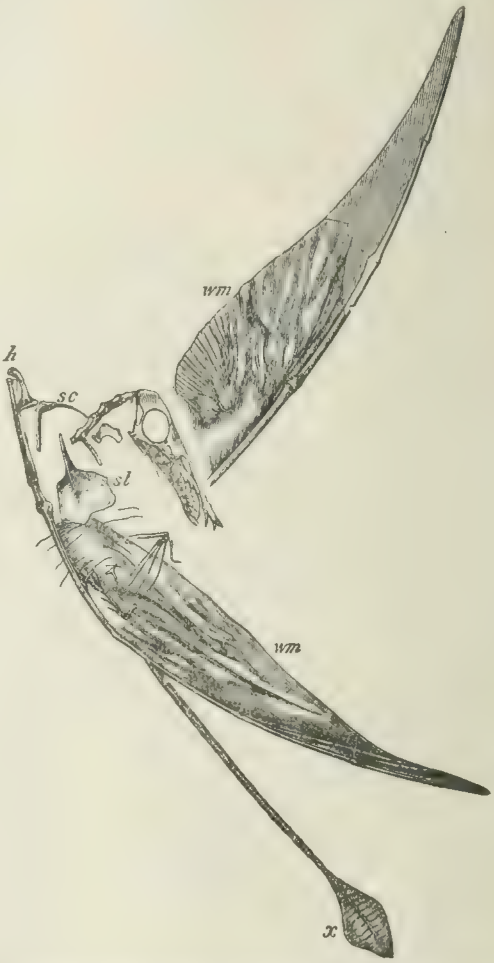

FIG. 2.—*Rhamphorhynchus phyllurus*, Marsh, from the Solenhofen slates, one fourth natural size, with the greater part of the wing membranes preserved. *x*, caudal membrane; *st*, sternum; *h*, humerus; *sc*, scapula and coracoid; *wm*, wing membrane.

In all pterodactyles the head, neck, and forelimb are large in proportion to the other parts of the body (fig. 1). The skull is remarkably avian, and even the teeth, which most of them possess, and which seem so unbird-like, are paralleled in the Cretaceous toothed birds of North America. Judging from the form of the skull, the brain was small, but rounded and more like that of a bird than that of a reptile. The position of the occipital condyle, beneath and not at the back of the skull, is another character pointing in the same direction. The nasal opening is not far in advance of the large orbit, and in some forms there is a lachrymo-nasal fossa between them. The premaxillæ are large, while the maxillæ are slender. In certain species the extremities of the upper and lower jaws seem to have been covered with horn, and some forms at least had bony plates around the eye. The union of the post-frontal bone with the squamosal to form a supra-temporal fossa is a reptilian character. Both jaws are usually provided with long slender teeth, but they are not always present. The vertebral column may be divided into cervical, dorsal, sacral, and caudal regions. The centra of the vertebræ are procœlous,—that is, the front of each centrum is cup-like and receives the ball-like hinder extremity of the vertebra next in front of it. The eight or nine cervical vertebræ are always large, and are succeeded by about fourteen or sixteen which bear ribs. Probably there are no vertebræ which can be called lumbar. The sacrum consists of from three to six vertebræ. The tail is short in some genera and very long in others. The sternum has a distinct median crest, and the scapula and coracoid are also much like those of carinate birds. The humerus has a strong ridge for the attachment of the pectoral muscle, and the radius and ulna are separate bones. There are four distinct metacarpals; passing from the inner or radial side, the first three of these bear respectively two, three, and four phalanges, the terminal ones having had claws. The phalanges of the outermost digit are much elongated, and except in one doubtful form are always four in number. It is the extreme elongation of this outer digit, for the support of the patagium, which is the most characteristic feature of the pterodactyle's organization. A slender bone called the "pteroid" is sometimes seen extending from the carpal region in the direction of the upper part of the humerus. Some naturalists look upon the pteroid merely as an ossification of a tendon, corresponding with one which is found in this position in birds, while others are inclined to regard it rather as a rudimentary first digit, modified to support the edge of the patagium. The pelvis is small. In form the ilia resemble rather the ornithic than the reptilian type; but the other portions of the pelvis are more like those of the crocodiles. The hind limb is small, and the fibula seems to have been feebly developed and fixed to the tibia. The hind foot has five digits in some forms, but only four in others. In the latter case the number of phalanges to each digit, counting from the tibial side, is two, three, four, five respectively. The long bones and vertebræ, as well as some parts of the skull, contained large pneumatic cavities similar to those found in birds. There can be little doubt that the pterodactyles had the power of sustained flight. The large size of the sternal crest indicates a similar development of the pectoral muscles and a corresponding strength in the arms. The form of the forelimb, especially its outer digit, indicates in no uncertain manner that it supported a flying membrane; but within the last few years this has been more clearly demonstrated by the discovery of a specimen in the Solenhofen slates with the membrane preserved (fig. 2). The occurrence of pterodactyle remains in marine deposits would seem to indicate that they frequented the seashore; and it is tolerably certain that those forms with long and slender teeth were, in part at least, fish-eaters. Seeing, however, that the armature of the jaws varies considerably in the different genera, it is most likely that their diet varied accordingly.

Pterodactyles present so many avian peculiarities that it has been proposed to place them in a special group, to be called *Ornithosauria*, which would hold a position intermediate between *Aves* and *Reptilia*. On the other hand, pterodactyles are thought by most authorities to have a closer relationship with the reptiles, and the different genera are placed in a separate order of the *Reptilia* called *Pterosauria*. The most important genera are five. (1) *Pterodactylus*; these have the jaws pointed and toothed to their extremities, and the tail very short. (2) *Rhamphorhynchus* (fig. 2); this genus has the jaws provided with slender teeth, but the extremities of both mandible and upper jaw are produced into toothless beaks, which were probably covered with horn; the tail is extremely long. (3) *Dimorphodon*; in this form the anterior teeth in both upper and lower jaws are long, but those at the hinder part of the jaws are short; the tail is extremely long. (4) *Pteranodon*; similar in most respects to *Pterodactylus*, but the jaws are devoid of teeth. In these four genera the outer digit of the manus has four phalanges. (5) *Ornithopterus*; this form is said to have only two phalanges in the outer digit of the manus; the genus, however, is very imperfectly known, and it has been suggested that it may perhaps be a true bird.

The *Pterosauria* are only known to have lived during the Mesozoic period. They are first met with in the Lower Lias, the *Dimorphodon macronyx* from Lyme Regis being perhaps the earliest known species. The Jurassic slates of Solenhofen have yielded a large number of beautifully preserved examples of *Pterodactylus* and *Rhamphorhynchus*, and remains of the same genera have been found in England in the Stonesfield slate. Bones of pterodactyles have also been obtained in some abundance from the Cretaceous phosphatic deposits near Cambridge; and their remains have been met with occasionally in the Wealden and Chalk of Kent. The genus *Pteranodon* is only known from the Upper Cretaceous rocks of North America. The *Pterosauria* were for the most part of moderate or small size (see fig. 1), but some attained to very considerable dimensions; for instance, *Rhamphorhynchus Bucklandi* from the Stonesfield slate probably measured 7 feet between the wing-tips. But the largest forms existed apparently towards the close of the Mesozoic period, the pterodactyles of the British Cretaceous rocks and the American *Pteranodon* being of still larger size: some of them, it is calculated, must have had wings at least 20 feet in extent.

See Buckland, *Bridgewater Treatise*, 1836; Cuvier, *Ossements fossiles*, vol. v. pt. 2, p. 359 (1824); Huxley, "On *Rhamphorhynchus Bucklandi*," in *Quart. Journ. Geol. Soc.*, vol. xv. p. 658 (1859), and *Anatomy of Vertebrated Animals* (1871), p. 266; Marsh, "Notice of New Sub-order of *Pterosauria* (*Pteranodon*)," *Amer. Journ. Sci. and Art*, vol. xi. p. 507 (1876), and on the "Wings of Pterodactyles," in *Amer. Journ. Science*, vol. xxiii. p. 251 (1882); Owen, *Palæontographical Society* (1851, 1859, 1860); Seeley, *Ornithosauria* (1870); Von Meyer, *Reptilien aus dem lithograph. Schiefer* [*Fauna der Vorwelt*] (1859), and *Palæontographica*, vol. x. p. 1 (1861). (E. T. N.)

PTOLEMIES, the Macedonian dynasty of sovereigns of Egypt. See EGYPT, vol. vii. pp. 745-748, and MACEDONIAN EMPIRE, vol. xv. p. 144.

PTOLEMY (CLAUDIUS PTOLEMÆUS), celebrated as a mathematician, astronomer, and geographer. He was a native of Egypt, but there is an uncertainty as to the place of his birth; some ancient manuscripts of his works describe him as of Pelusium, but Theodorus Meliteniota, a Greek writer on astronomy of the 12th century, says that he was born at Ptolemais Hermii, a Grecian city of the Thebaid. It is certain that he observed at Alexandria during the reigns of Hadrian and Antoninus Pius, and that he survived Antoninus. Olympiodorus, a philosopher of the Neoplatonic school who lived in the reign of the emperor Justinian, relates in his scholia on the *Phædo* of Plato that Ptolemy devoted his life to astronomy and lived for forty years in the so-called Πτερὰ τοῦ Κανώβου, probably elevated terraces of the temple of Serapis at Canopus near Alexandria, where they raised pillars with the results of his astronomical discoveries engraved upon them. This statement is probably correct; we have indeed the direct evidence of Ptolemy himself that he made astronomical observations during a long series of years; his first recorded observation was made in the eleventh year of Hadrian, 127 A.D.,[1] and his last in the fourteenth year of Antoninus, 151 A.D. Ptolemy, moreover, says, "We make our observations in the parallel of Alexandria." St Isidore of Seville asserts that he was of the royal race of the Ptolemies, and even calls him king of Alexandria; this assertion has been followed by others, but there is no ground for their opinion. Indeed Fabricius shows by numerous instances that the name Ptolemy was common in Egypt. Weidler, from whom this is taken, also tells us that according to Arabian tradition Ptolemy lived to the age of seventy-eight years; from the same source some description of his personal appearance has been handed down, which is generally considered as not trustworthy, but which may be seen in Weidler, *Historia Astronomiæ*, p. 177, or in the preface to Halma's edition of the *Almagest*, p. lxi. Ptolemy's work as a geographer is treated of below (p. 91 *sq.*), and an account of the discoveries in astronomy of Hipparchus and Ptolemy has been given in the article ASTRONOMY. Their contributions to pure mathematics have not yet been noticed in the present work. Of these the chief is the foundation of trigonometry, plane and spherical, including the formation of a table of chords, which served the same purpose as our table of sines. This branch of mathematics was created by Hipparchus for the use of astronomers, and its exposition was given by Ptolemy in a form so perfect that for 1400 years it was not surpassed. In this respect it may be compared with the doctrine as to the motion of the heavenly bodies so well known as the Ptolemaic system, which was paramount for about the same period of time. There is, however, this difference, that, whereas the Ptolemaic system was then overthrown, the theorems of Hipparchus and Ptolemy, on the other hand, will be, as Delambre says, for ever the basis of trigonometry. The astronomical and trigonometrical systems are contained in the great work of Ptolemy Ἡ μαθηματικὴ σύνταξις, or, as Fabricius after Syncellus writes it, Μεγάλη σύνταξις τῆς ἀστρονομίας; and in like manner Suidas says οὗτος [Πτολ.] ἔγραψε τὸν μέγαν ἀστρονόμον ἤτοι σύνταξιν. The *Syntaxis* of Ptolemy was called Ὁ μέγας ἀστρονόμος to distinguish it from another collection called Ὁ μικρὸς ἀστρονόμος, also highly esteemed by the Alexandrian school, which contained some works of Autolycus, Euclid, Aristarchus, Theodosius of Tripolis, Hypsicles, and Menelaus. To designate the great work of Ptolemy the Arabs used the superlative μεγίστη, from which, the article *al* being prefixed, the hybrid name *Almagest*, by which it is now universally known, is derived.

We proceed now to consider the trigonometrical work of Hipparchus and Ptolemy. In the ninth chapter of the first book of the *Almagest* Ptolemy shows how to form a table of chords. He supposes the circumference divided into 360 equal parts (τμήματα), and then bisects each of these parts. Further, he divides the diameter into 120 equal parts, and then for the subdivisions of these he employs the sexagesimal method as most convenient in practice, *i.e.*, he divides each of the sixty parts of the radius into sixty equal parts, and each of these parts he further subdivides into sixty equal parts. In the Latin translation these subdivisions become “partes minutæ primæ” and “partes minutæ secundæ,” whence our “minutes” and “seconds” have arisen. It must not be supposed, however, that these sexagesimal divisions are due to Ptolemy; they must have been familiar to his predecessors, and were handed down from the Chaldæans. Nor did the formation of the table of chords originate with Ptolemy; indeed, Theon of Alexandria, the father of Hypatia, who lived in the reign of Theodosius, in his commentary on the *Almagest* says expressly that Hipparchus had already given the doctrine of chords inscribed in a circle in twelve books, and that Menelaus had done the same in six books, but, he continues, every one must be astonished at the ease with which Ptolemy, by means of a few simple theorems, has found their values; hence it is inferred that the method of calculation in the *Almagest* is Ptolemy's own.

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[1] Weidler and Halma give the ninth year; in the account of the eclipse of the moon in that year Ptolemy, however, does not say, as in other similar cases, he had observed, but it had been observed (*Almagest*, iv. 9).

As starting-point the values of certain chords in terms of the diameter were already known, or could be easily found by means of the *Elements* of Euclid. Thus the side of the hexagon, or the chord of 60°, is equal to the radius, and therefore contains sixty parts. The side of the decagon, or the chord of 36°, is the greater segment of the radius cut in extreme and mean ratio, and therefore contains approximately $37^{p}\ 4'\ 55''$ parts, of which the diameter contains 120 parts. Further, the square on the side of the regular pentagon is equal to the sum of the squares on the sides of the regular hexagon and of the regular decagon, all being inscribed in the same circle (Eucl. XIII. 10); the chord of 72° can therefore be calculated, and contains approximately $70^{p}\ 32'\ 3''$. In like manner, the square on the chord of 90°, which is the side of the inscribed square, is twice the square on the radius; and the square on the chord of 120°, or the side of the equilateral triangle, is three times the square on the radius; these chords can thus be calculated approximately. Further, from the values of all these chords we can calculate at once the chords of the arcs which are their supplements.

This being laid down, we now proceed to give Ptolemy's exposition of the mode of obtaining his table of chords, which is a piece of geometry of great elegance, and is indeed, as De Morgan says, “one of the most beautiful in the Greek writers.”

He takes as basis and sets forth as a lemma the well-known theorem, which is called after him, concerning a quadrilateral inscribed in a circle: The rectangle under the diagonals is equal to the sum of the rectangles under the opposite sides. By means of this theorem the chord of the sum or of the difference of two arcs whose chords are given can be easily found, for we have only to draw a diameter from the common vertex of the two arcs the chord of whose sum or difference is required, and complete the quadrilateral; in one case a diagonal, in the other one of the sides is a diameter of the circle. The relations thus obtained are equivalent to the fundamental formulæ of our trigonometry—

$$\sin(A+B)=\sin A\cos B+\cos A\sin B,$$
$$\sin(A-B)=\sin A\cos B-\cos A\sin B,$$

which can therefore be established in this simple way.

Ptolemy then gives a geometrical construction for finding the chord of half an arc from the chord of the arc itself. By means of the foregoing theorems, since we know the chords of 72° and of 60°, we can find the chord of 12°; we can then find the chords of 6°, 3°, $1\frac{1}{2}$°, and three-fourths of 1°, and lastly, the chords of $4\frac{1}{2}$°, $7\frac{1}{2}$°, 9°, $10\frac{1}{2}$°, &c.,—all those arcs, namely, as Ptolemy says, which being doubled are divisible by 3. Performing the calculations, he finds that the chord of $1\frac{1}{2}$° contains approximately $1^{p}\ 34'\ 55''$, and the chord of three-fourths of 1° contains $0^{p}\ 47'\ 8''$. A table of chords of arcs increasing by $1\frac{1}{2}$° can thus be formed; but this is not sufficient for Ptolemy's purpose, which was to frame a table of chords increasing by half a degree. This could be effected if he knew the chord of one-half of 1°; but, since this chord cannot be found geometrically from the chord of $1\frac{1}{2}$°, inasmuch as that would come to the trisection of an angle, he proceeds to seek in the first place the chord of 1°, which he finds approximately by means of a lemma of great elegance, due probably to Apollonius. It is as follows: If two unequal chords be inscribed in a circle, the greater will be to the less in a less ratio than the arc described on the greater will be to the arc described on the less. Having proved this theorem, he proceeds to employ it in order to find approximately the chord of 1°, which he does in the following manner—

$$\frac{\text{chord } 60'}{\text{chord } 45'}<\frac{60}{45},\ i.e.,<\frac{4}{3};\ \therefore \text{chord } 1^\circ<\frac{4}{3}\text{ chord } 45;$$

again—

$$\frac{\text{chord } 90'}{\text{chord } 60'}<\frac{90}{60},\ i.e.,<\frac{3}{2},\ \therefore \text{chord } 1^\circ>\frac{2}{3}\text{ chord } 90.$$

For brevity we use modern notation. It has been shown that the chord of 45′ is $0^{p}\ 47'\ 8''$ q.p., and the chord of 90′ is $1^{p}\ 34'\ 15''$ q.p.; hence it follows that approximately

$$\text{chord } 1^\circ<1^{p}\ 2'\ 50''\ 40''' \text{ and } >1^{p}\ 2'\ 50''$$

Since these values agree as far as the seconds, Ptolemy takes $1^{p}\ 2'\ 50''$ as the approximate value of the chord of 1°. The chord of 1° being thus known, he finds the chord of one-half of a degree, the approximate value of which is $0^{p}\ 31'\ 25''$, and he is at once in a position to complete his table of chords for arcs increasing by half a degree. Ptolemy then gives his table of chords, which is arranged in three columns; in the first he has entered the arcs, increasing by half-degrees, from 0° to 180°; in the second he gives the values of the chords of these arcs in parts of which the diameter contains 120, the subdivisions being sexagesimal; and in the third he has inserted the thirtieth parts of the differences of these chords for each half-degree, in order that the chords of the intermediate arcs, which do not occur in the table, may be calculated, it being assumed that the increment of the chords of arcs within the table for each interval of 30′ is proportional to the increment of the arc.[1]

Trigonometry, we have seen, was created by Hipparchus for the use of astronomers. Now, since spherical trigonometry is directly applicable to astronomy, it is not surprising that its development was prior to that of plane trigonometry. It is the subject-matter of the eleventh chapter of the *Almagest*, whilst the solution of plane triangles is not treated separately in that work.

To resolve a plane triangle the Greeks supposed it to be inscribed in a circle; they must therefore have known the theorem—which is the basis of this branch of trigonometry—The sides of a triangle are proportional to the chords of the double arcs which measure the angles opposite to those sides. In the case of a right-angled triangle this theorem, together with Eucl. I. 32 and 47, gives the complete solution. Other triangles were resolved into right-angled triangles by drawing the perpendicular from a vertex on the opposite side. In one place (*Alm.*, vi. c. 7; vol. i. p. 422, ed. Halma) Ptolemy solves a triangle in which the three sides are given by finding the segments of a side made by the perpendicular on it from the opposite vertex. It should be noticed also that the eleventh chapter of the first book of the *Almagest* contains incidentally some theorems and problems in plane trigonometry. The problems which are met with correspond to the following: Divide a given arc into two parts so that the chords of the doubles of those arcs shall have a given ratio; the same problem for external section. Lastly, it may be mentioned that Ptolemy (*Alm.*, vi. 7; vol. i. p. 421, ed. Halma) takes $3^{p}\ 8'\ 30''$, *i.e.*, $3+\frac{8}{60}+\frac{30}{3600}=3{\cdot}1416$, as the value of the ratio of the circumference to the diameter of a circle, and adds that, as had been shown by Archimedes, it lies between $3\frac{1}{7}$ and $3\frac{10}{71}$.

The foundation of spherical trigonometry is laid in chapter xi. on a few simple and useful lemmas. The starting-point is the well-known theorem of plane geometry concerning the segments of the sides of a triangle made by a transversal: The segments of any side are in a ratio compounded of the ratios of the segments of the other two sides. This theorem, as well as that concerning the inscribed quadrilateral, was called after Ptolemy—naturally, indeed, since no reference to its source occurs in the *Almagest*. This error was corrected by Mersenne, who showed that it was known to Menelaus, an astronomer and geometer who lived in the reign of the emperor Trajan. The theorem now bears the name of Menelaus, though most probably it came down from Hipparchus; Chasles, indeed, thinks that Hipparchus deduced the property of the spherical triangle from that of the plane triangle, but throws the origin of the latter further back and attributes it to Euclid, suggesting that it was given in his *Porisms*.[2] Carnot made this theorem the basis of his theory of transversals in his essay on that subject. It should be noticed that the theorem is not given in the *Almagest* in the general manner stated above; Ptolemy considers two cases only of the theorem, and Theon, in his commentary on the *Almagest*, has added two more cases. The proofs, however, are general. Ptolemy then lays down two lemmas: If the chord of an arc of a circle be cut in any ratio and a diameter be drawn through the point of section, the diameter will cut the arc into two parts the chords of whose doubles are in the same ratio as the segments of the chord; and a similar theorem in the case when the chord is cut externally in any ratio. By means of these two lemmas Ptolemy deduces in an ingenious manner—easy to follow, but difficult to discover—from the theorem of Menelaus for a plane triangle the corresponding theorem for a spherical triangle: If the sides of a spherical triangle be cut by an arc of a great circle, the chords of the doubles of the segments of any one side will be to each other in a ratio compounded of the ratios of the chords of the doubles of the segments of the other two sides. Here, too, the theorem is not stated generally; two cases only are considered, corresponding to the two cases given *in plano*. Theon has added two cases. The proofs are general. By means of this theorem four of Napier's formulæ for the solution of right-angled spherical triangles can be easily established. Ptolemy does not give them, but in each case when required applies the theorem of Menelaus for spherics directly. This greatly increases the length of his demonstrations, which the modern reader finds still more cumbrous, inasmuch as in each case it was necessary to express the relation in terms of chords—the equivalents of sines—only, cosines and tangents being of later invention.

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[1] Ideler has examined the degree of accuracy of the numbers in these tables and finds that they are correct to five places of decimals.

[2] On the theorem of Menelaus and the rule of six quantities, see Chasles, *Aperçu Historique sur l'Origine et Développement des Méthodes en Géométrie*, note vi. p. 291.

Such, then, was the trigonometry of the Greeks. Mathematics, indeed, has ever been, as it were, the handmaid of astronomy, and many important methods of the former arose from the needs of the latter. Moreover, by the foundation of trigonometry, astronomy attained its final general constitution, in which calculations took the place of diagrams, as these latter had been at an earlier period substituted for mechanical apparatus in solving the ordinary problems.[1] Further, we find in the application of trigonometry to astronomy frequent examples and even a systematic use of the method of approximations,—the basis, in fact, of all application of mathematics to practical questions. There was a disinclination on the part of the Greek geometer to be satisfied with a mere approximation, were it ever so close; and the unscientific *agrimensor* shirked the labour involved in acquiring the knowledge which was indispensable for learning trigonometrical calculations. Thus the development of the calculus of approximations fell to the lot of the astronomer, who was both scientific and practical.[2]

We now proceed to notice briefly the contents of the *Almagest*. It is divided into thirteen books. The first book, which may be regarded as introductory to the whole work, opens with a short preface, in which Ptolemy, after some observations on the distinction between theory and practice, gives Aristotle's division of the sciences and remarks on the certainty of mathematical knowledge, "inasmuch as the demonstrations in it proceed by the incontrovertible ways of arithmetic and geometry." He concludes his preface with the statement that he will make use of the discoveries of his predecessors, and relate briefly all that has been sufficiently explained by the ancients, but that he will treat with more care and development whatever has not been well understood or fully treated. Ptolemy unfortunately does not always bear this in mind, and it is sometimes difficult to distinguish what is due to him from that which he has borrowed from his predecessors.

Ptolemy then, in the first chapter, presupposing some preliminary notions on the part of the reader, announces that he will treat in order—what is the relation of the earth to the heavens, what is the position of the oblique circle (the ecliptic), and the situation of the inhabited parts of the earth; that he will point out the differences of climates; that he will then pass on to the consideration of the motion of the sun and moon, without which one cannot have a just theory of the stars; lastly, that he will consider the sphere of the fixed stars and then the theory of the five stars called "planets." All these things—*i.e.*, the phenomena of the heavenly bodies—he says he will endeavour to explain in taking for principle that which is evident, real, and certain, in resting everywhere on the surest observations and applying geometrical methods. He then enters on a summary exposition of the general principles on which his *Syntaxis* is based, and adduces arguments to show that the heaven is of a spherical form and that it moves after the manner of a sphere, that the earth also is of a form which is sensibly spherical, that the earth is in the centre of the heavens, that it is but a point in comparison with the distances of the stars, and that it has not any motion of translation. With respect to the revolution of the earth round its axis, which he says some have held, Ptolemy, while admitting that this supposition renders the explanation of the phenomena of the heavens much more simple, yet regards it as altogether ridiculous. Lastly, he lays down that there are two principal and different motions in the heavens—one by which all the stars are carried from east to west uniformly about the poles of the equator; the other, which is peculiar to some of the stars, is in a contrary direction to the former motion and takes place round different poles. These preliminary notions, which are all older than Ptolemy, form the subjects of the second and following chapters. He next proceeds to the construction of his table of chords, of which we have given an account, and which is indispensable to practical astronomy. The employment of this table presupposes the evaluation of the obliquity of the ecliptic, the knowledge of which is indeed the foundation of all astronomical science. Ptolemy in the next chapter indicates two means of determining this angle by observation, describes the instruments he employed for that purpose, and finds the same value which had already been found by Eratosthenes and used by Hipparchus. This "is followed by spherical geometry and trigonometry enough for the determination of the connexion between the sun's right ascension, declination, and longitude, and for the formation of a table of declinations to each degree of longitude. Delambre says he found both this and the table of chords very exact."[3]

In book ii., after some remarks on the situation of the habitable parts of the earth, Ptolemy proceeds to make deductions from the principles established in the preceding book, which he does by means of the theorem of Menelaus. The length of the longest day being given, he shows how to determine the arcs of the horizon intercepted between the equator and the ecliptic—the amplitude of the eastern point of the ecliptic at the solstice—for different degrees of obliquity of the sphere; hence he finds the height of the pole and reciprocally. From the same data he shows how to find at what places and times the sun becomes vertical and how to calculate the ratios of gnomons to their equinoctial and solstitial shadows at noon and conversely, pointing out, however, that the latter method is wanting in precision. All these matters he considers fully and works out in detail for the parallel of Rhodes. Theon gives us three reasons for the selection of that parallel by Ptolemy: the first is that the height of the pole at Rhodes is 36°, a whole number, whereas at Alexandria he believed it to be 30° 58′; the second is that Hipparchus had made at Rhodes many observations; the third is that the climate of Rhodes holds the mean place of the seven climates subsequently described. Delambre suspects a fourth reason, which he thinks is the true one, that Ptolemy had taken his examples from the works of Hipparchus, who observed at Rhodes and had made these calculations for the place where he lived. In chapter vi. Ptolemy gives an exposition of the most important properties of each parallel, commencing with the equator, which he considers as the southern limit of the habitable quarter of the earth. For each parallel or climate, which is determined by the length of the longest day, he gives the latitude, a principal place on the parallel, and the lengths of the shadows of the gnomon at the solstices and equinox. In the next chapter he enters into particulars and inquires what are the arcs of the equator which cross the horizon at the same time as given arcs of the ecliptic, or, which comes to the same thing, the time which a given arc of the ecliptic takes to cross the horizon of a given place. He arrives at a formula for calculating ascensional differences and gives tables of ascensions arranged by 10° of longitude for the different climates from the equator to that where the longest day is seventeen hours. He then shows the use of these tables in the investigation of the length of the day for a given climate, of the manner of reducing temporal[4] to equinoctial hours and *vice versa*, and of the nonagesimal point and the point of orientation of the ecliptic. In the following chapters of this book he determines the angles formed by the intersections of the ecliptic—first with the meridian, then with the horizon, and lastly with the vertical circle—and concludes by giving tables of the angles and arcs formed by the intersection of these circles, for the seven climates, from the parallel of Meroe (thirteen hours) to that of the mouth of the Borysthenes (sixteen hours). These tables, he adds, should be completed by the situation of the chief towns in all countries according to their latitudes and longitudes; this he promises to do in a separate treatise and has in fact done in his *Geography*.

Book iii. treats of the motion of the sun and of the length of the year. In order to understand the difficulties of this question Ptolemy says one should read the books of the ancients, and especially those of Hipparchus, whom he praises "as a lover of labour and a lover of truth" (*ἀνδρὶ φιλοπόνῳ τε ὁμοῦ καὶ φιλαληθεῖ*). He begins by telling us how Hipparchus was led to discover the precession of the equinoxes; he relates the observations which led Hipparchus to his second great discovery, that of the eccentricity of the solar orbit, and gives the hypothesis of the eccentric by which he explained the inequality of the sun's motion. Ptolemy concludes this book by giving a clear exposition of the circumstances on which the equation of time depends. All this the reader will find in the article ASTRONOMY (vol. ii. p. 750). Ptolemy, moreover, applies Apollonius's hypothesis of the epicycle to explain the inequality of the sun's motion, and shows that it leads to the same results as the hypothesis of the eccentric. He prefers the latter hypothesis as more simple, requiring only one and not two motions, and as equally fit to clear up the difficulties. In the second chapter there are some general remarks to which attention should be directed. We find the principle laid down that for the explanation of phenomena one should adopt the simplest hypothesis that it is possible to establish, provided that it is not contradicted by the observations in any important respect.[5] This fine principle, which is of universal application, may, we think—regard being paid to its place in the *Almagest*—be justly attributed to Hipparchus. It is the first law of the "philosophia prima" of Comte.[1] We find in the same page another principle, or rather practical injunction, that in investigations founded on observations where great delicacy is required we should select those made at considerable intervals of time in order that the errors arising from the imperfection which is inherent in all observations, even in those made with the greatest care, may be lessened by being distributed over a large number of years. In the same chapter we find also the principle laid down that the object of mathematicians ought to be to represent all the celestial phenomena by uniform and circular motions. This principle is stated by Ptolemy in the manner which is unfortunately too common with him.—that is to say, he does not give the least indication whence he derived it. We know, however, from Simplicius, on the authority of Sosigenes,[2] that Plato is said to have proposed the following problem to astronomers: "What regular and determined motions being assumed would fully account for the phenomena of the motions of the planetary bodies?" We know, too, from the same source that Eudemus says in the second book of his *History of Astronomy* that "Eudoxus of Cnidus was the first of the Greeks to take in hand hypotheses of this kind,"[3] that he was in fact the first Greek astronomer who proposed a geometrical hypothesis for explaining the periodic motions of the planets—the famous system of concentric spheres. It thus appears that the principle laid down here by Ptolemy can be traced to Eudoxus and Plato; and it is probable that they derived it from the same source, namely, Archytas and the Pythagoreans. We have indeed the direct testimony of Geminus of Rhodes that the Pythagoreans endeavoured to explain the phenomena of the heavens by uniform and circular motions.[4]

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[1] Comte, *Système de Politique Positive*, iii. 324.

[2] Cantor, *Vorlesungen über Geschichte der Mathematik*, p. 356.

[3] De Morgan, in Smith's *Dictionary of Greek and Roman Biography*, *s.v.* "Ptolemæus, Claudius."

[4] *Καιρικαί*, temporal or variable. These hours varied in length with the seasons: they were used in ancient times and arose from the division of the natural day (from sunrise to sunset) into twelve parts.

[5] *Alm.*, ed. Halma, i. 159.

Books iv., v. are devoted to the motions of the moon, which are very complicated; the moon in fact, though the nearest to us of all the heavenly bodies, has always been the one which has given the greatest trouble to astronomers.[5] Book iv., in which Ptolemy follows Hipparchus, treats of the first and principal inequality of the moon, which quite corresponds to the inequality of the sun treated of in the third book. As to the observations which should be employed for the investigation of the motion of the moon, Ptolemy tells us that lunar eclipses should be preferred, inasmuch as they give the moon's place without any error on the score of parallax. The first thing to be determined is the time of the moon's revolution; Hipparchus, by comparing the observations of the Chaldæans with his own, discovered that the shortest period in which the lunar eclipses return in the same order was 126,007 days and 1 hour. In this period he finds 4267 lunations, 4573 restitutions of anomaly, and 4612 tropical revolutions of the moon less $7\frac{1}{2}^\circ$ q.p.; this quantity ($7\frac{1}{2}^\circ$) is also wanting to complete the 345 revolutions which the sun makes in the same time with respect to the fixed stars. He concluded from this that the lunar month contains 29 days and 31′ 50″ 8‴ 20⁗ of a day, very nearly, or 29 days 12 hours 44′ 3″ 20‴. These results are of the highest importance. (See ASTRONOMY.) In order to explain this inequality, or the equation of the centre, Ptolemy makes use of the hypothesis of an epicycle, which he prefers to that of the eccentric. The fifth book commences with the description of the astrolabe of Hipparchus, which Ptolemy made use of in following up the observations of that astronomer, and by means of which he made his most important discovery, that of the second inequality in the moon's motion, now known by the name of the "evection." In order to explain this inequality he supposed the moon to move on an epicycle, which was carried by an eccentric whose centre turned about the earth in a direction contrary to that of the motion of the epicycle. This is the first instance in which we find the two hypotheses of eccentric and epicycle combined. The fifth book treats also of the parallaxes of the sun and moon, and gives a description of an instrument—called later by Theon the "parallactic rods"—devised by Ptolemy for observing meridian altitudes with greater accuracy.

The subject of parallaxes is continued in the sixth book of the *Almagest*, and the method of calculating eclipses is there given. The author says nothing in it which was not known before his time.

Books vii., viii. treat of the fixed stars. Ptolemy verified the fixity of their relative positions and confirmed the observations of Hipparchus with regard to their motion in longitude, or the precession of the equinoxes. (See ASTRONOMY.) The seventh book concludes with the catalogue of the stars of the northern hemisphere, in which are entered their longitudes, latitudes, and magnitudes, arranged according to their constellations; and the eighth book commences with a similar catalogue of the stars in the constellations of the southern hemisphere. This catalogue has been the subject of keen controversy amongst modern astronomers. Some, as Flamsteed and Lalande, maintain that it was the same catalogue which Hipparchus had drawn up 265 years before Ptolemy, whereas others, of whom Laplace is one, think that it is the work of Ptolemy himself. The probability is that in the main the catalogue is really that of Hipparchus altered to suit Ptolemy's own time, but that in making the changes which were necessary a wrong precession was assumed. This is Delambre's opinion; he says, "Whoever may have been the true author, the catalogue is unique, and does not suit the age when Ptolemy lived; by subtracting 2° 40′ from all the longitudes it would suit the age of Hipparchus; this is all that is certain."[6] It has been remarked that Ptolemy, living at Alexandria, at which city the altitude of the pole is 5° less than at Rhodes, where Hipparchus observed, could have seen stars which are not visible at Rhodes; none of these stars, however, are in Ptolemy's catalogue. The eighth book contains, moreover, a description of the milky way and the manner of constructing a celestial globe; it also treats of the configuration of the stars, first with regard to the sun, moon, and planets, and then with regard to the horizon, and likewise of the different aspects of the stars and of their rising, culmination, and setting simultaneously with the sun.

The remainder of the work is devoted to the planets. The ninth book commences with what concerns them all in general. The planets are much nearer to the earth than the fixed stars and more distant than the moon. Saturn is the most distant of all, then Jupiter and then Mars. These three planets are at a greater distance from the earth than the sun.[7] So far all astronomers are agreed. This is not the case, he says, with respect to the two remaining planets, Mercury and Venus, which the old astronomers placed between the sun and earth, whereas more recent writers[8] have placed them beyond the sun, because they were never seen on the sun.[9] He shows that this reasoning is not sound, for they might be nearer to us than the sun and not in the same plane, and consequently never seen on the sun. He decides in favour of the former opinion, which was indeed that of most mathematicians. The ground of the arrangement of the planets in order of distance was the relative length of their periodic times; the greater the circle, the greater, it was thought, would be the time required for its description. Hence we see the origin of the difficulty and the difference of opinion as to the arrangement of the sun, Mercury, and Venus, since the times in which, as seen from the earth, they appear to complete the circuit of the zodiac are nearly the same—a year.[10] Delambre thinks it strange that Ptolemy did not see that these contrary opinions could be reconciled by supposing that the two planets moved in epicycles about the sun; this would be stranger still, he adds, if it is true that this idea, which is older than Ptolemy, since it is referred to by Cicero,[11] had been that of the Egyptians.[12] It may be added, as strangest of all, that this doctrine was held by Theon of Smyrna,[13] who was a contemporary of Ptolemy or somewhat senior to him. From this system to that of Tycho Brahe there is, as Delambre observes, only a single step.

We have seen that the problem which presented itself to the astronomers of the Alexandrian epoch was the following: it was required to find such a system of equable circular motions as would represent the inequalities in the apparent motions of the sun, the moon, and the planets. Ptolemy now takes up this question for the planets; he says that "this perfection is of the essence of celestial things, which admit of neither disorder nor inequality," that this planetary theory is one of extreme difficulty, and that no one had yet completely succeeded in it. He adds that it was owing to these difficulties that Hipparchus—who loved truth above all things, and who, moreover, had not received from his predecessors observations either so numerous or so precise as those that he has left—had succeeded, as far as possible, in representing the motions of the sun and moon by circles, but had not even commenced the theory of the five planets. He was content, Ptolemy continues, to arrange the observations which had been made on them in a methodic order and to show thence that the phenomena did not agree with the hypotheses of mathematicians at that time. He showed that in fact each planet had two inequalities, which are different for each, that the retrogradations are also different, whilst other astronomers admitted only a single inequality and the same retrogradation; he showed further that their motions cannot be explained by eccentrics nor by epicycles carried along concentrics, but that it was necessary to combine both hypotheses. After these preliminary notions he gives from Hipparchus the periodic motions of the five planets, together with the shortest times of restitutions, in which, moreover, he has made some slight corrections. He then gives tables of the mean motions in longitude and of anomaly of each of the five planets,[1] and shows how the motions in longitude of the planets can be represented in a general manner by means of the hypothesis of the eccentric combined with that of the epicycle. He next applies his theory to each planet and concludes the ninth book by the explanation of the various phenomena of the planet Mercury. In the tenth and eleventh books he treats, in like manner, of the various phenomena of the planets Venus, Mars, Jupiter, and Saturn.

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[1] *Système de Politique Positive*, iv. 173.

[2] This Sosigenes, as Th. H. Martin has shown, was not the astronomer of that name who was a contemporary of Julius Cæsar, but a Peripatetic philosopher who lived at the end of the 2d century A.D.

[3] Brandis, *Schol. in Aristot. edidit Acad. Reg. Borussica* (Berlin, 1836), p. 498.

[4] Εἰσαγωγὴ εἰς τὰ φαινόμενα, c. i. in Halma's edition of the works of Ptolemy, vol. iii. ("Introduction aux Phénomènes Célestes, traduite du Grec de Géminus," p. 9), Paris, 1819.

[5] This has been noticed by Pliny, who says, "Multiformi hæc (luna) ambage torsit ingenia contemplantium, et proximum ignorari maxime sidus indignantium" (*N. H.*, ii. 9).

[6] Delambre, *Histoire de l'Astronomie Ancienne*, ii. 264.

[7] This is true of their mean distances; but we know that Mars at opposition is nearer to us than the sun.

[8] Eratosthenes, for example, as we learn from Theon of Smyrna.

[9] Transits of Mercury and Venus over the sun's disk, therefore, had not been observed.

[10] This was known to Eudoxus. Sir George Cornewall Lewis (*An Historical Survey of the Astronomy of the Ancients*, p. 155), confusing the *geocentric* revolutions assigned by Eudoxus to these two planets with the *heliocentric* revolutions in the Copernican system, which are of course quite different, says that "the error with respect to Mercury and Venus is considerable"; this, however, is an error not of Eudoxus but of Cornewall Lewis, as Schiaparelli has remarked.

[11] "Hunc [solem] ut comites consequuntur Veneris alter, alter Mercurii cursus" (*Somnium Scipionis, De Rep.*, vi. 17). This hypothesis is alluded to by Pliny, *N. H.*, ii. 17, and is more explicitly stated by Vitruvius, *Arch.*, ix. 4.

[12] Macrobius, *Commentarius ex Cicerone in Somnium Scipionis*, i. 19.

[13] Theon (Smyrnæus Platonicus), *Liber de Astronomia*, ed. Th. H. Martin (Paris, 1849), pp. 174, 294, 296. Martin thinks that Theon, the mathematician, four of whose observations are used by Ptolemy (*Alm.*, ii. 176, 193, 194, 195, 196, ed. Halma), is not the same as Theon of Smyrna, on the ground chiefly that the latter was not an observer.

Book xii. treats of the stationary and retrograde appearances of each of the planets and of the greatest elongations of Mercury and Venus. The author tells us that some mathematicians, and amongst them Apollonius of Perga, employed the hypothesis of the epicycle to explain the stations and retrogradations of the planets. Ptolemy goes into this theory, but does not change in the least the theorems of Apollonius; he only promises simpler and clearer demonstrations of them. Delambre remarks that those of Apollonius must have been very obscure, since, in order to make the demonstrations in the *Almagest* intelligible, he (Delambre) was obliged to recast them. This statement of Ptolemy is important, as it shows that the mathematical theory of the planetary motions was in a tolerably forward state long before his time. Finally, book xiii. treats of the motions of the planets in latitude, also of the inclinations of their orbits and of the magnitude of these inclinations.

Those who wish to go into details and learn the mathematical explanation of this celebrated system of "eccentrics" and "epicycles" are referred to the *Almagest* itself, which can be most conveniently studied in Halma's edition,[2] to Delambre's *Histoire de l'Astronomie Ancienne*, the second volume of which is for the most part devoted to the *Almagest*,[3] or to Narrien's *History of Astronomy*,[4] in which the subject is treated with great clearness.

Ptolemy concludes his great work by saying that he has included in it everything of practical utility which in his judgment should find a place in a treatise on astronomy at the time it was written, with relation as well to discoveries as to methods. His work was justly called by him Μαθηματικὴ Σύνταξις, for it was in fact the mathematical form of the work which caused it to be preferred to all others which treated of the same science, but not by "the sure methods of geometry and calculation." Accordingly, it soon spread from Alexandria to all places where astronomy was cultivated; numerous copies were made of it, and it became the object of serious study on the part of both teachers and pupils. Amongst its numerous commentators may be mentioned Pappus and Theon of Alexandria in the 4th century and Proclus in the 5th. It was translated into Latin by Boetius, but this translation has not come down to us. The *Syntaxis* was translated into Arabic at Baghdad by order of the enlightened caliph Al-Mamún, who was himself an astronomer, about 827 A.D., and the Arabic translation was revised in the following century by Thabit ibn Korra. The emperor Frederick II. caused the *Almagest* to be translated from the Arabic into Latin at Naples about 1230. In the 15th century it was translated from a Greek manuscript in the Vatican by George of Trebizond. In the same century an epitome of the *Almagest* was commenced by Purbach (died 1461) and completed by his pupil and successor in the professorship of astronomy in the university of Vienna, Regiomontanus. The earliest edition of this epitome is that of Venice, 1496, and this was the first appearance of the *Almagest* in print. The first complete edition of the *Almagest* is that of P. Liechtenstein (Venice, 1515),—a Latin version from the Arabic. The Latin translation of George of Trebizond was first printed in 1528, at Venice. The Greek text, which was not known in Europe until the 15th century, was first published in the 16th by Simon Grynæus, who was also the first editor of the Greek text of Euclid, at Basel, 1538. This edition was from a manuscript in the library of Nuremberg—where it is no longer to be found—which had been presented by Regiomontanus, to whom it was given by Cardinal Bessarion. The last edition of the *Almagest* is that of Halma, Greek with French translation, in two vols., Paris, 1813-16. On the manuscripts of the *Almagest* and its bibliographical history, see Fabricius, *Bibliotheca Græca*, ed. Harles, vol. v. p. 280, and Halma's preface. An excellent summary of the bibliographical history is given by De Morgan in his article on Ptolemy already quoted.

Other works of Ptolemy, which we now proceed to notice very briefly, are as follows. (1) Φάσεις ἀπλανῶν ἀστέρων καὶ συναγωγὴ ἐπισημασιῶν, *On the Apparitions of the Fixed Stars and a Collection of Prognostics.* It is a calendar of a kind common amongst the Greeks under the name of παράπηγμα, or a collection of the risings and settings of the stars in the morning or evening twilight, which were so many visible signs of the seasons, with prognostics of the principal changes of temperature with relation to each climate, after the observations of the best meteorologists, as, for example, Meton, Democritus, Eudoxus, Hipparchus, &c. Ptolemy, in order to make his *Parapegma* useful to all the Greeks scattered over the enlightened world of his time, gives the apparitions of the stars not for one parallel only but for each of the five parallels in which the length of the longest day varies from 13½ hours to 16½ hours,—that is, from the latitude of Syene to that of the middle of the Pontus. This work has been printed by Petavius in his *Uranologion*, Paris, 1630, and by Halma in his edition of the works of Ptolemy, vol. iii., Paris, 1820. (2) Ὑποθέσεις τῶν πλανωμένων ἢ τῶν οὐρανίων κύκλων κινήσεις, *On the Planetary Hypotheses.* This is a summary of a portion of the *Almagest*, and contains a brief statement of the principal hypotheses for the explanation of the motions of the heavenly bodies. It was first published (Gr., Lat.) by Bainbridge, the Savilian professor of astronomy at Oxford, with the Sphere of Proclus and the Κανὼν βασιλειῶν, London, 1620, and afterwards by Halma, vol. iii., Paris 1820. (3) Κανὼν βασιλειῶν, *A Table of Reigns.* This is a chronological table of Assyrian, Persian, Greek, and Roman sovereigns, with the length of their reigns, from Nabonasar to Antoninus Pius. This table (comp. G. Syncellus, *Chronogr.*, ed. Dind., i. 388 *sq.*) has been printed by Scaliger, Calvisius, Petavius, Bainbridge (as above noted), and by Halma, vol. iii., Paris, 1819. (4) Ἁρμονικῶν βιβλία γ'. This *Treatise on Music* was published in Greek and Latin by Wallis at Oxford, 1682. It was afterwards reprinted with Porphyry's commentary in the third volume of Wallis's works, Oxford, 1699. (5) Τετράβιβλος σύνταξις, *Tetrabiblon* or *Quadripartitum.* This work is astrological, as is also the small collection of aphorisms, called Καρπός or *Centiloquium*, by which it is followed. It is doubtful whether these works are genuine, but the doubt merely arises from the feeling that they are unworthy of Ptolemy. They were both published in Greek and Latin by Camerarius, Nuremberg, 1535, and by Melanchthon, Basel, 1553. (6) *De Analemmate.* The original of this work of Ptolemy is lost. It was translated from the Arabic and published by Commandine, Rome, 1562. The *Analemma* is the description of the sphere on a plane. We find in it the sections of the different circles, as the diurnal parallels, and everything which can facilitate the intelligence of gnomonics. This description is made by perpendiculars let fall on the plane; whence it has been called by the moderns "orthographic projection." (7) *Planisphærium, The Planisphere.* The Greek text of this work also is lost, and we have only a Latin translation of it from the Arabic. The "planisphere" is a projection of the sphere on the equator, the eye being at the pole,—in fact what is now called "stereographic" projection. The best edition of this work is that of Commandine, Venice, 1558. (8) *Optics.* This work is known to us only by imperfect manuscripts in Paris and Oxford, which are Latin translations from the Arabic; some extracts from them have been recently published. The *Optics* consists of five books, of which the fifth presents most interest: it treats of the refraction of luminous rays in their passage through media of different densities, and also of astronomical refractions, on which subject the theory is more complete than that of any astronomer before the time of Cassini. De Morgan doubts whether this work is genuine on account of the absence of allusion to the *Almagest* or to the subject of refraction in the *Almagest* itself; but his chief reason for doubting its authenticity is that the author of the *Optics* was a poor geometer. (G. J. A.)

Geography.

Ptolemy is hardly less celebrated as a geographer than as an astronomer, and his great work on geography exercised as great an influence on the progress of that science as did his *Almagest* on that of astronomy. It became indeed the paramount authority on all geographical questions for a period of many centuries, and was only gradually superseded by the progress of maritime discovery in the 15th and 16th centuries. This exceptional position was due in a great measure to its scientific form, which rendered it very convenient and easy of reference; but, apart from this consideration, it was really the first attempt ever made to place the study of geography on a truly scientific basis. The great astronomer Hipparchus had indeed pointed out, three centuries before the time of Ptolemy, that the only way to construct a really trustworthy map of the Inhabited World would be by observations of the latitude and longitude of all the principal points on its surface, and laying down a map in accordance with the positions thus determined. But the materials for such a course of proceeding were almost wholly wanting, and, though Hipparchus made some approach to a correct division of the known world into zones of latitude, or "climata," as he termed them, trustworthy observations even of this character were in his time very few in number, while the means of determining longitudes could hardly be said to exist. Hence probably it arose that no attempt was made by succeeding geographers to follow up the important suggestion of Hipparchus. Marinus of Tyre, who lived shortly before the time of Ptolemy, and whose work is known to us only through that writer, appears to have been the first to resume the problem thus proposed, and lay down the map of the known world in accordance with the precepts of Hipparchus. His materials for the execution of such a design were indeed miserably inadequate, and he was forced to content himself for the most part with determinations derived not from astronomical observations but from the calculation of distances from itineraries and other rough methods, such as still continue to be employed even by modern geographers where more accurate means of determination are not available. The greater part of the treatise of Marinus was occupied with the discussion of these authorities, and it is impossible for us, in the absence of the original work, to determine how far he had succeeded in giving a scientific form to the results of his labours; but we are told by Ptolemy himself that he considered them, on the whole, so satisfactory that he had made the work of his predecessor the basis of his own in regard to all the countries bordering on the Mediterranean, a term which would comprise to the ancient geographer almost all those regions of which he had really any definite knowledge. With respect to the more remote regions of the world, Ptolemy availed himself of the information imparted by Marinus, but not without reserve, and has himself explained to us the reasons that induced him in some instances to depart from the conclusions of his predecessor. It is very unjust to term Ptolemy a plagiarist from Marinus, as has been done by some modern authors, as he himself acknowledges in the fullest manner his obligations to that writer, from whom he derived the whole mass of his materials, which he undertook to arrange and present to his readers in a scientific form. It is this form and arrangement that constitute the great merit of Ptolemy's work and that have stamped it with a character wholly distinct from all previous treatises on geography. But at the same time it possesses much interest, as showing the greatly increased knowledge of the more remote portions of Asia and Africa which had been acquired by geographers since the time of Strabo and Pliny.

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[1] Delambre compares these mean motions with those of our modern tables and finds them tolerably correct. By "motion in longitude" must be understood the motion of the centre of the epicycle about the eccentric, and by "anomaly" the motion of the star on its epicycle.

[2] In this edition the Greek text and the French translation are given in parallel columns; the latter, however, should not be read without reference to the former.

[3] Delambre begins his analysis of the *Almagest* thus—"L'Astronomie des Grecs est toute entière dans la Syntaxe mathématique de Ptolémée."

[4] Narrien. *An Historical Account of the Origin and Progress of Astronomy*, London, 1833.

It will be convenient to consider separately the two different branches of the subject,—(1) the mathematical portion, which constitutes his geographical system, properly so termed; and (2) his contributions to the progress of positive knowledge with respect to the Inhabited World.

1. *Mathematical Geography.*—As a great astronomer, Ptolemy was of course infinitely better qualified to comprehend and explain the mathematical conditions of the earth and its relations to the celestial bodies that surround it than any preceding writers on the special subject of geography. But his general views, except on a few points, did not differ from those of his most eminent precursors Eratosthenes and Strabo. In common with them, he assumed that the earth was a globe, the surface of which was divided by certain great circles—the equator and the tropics—parallel to one another, and dividing the earth into five great zones, the relations of which with astronomical phenomena were of course clear to his mind as a matter of theory, though in regard to the regions bordering on the equator, as well as to those adjoining the polar circle, he could have had no confirmation of his conclusions from actual observation. He adopted also from Hipparchus the division of the equator and other great circles into 360 parts or "degrees" (as they were subsequently called, though the word does not occur in this sense in Ptolemy), and supposed other circles to be drawn through these, from the equator to the pole, to which he gave the name of "meridians." He thus conceived the whole surface of the earth (as is done by modern geographers) to be covered with a complete network of "parallels of latitude" and "meridians of longitude," terms which he himself was the first extant writer to employ in this technical sense. Within the network thus constructed it was the task of the scientific geographer to place the outline of the world, so far as it was then known by experience and observation.

Unfortunately at the very outset of his attempt to realize this conception he fell into an error which had the effect of vitiating all his subsequent conclusions. Eratosthenes was the first writer who had attempted in a scientific manner to determine the circumference of the earth, and the result at which he arrived, that it amounted to 250,000 stadia or 25,000 geographical miles, was generally adopted by subsequent geographers, including Strabo. Posidonius, however, who wrote about a century after Eratosthenes, had made an independent calculation, by which he reduced the circumference of the globe to 180,000 stadia, or less than three-fourths of the result obtained by Eratosthenes, and this computation, on what grounds we know not, was unfortunately adopted by Marinus Tyrius, and from him by Ptolemy. The consequence of this error was of course to make every degree of latitude or longitude (measured at the equator) equal to only 500 stadia (50 geographical miles), instead of its true equivalent of 600 stadia. Its effects would indeed have been in some measure neutralized had there existed a sufficient number of points of which the position was determined by actual observation; but we learn from Ptolemy himself that this was not the case, and that such observations for latitude were very few in number, while the means of determining longitudes were almost wholly wanting.[1] Hence the positions laid down by him were really, with very few exceptions, the result of computations of distances from itineraries and the statements of travellers, estimates which were liable to much greater error in ancient times than at the present day, from the want of any accurate mode of observing bearings, or portable instruments for the measurement of time, while they had no means at all of determining distances at sea, except by the rough estimate of the time employed in sailing from point to point. The use of the log, simple as it appears to us, was unknown to the ancients. But, great as would naturally be the errors resulting from such imperfect means of calculation, they were in most cases increased by the permanent error arising from the erroneous system of graduation adopted by Ptolemy in laying them down upon his map. Thus, if he had arrived at the conclusion from itineraries that two places were 5000 stadia from one another, he would place them at a distance of 10° apart, and thus in fact separate them by an interval of 6000 stadia.

Another source of permanent error (though one of much less importance) which affected all his longitudes arose from the erroneous assumption of his prime meridian. In this respect also he followed Marinus, who, having arrived at the conclusion that the Fortunate Islands (the Canaries) were situated farther west than any part of the continent of Europe, had taken the meridian through the outermost of this group as his prime meridian, from whence he calculated all his longitudes eastwards to the Indian Ocean. But, as both Marinus and Ptolemy were very imperfectly acquainted with the position and arrangements of the islands in question, the line thus assumed was in reality a purely imaginary one, being drawn through the *supposed* position of the outer island, which they placed 2½° west of the Sacred Promontory (Cape St Vincent), which was regarded by Marinus and Ptolemy, as it had been by all previous geographers, as the westernmost point of the continent of Europe,—while the real difference between the two is not less than 9° 20′. Hence *all* Ptolemy's longitudes, reckoned eastwards from this assumed line, were in fact about 7° less than they would have been if really measured from the meridian of Ferro, which continued so long in use among geographers in modern times. The error in this instance was the more unfortunate as the longitude could not of course be really measured, or even calculated, from this imaginary line, but was in reality calculated in both directions from Alexandria, westwards as well as eastwards (as Ptolemy himself has done in his eighth book) and afterwards *reversed*, so as to suit the supposed method of computation.

It must be observed also that the equator was in like manner placed by Ptolemy at a considerable distance from its true *geographical* position. The place of the equinoctial line on the surface of the globe was of course well known to him as a matter of theory, but as no observations could have been made in those remote regions he could only calculate its place from that of the tropic, which he supposed to pass through Syene. And as he here, as elsewhere, reckoned a degree of latitude as equivalent to 500 stadia, he inevitably made the interval between the tropic and the equator too small by one-sixth; and the place of the former on the surface of the earth being fixed by observation he necessarily carried up the supposed place of the equator too high by more than 230 geographical miles. But as he had practically no *geographical* acquaintance with the equinoctial regions of the earth this error was of little importance.

With Marinus and Ptolemy, as with all preceding Greek geographers, the most important line on the surface of the globe for all practical purposes was the parallel of 36° of latitude, which passes through the Straits of Gibraltar at one end of the Mediterranean, and through the Island of Rhodes and the Gulf of Issus at the other. It was thus regarded by Dicæarchus and almost all his successors as dividing the regions around the inland sea into two portions, and as being continued in theory along the chain of Mount Taurus till it joined the great mountain range north of India; and from thence to the Eastern Ocean it was regarded as constituting the dividing line of the Inhabited World, along which its length must be measured. But it sufficiently shows how inaccurate were the observations and how imperfect the materials at his command, even in regard to the best known portions of the earth, that Ptolemy, following Marinus, describes this parallel as passing through Caralis in Sardinia and Lilybæum in Sicily, the one being really in 39° 12′ lat., the other in 37° 50′. It is still more strange that he places so important and well known a city as Carthage 1° 20′ *south* of the dividing parallel, while it really lies nearly 1° to the *north* of it

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[1] Hipparchus had indeed pointed out long before the mode of determining longitudes by observations of eclipses, but the instance to which he referred of the celebrated eclipse before the battle of Arbela, which was seen also at Carthage, was a mere matter of popular observation, of no scientific value. Yet Ptolemy seems to have known of no other.

The great problem that had attracted the attention and exercised the ingenuity of all geographers from the time of Dicæarchus to that of Ptolemy was to determine the length and breadth of the Inhabited World, which they justly regarded as the chief subject of the geographer's consideration. This question had been very fully discussed by Marinus, who had arrived at conclusions widely different from those of his predecessors. Towards the north indeed there was no great difference of opinion, the latitude of Thule being generally recognized as that of the highest northern land, and this was placed both by Marinus and Ptolemy in 63° lat., not very far beyond the true position of the Shetland Islands, which had come in their time to be generally identified with the mysterious Thule of Pytheas. The western extremity, as already mentioned, had been in like manner determined by the prime meridian drawn through the *supposed* position of the Fortunate Islands. But towards the south and east Marinus gave an enormous extension to the continents of Africa and Asia, beyond what had been known to or suspected by the earlier geographers, and, though Ptolemy greatly reduced his calculations, he still retained a very exaggerated estimate of their results.

The additions thus made to the estimated dimensions of the known world were indeed in both directions based upon a real extension of knowledge, derived from recent information; but unfortunately the original statements were so perverted by misinterpretation in applying them to the construction of a map as to give results differing widely from the truth. The southern limit of the world as known to Eratosthenes, and even to Strabo (who had in this respect no further knowledge than his predecessor more than two centuries before), had been fixed by them at the parallel which passed through the eastern extremity of Africa (Cape Guardafui), or the Land of Cinnamon as they termed it, and that of the Sembritæ (corresponding to Sennaar) in the interior of the same continent. This parallel, which would correspond nearly to that of 10° of *true* latitude, they supposed to be situated at a distance of 3400 stadia (340 geographical miles) from that of Meroe (the position of which was accurately known), and 13,400 to the south of Alexandria; while they conceived it as passing, when prolonged to the eastward, through the island of Taprobane (Ceylon), which was universally recognized as the southernmost land of Asia. Both these geographers were wholly ignorant of the vast extension of Africa to the south of this line and even of the equator, and conceived it as trending away to the west from the Land of Cinnamon and then to the north-west to the Straits of Gibraltar. Marinus had, however, learned from itineraries both by land and sea the fact of this great extension, of which he had indeed conceived so exaggerated an idea that even after Ptolemy had reduced it by more than a half it was still materially in excess of the truth. The eastern coast of Africa was indeed tolerably well known, being frequented by Greek and Roman traders, as far as a place called Rhapta, opposite to Zanzibar, and this is placed by Ptolemy not far from its true position in 7° S. lat. But he added to this a bay of great extent as far as a promontory called Prasum (perhaps Cape Delgado), which he placed in 15½° S. lat. At the same time he assumed the position in about the same parallel of a region called Agisymba, which was supposed to have been discovered by a Roman general, whose itinerary was employed by Marinus. Taking, therefore, this parallel as the limit of knowledge to the south, while he retained that of Thule to the north, he assigned to the inhabited world a breadth of nearly 80°, instead of less than 60°, which it had occupied on the maps of Eratosthenes and Strabo.

It had been a fixed belief with all the Greek geographers from the earliest attempts at scientific geography not only that the length of the Inhabited World greatly exceeded its breadth, but that it was more than twice as great,—a wholly unfounded assumption, but to which their successors seem to have felt themselves bound to conform. Thus Marinus, while giving an undue extension to Africa towards the south, fell into a similar error, but to a far greater degree, in regard to the extension of Asia towards the east. Here also he really possessed a great advance in knowledge over all his predecessors, the increased trade with China for silk having led to an acquaintance, though of course of a very vague and general kind, with the vast regions in Central Asia that lay to the east of the Pamir range, which had formed the limit of the Asiatic nations previously known to the Greeks. But Marinus had learned that traders proceeding eastward from the Stone Tower—a station at the foot of this range—to Sera, the capital city of the Seres, occupied seven months on the journey, and from thence he arrived at the enormous result that the distance between the two points was not less than 36,200 stadia, or 3620 geographical miles. Ptolemy, while he justly points out the absurdity of this conclusion and the erroneous mode of computation on which it was founded, had no means of correcting it by any real authority, and hence reduced it summarily by one half. The effect of this was to place Sera, the easternmost point on his map of Asia, at a distance of 45½° from the Stone Tower, which again he fixed, on the authority of itineraries cited by Marinus, at 24,000 stadia or 60° of longitude from the Euphrates, reckoning in both cases a degree of longitude as equivalent to 400 stadia, in accordance with his uniform system of allowing 500 stadia to 1° of latitude. Both distances were greatly in excess of the truth, independently of the error arising from this mistaken system of graduation. The distances west of the Euphrates were of course *comparatively* well known, nor did Ptolemy's calculation of the length of the Mediterranean differ very materially from those of previous Greek geographers, though still greatly exceeding the truth, after allowing for the permanent error of graduation. The effect of this last cause, it must be remembered, would unfortunately be cumulative, in consequence of the longitudes being computed from a fixed point in the west, instead of being reckoned east and west from Alexandria, which was undoubtedly the mode in which they were really calculated. The result of these combined causes of error was to lead him to assign no less than 180°, or 12 hours, of longitude to the interval between the meridian of the Fortunate Islands and that of Sera, which really amounts to about 130°.

But in thus estimating the length and breadth of the known world Ptolemy attached a very different sense to these terms from that which they had generally borne with preceding writers. All former Greek geographers, with the single exception of Hipparchus, had agreed in supposing the Inhabited World to be surrounded on all sides by sea, and to form in fact a vast island in the midst of a circumfluous ocean. This notion, which was probably derived originally from the Homeric fiction of an ocean stream, and was certainly not based upon direct observation, was nevertheless of course in accordance with the truth, great as was the misconception it involved of the extent and magnitude of the continents included within this assumed boundary. Hence it was unfortunate that Ptolemy should in this respect have gone back to the views of Hipparchus, and have assumed that the land extended indefinitely to the north in the case of Europe and Scythia, to the east in that of Asia, and to the south in that of Africa. His boundary-line was in each of these cases an arbitrary limit, beyond which lay the Unknown Land, as he calls it. But in the last case he was not content with giving to Africa an indefinite extension to the south; he assumed the existence of a vast prolongation of the land to the east from its southernmost known point, so as to form a connexion with the south-eastern extremity of Asia, of the extent and position of which he had a wholly erroneous idea.

In this last case Marinus had derived from the voyages of recent navigators in the Indian Seas a knowledge of the fact that there lay in that direction extensive lands which had been totally unknown to previous geographers, and Ptolemy had acquired still more extensive information in this quarter. But unfortunately he had formed a totally false conception of the bearings of the coasts thus made known, and consequently of the position of the lands to which they belonged, and, instead of carrying the line of coast northwards from the Golden Chersonese (the Malay Peninsula) to China or the land of the Sinæ, he brought it down again towards the south after forming a great bay, so that he placed Cattigara—the principal emporium in this part of Asia, and the farthest point known to him—on a supposed line of coast, of unknown extent, but with a direction from north to south. The hypothesis that this land was continuous with the most southern part of Africa, so that the two enclosed one vast gulf, though a mere assumption, is stated by him as definitely as if it was based upon positive information; and it was long received by mediæval geographers as an unquestioned fact. This circumstance undoubtedly contributed to perpetuate the error of supposing that Africa could not be circumnavigated, in opposition to the more correct views of Strabo and other earlier geographers. On the other hand, there can be no doubt that the undue extension of Asia towards the east, so as to diminish by 50° of longitude the interval between that continent and the western coasts of Europe, had a material influence in fostering the belief of Columbus and others that it was possible to reach the Land of Spices (as the East Indian islands were then called) by direct navigation towards the west.

It is not surprising that Ptolemy should have fallen into considerable errors respecting the more distant quarters of the world; but even in regard to the Mediterranean and its dependencies, as well as the regions that surrounded them, with which he was in a certain sense well acquainted, the imperfection of his geographical knowledge is strikingly apparent. Here he had indeed some well-established data for his guidance, as far as latitudes were concerned. That of Massilia had been determined many years before by Pytheas within a few miles of its true position, and the latitude of Rome, as might be expected, was known with approximate accuracy. Those of Alexandria and Rhodes also were well known, having been the place of observation of distinguished astronomers, and the fortunate accident that the Island of Rhodes lay on the same parallel of latitude with the Straits of Gibraltar at the other end of the sea enabled him to connect the two by drawing the parallel direct from the one to the other. The importance attached to this line (36° N. lat.) by all preceding geographers has been already mentioned. Unfortunately Ptolemy, like his predecessors, supposed its course to lie almost uniformly through the open sea, wholly ignoring the great projection of the African coast towards the north from Carthage to the neighbourhood of the straits. The erroneous position assigned to the former city has been already adverted to, and, being supposed to rest upon astronomical observation, doubtless determined that of all the north coast of Africa. The result was that he assigned to the width of the Mediterranean from Massilia to the opposite point of the African coast an extent of more than 11° of latitude, while it does not really exceed 6½°.

At the same time he was still more at a loss in respect of longitudes, for which he had absolutely no trustworthy observations to guide him; but he nevertheless managed to arrive at a result considerably nearer the truth than had been attained by previous geographers, all of whom had greatly exaggerated the length of the Inland Sea. Their calculations, like those of Marinus and Ptolemy, could only be founded on the imperfect estimates of mariners; but unfortunately Ptolemy, in translating the conclusions thus arrived at into a scientific form, vitiated all his results by his erroneous system of graduation, and, while the calculation of Marinus gave a distance of 24,800 stadia as the length of the Mediterranean from the straits to the Gulf of Issus, this was converted by Ptolemy in preparing his tables to an interval of 62°, or just about 20° beyond the truth. Even after correcting the error due to his erroneous computation of 500 stadia to a degree, there remains an excess of nearly 500 geographical miles, which was doubtless owing to the exaggerated estimates of distances almost always made by navigators who had no real means of measuring them.

Another unfortunate error which disfigured the eastern portion of his map of the Mediterranean was the position assigned to Byzantium, which Ptolemy (misled in this instance by the authority of Hipparchus) placed in the same latitude with Massilia (43° 5′), thus carrying it up more than 2° above its true position. This had the inevitable effect of transferring the whole of the Euxine Sea—with the general form and dimensions of which he was fairly well acquainted—too far to the north by the same amount; but in addition to this he enormously exaggerated the extent of the Palus Mæotis (the Sea of Azoff), which he at the same time represented as having its direction from south to north, so that by the combined effect of these two errors he carried up its northern extremity (with the mouth of the Tanais and the city of that name) as high as 54° 30′, or on the true parallel of the south shore of the Baltic. Yet, while he fell into this strange misconception with regard to the great river which was universally considered by the ancients as the boundary between Europe and Asia, he was the first writer of antiquity who showed a clear conception of the true relations between the Tanais and the Rha or Volga, which he correctly described as flowing into the Caspian Sea. With respect to this last also he was the first geographer after the time of Alexander to return to the correct view (already found in Herodotus) that it was an inland sea, without any communication with the Northern Ocean.

With regard to the north of Europe his views were still very vague and imperfect. He had indeed considerably more acquaintance with the British Islands than any previous geographer, and even showed a tolerably accurate knowledge of some portions of their shores. But his map was, in this instance, disfigured by two unfortunate errors,—the one, that he placed Ireland (which he calls Ivernia) altogether too far to the north, so that its southernmost portion was brought actually to a latitude beyond that of North Wales; the other, which was probably connected with it, that the whole of Scotland is *twisted round*, so as to bring its general extension into a direction from west to east, instead of from south to north, and place the northern extremity of the island on the same parallel with the promontory of Galloway. He appears to have been embarrassed in this part of his map by his having adopted the conclusion of Marinus—based upon what arguments we know not—that Thule was situated in 63°, while at the same time he regarded it, in conformity with the received view of all earlier geographers, as the most northern of all known lands. In accordance with this same assumption Ptolemy supposed the northern coast of Germany, which he believed to be the southern shore of the Great Ocean, to have a general direction from west to east, while he placed it not very far from the true position of that of the Baltic, of the existence of which as an inland sea he was wholly ignorant, as well as of the vast peninsula of Scandinavia beyond it, and only inserted the name of Scandia as that of an island of inconsiderable dimensions. At the same time he supposed the coast of Sarmatia from the Vistula eastwards to trend away to the north as far as the parallel of Thule; nor did he conceive this as an actual limit, but believed the Unknown Land to extend indefinitely in this direction, as also to the north of Asiatic Scythia.

The enormous extent assigned by him to the latter region has been already adverted to; but vague and erroneous as were his views concerning it, it is certain that they show a much greater approximation to the truth than those of earlier geographers, who possessed hardly a suspicion of the vast tracts in question, which stretch across Central Asia from the borders of Sarmatia to those of China. Ptolemy was also the first who had anything like a clear idea of the chain to which he gave the name of Imaus, and correctly regarded as having a direction across Scythia from south to north, so as to divide that great region into two distinct portions which he termed Scythia intra Imaum and Scythia extra Imaum, corresponding in some degree with those recognized in modern maps as Independent and Chinese Tartary. The Imaus of Ptolemy corresponds clearly to the range known in modern days as the Bolor or Pamir, which has only been fully explored in quite recent times. It was, however, enormously misplaced, being transferred to 140° E. long., or 80° east of Alexandria, the real interval between the two being little more than 40°.

It is in respect of the southern shores of Asia that Ptolemy's geography is especially faulty, and his errors are here the more unfortunate as they were associated with greatly increased knowledge in a general way of the regions in question. For more than a century before his time, indeed, the commercial relations between Alexandria, as the great emporium of the Roman empire, and India had assumed a far more important character than at any former period, and the natural consequence was a greatly increased geographical knowledge of the Indian peninsula. The little tract called the *Periplus of the Erythræan Sea*, about 80 A.D., contains sailing directions for merchants to the western ports of that country, from the mouth of the Indus to the coast of Malabar, and correctly indicates that the coast from Barygaza southwards had a general direction from north to south as far as the extremity of the peninsula (Cape Comorin). We are utterly ignorant of the reasons which induced Marinus, followed in this instance as in so many others by Ptolemy, to depart from this correct view, and, while giving to the coast of India, from the mouths of the Indus to those of the Ganges, an undue extension in longitude, to curtail its extension towards the south to such an amount as to place Cape Cory (the southernmost point of the peninsula) only 4° of latitude south of Barygaza, the real intervals being more than 800 geographical miles, or, according to Ptolemy's system of graduation, 16° of latitude! This enormous error, which has the effect of distorting the whole appearance of the south coast of Asia, is associated with another equally extraordinary, but of an opposite tendency, in regard to the neighbouring island of Taprobane or Ceylon, the dimensions of which had been exaggerated by most of the earlier Greek geographers; but to such an extent was this carried by Ptolemy as to extend it through not less than 15° of latitude and 12° of longitude, so as to make it about fourteen times as large as the reality, and bring down its southern extremity more than 2° to the south of the equator.

We have much less reason to be surprised at finding similar distortions in respect to the regions beyond the Ganges, concerning which he is our only ancient authority. During the interval which elapsed between the date of the *Periplus* and that of Marinus it is certain that some adventurous Greek mariners had not only crossed the great Gangetic Gulf and visited the land on the opposite side, to which they gave the name of the Golden Chersonese, but they had pushed their explorations considerably farther to the east, as far as Cattigara. It was not to be expected that these commercial ventures should have brought back any accurate geographical information, and accordingly we find the conception entertained by Ptolemy of these newly discovered regions to be very different from the reality. Not only had the distances, as was usually the case with ancient navigators in remote quarters, been greatly exaggerated, but the want of accurate observations of bearings was peculiarly unfortunate in a case where the real features of the coast and the adjoining islands were so intricate and exceptional. A glance at the map appended to the article MAP (vol. xv. Plate VII.) will at once show the entire discrepancy between the configuration of this part of Asia as conceived by Ptolemy and its true formation. Yet with the materials at his command we can hardly wonder at his not having arrived at a nearer approximation to the truth. The most unfortunate error was his idea that after passing the Great Gulf, which lay beyond the Golden Chersonese, the coast trended away to the south, instead of towards the north, and he thus placed Cattigara (which was probably one of the ports in the south of China) not less than 8½° south of the equator. It is probable that in this instance he was misled by his own theoretical conclusions, and carried this remotest part of the Asiatic continent so far to the south with the view of connecting it with his assumed eastward prolongation of that of Africa.

Notwithstanding this last theoretical assumption Ptolemy's map of Africa presents a marked improvement upon those of Eratosthenes and Strabo. But his knowledge of the west coast, which he conceived as having its direction nearly on a meridional line from north to south, was very imperfect, and his latitudes utterly erroneous. Even in regard to the Fortunate Islands, the position of which was so important to his system in connexion with his prime meridian, he was entirely misinformed as to their character and arrangement, and extended the group through a space of more than 5° of latitude, so as to bring down the most southerly of them to the real parallel of the Cape de Verd Islands.

In regard to the mathematical construction, or, to use the modern phrase, the projection of his maps, not only was Ptolemy greatly in advance of all his predecessors, but his theoretical skill was altogether beyond the nature of the materials to which he applied it. The methods by which he obviated the difficulty of transferring the delineation of different countries from the spherical surface of the globe to the plane surface of an ordinary map differed indeed but little from those in use at the present day, and the errors arising from this cause (apart from those produced by his fundamental error of graduation) were really of little consequence compared with the defective character of his information and the want of anything approaching to a survey of the countries delineated. He himself was well aware of his deficiencies in this respect, and, while giving full directions for the scientific construction of a general map, he contents himself for the special maps of different countries with the simple method employed by Marinus of drawing the parallels of latitude and meridians of longitude as straight lines, assuming in each case the proportion between the two, as it really stood with respect to some one parallel towards the middle of the map, and neglecting the inclination of the meridians to one another. Such a course, as he himself repeatedly affirms, will not make any material difference within the limits of each special map.

Ptolemy's geographical work was devoted almost exclusively to the mathematical branch of his subject, and its peculiar arrangement, in which his results are presented in a tabular form, instead of being at once embodied in a map, was undoubtedly designed to enable the geographical student to construct his maps for himself, instead of depending upon those constructed ready to his hand. This purpose it has abundantly served, and there is little doubt that we owe to the peculiar form thus given to his results their transmission in a comparatively perfect condition to the present day. Unfortunately the specious appearance of the results thus presented to us has led to a very erroneous estimate of their accuracy, and it has been too often supposed that what was stated in so scientific a form must necessarily be based upon scientific observations. Though Ptolemy himself has distinctly pointed out in his first book the defective nature of his materials and the true character of the data furnished by his tables, few readers studied this portion of his work, and his statements were generally received with the same undoubting faith as was justly attached to his astronomical observations. It is only in quite recent times that his conclusions have been estimated at their just value, and the apparently scientific character of his work shown to be in most cases a specious edifice resting upon no adequate foundations.

There can be no doubt that the work of Ptolemy was from the time of its first publication accompanied with maps, which are regularly referred to in the eighth book. But how far those which are now extant represent the original series is a disputed point. In two of the most ancient MSS. it is expressly stated that the maps which accompany them are the work of one Agathodæmon of Alexandria, who "drew them according to the eight books of Claudius Ptolemy." This expression might equally apply to the work of a contemporary draughtsman under the eyes of Ptolemy himself, or to that of a skilful geographer at a later period, and nothing is known from any other source concerning this Agathodæmon. The attempt to identify him with a grammarian of the same name who lived in the 5th century is wholly without foundation. But it appears, on the whole, most probable that the maps appended to the MSS. still extant have been transmitted by uninterrupted tradition from the time of Ptolemy.

2. *Progress of Geographical Knowledge.*—The above examination of the methods pursued by Ptolemy in framing his general map of the world, or according to the phrase universally employed by the ancients, the Inhabited World (ἡ οἰκουμένη), has already drawn attention to the principal extensions of geographical knowledge since the time of Strabo.

While anything like an accurate acquaintance was still confined to the limits of the Roman empire and the regions that immediately adjoined it, with the addition of the portions of Asia that had been long known to the Greeks, the geographical horizon had been greatly widened towards the east by commercial enterprise, and towards the south by the same cause, combined with expeditions of a military character, but which would appear to have been dictated by a spirit of discovery. Two expeditions of this kind had been carried out by Roman generals before the time of Marinus, which, starting from Fezzan, had penetrated the heart of the African continent due south as far as a tract called Agisymba, "which was inhabited by Ethiopians and swarmed with rhinoceroses." These statements point clearly to the expeditions having traversed the great desert and arrived at the Soudan or Negroland. But the actual position of Agisymba cannot be determined except by mere conjecture. The absurdly exaggerated view taken by Marinus has been already noticed; but, even after his estimate had been reduced by Ptolemy by more than one-half, the position assigned by that author to Agisymba was doubtless far in excess towards the south. But, while this name was the only result that we know to have been derived from these memorable expeditions, Ptolemy found himself in possession of a considerable amount of information concerning the interior of northern Africa (from whence derived we know not), to which nothing similar is found in any earlier writer. Unfortunately this new information was of so crude and vague a character, and is presented to us in so embarrassing a form, as to perplex rather than assist the geographical student, and the statements of Ptolemy concerning the rivers Gir and Nigir, and the lakes and mountains with which they were connected, have exercised the ingenuity and baffled the sagacity of successive generations of geographers in modern times to interpret or explain them. It may safely be said that they present no resemblance to the real features of the country as known to us by modern explorations, and cannot be reconciled with them except by the most arbitrary conjectures.

It is otherwise in the case of the Nile. To discover the source of that river had been long an object of curiosity both among the Greeks and Romans, and an expedition sent out for that purpose by the emperor Nero had undoubtedly penetrated as far as the marshes of the White Nile; but we are wholly ignorant of the sources from whence Ptolemy derived his information. But his statement that the mighty river derived its waters from the confluence of two streams, which took their rise in two lakes a little to the south of the equator, was undoubtedly a nearer approach to the truth than any of the theories concocted in modern times before the discovery in our own days of the two great lakes now known as the Victoria and Albert Nyanza. He at the same time notices the other arm of the river (the Blue Nile) under the name of the Astapus, which he correctly describes as rising in another lake. In connexion with this subject he introduces a range of mountains running from east to west, which he calls the Mountains of the Moon, and which have proved a sad stumbling-block to geographers in modern times, but may now be safely affirmed to represent the real fact of the existence of snow-covered mountains (Kilimanjaro and Kenia) in these equatorial regions.

Much the same remarks apply to Ptolemy's geography of Asia as to that of Africa. In this case also he had obtained, as we have already seen, a vague knowledge of extensive regions, wholly unknown to the earlier geographers, and resting to a certain extent on authentic information, though much exaggerated and misunderstood. But, while these informants had really brought home some definite statements concerning Serica or the Land of Silk, and its capital of Sera, there lay a vast region towards the north of the line of route leading to this far eastern land (supposed by Ptolemy to be nearly coincident with the parallel of 40°) of which apparently he knew nothing, but which he vaguely assumed to extend indefinitely northwards as far as the limits of the Unknown Land. The Jaxartes, which ever since the time of Alexander had been the boundary of Greek geography in this direction, still continued in that of Ptolemy to be the northern limit of all that was really known of Central Asia. Beyond that he places a mass of names of tribes, to which he could assign no definite locality, and mountain ranges which he could only place at haphazard. The character of his information concerning the south-east of Asia has been already adverted to. But, strangely as he misplaced Cattigara and the metropolis of Sinæ connected with it, there can be no doubt that we recognize in this name (variously written Thinæ and Sinæ) the now familiar name of China; and it is important to observe that he places the land of the Sinæ immediately south of that of the Seres, showing that he was aware of the connexion between the two, though the one was known only by land explorations and the other by maritime voyages.

In regard to the better known regions of the world, and especially those bordering on the Mediterranean, Ptolemy according to his own account followed for the most part the guidance of Marinus. The latter seems to have relied to a great extent on the work of Timosthenes (who flourished more than two centuries before) in respect to the coasts and maritime distances. Ptolemy, however, introduced many changes, some of which he has pointed out to us, though there are doubtless many others which we have no means of detecting. For the interior of the different countries the Roman roads and itineraries must have furnished him with a mass of valuable materials which had not been available to earlier geographers. But neither Marinus nor Ptolemy seems to have taken advantage of this last resource to the extent that we should have expected, and the tables of the Alexandrian geographer abound with mistakes—even in countries so well known as Gaul and Spain—which might easily have been obviated by a more judicious use of such Roman authorities.

Great as are undoubtedly the merits of Ptolemy's geographical work, it cannot be regarded as having any claim to be a complete or satisfactory treatise upon this vast subject. It was the work of an astronomer rather than a geographer, in the highest sense of the term. Not only did its plan exclude all description of the countries with which it dealt, their climate, natural productions, inhabitants, and peculiar features, all of which are included in the domain of the modern geographer, but even its physical geography strictly so called is treated in the most irregular and perfunctory manner. While Strabo was fully alive to the importance of the great rivers and mountain chains which (to use his own expressive phrase) "geographize" a country, Ptolemy deals with this part of his subject in so careless a manner as to be often worse than useless. Even in the case of a country so well known as Gaul the few notices that he gives of the great rivers that play so important a part in its geography are disfigured by some astounding errors; while he does not notice any of the great tributaries of the Rhine, though mentioning an obscure streamlet, otherwise unknown, because it happened to be the boundary between two Roman provinces.

The revival of the study of Ptolemy's work after the Middle Ages and the influence it exercised upon the progress of geography have been described in the article MAP (vol. xv. p. 520). His *Geographia* was printed for the first time in a Latin translation, accompanied with maps, in 1478, and numerous other editions followed in the latter part of the 15th and earlier half of the 16th century, but the Greek text did not make its appearance till 1533, when it was published at Basel in 4to, edited by the celebrated Erasmus. All these early editions, however, swarm with textual errors, and are wholly worthless for critical purposes. The same may be said of the edition of Bertius (Gr. and Lat., Leyden, 1618, typ. Elzevir), which was long the standard library edition of the work. It contains a new set of maps drawn by Mercator, as well as a fresh series (not intended to illustrate Ptolemy) by Ortelius, the Roman Itineraries, including the Tabula Peutingeriana, and much other miscellaneous matter. The first attempt at a really critical edition was made by Wilberg and Grashof (4to, Essen, 1842), but this unfortunately was never completed. The edition of Nobbe (3 vols. 18mo, Leipsic, 1843) presents the best Greek text of the whole work as yet available and has a useful index. But by far the best edition, so far as completed, is that published in Didot's *Bibliotheca Classicorum Græcorum* (Paris, 1883), edited by Dr C. Müller, with a Latin translation and a copious commentary, geographical as well as critical. The first part, which is all that has yet appeared, contains only the first three books, without the Prolegomena, which will be anxiously expected by all students of Ptolemy. (E. H. B.)

PUBLIC HEALTH. State medicine as an organized department of administration is entirely of modern growth. By the common law of England the only remedy for any act or omission dangerous to health was an action for damages or an indictment for nuisance. (See NUISANCE.) At the same time the jurisdiction of the commissioners of sewers acted to a certain extent as a preventive means. Commissions of sewers were granted by the crown, at first in virtue of the general prerogative, afterwards under the provisions of numerous statutes, the earliest dating from 1427 (6 Hen. VI. c. 5). The powers of the commissioners included the removal of obstructions in rivers, the making of fosses and drains, &c. Their jurisdiction, where still existing, is expressly preserved in the modern Public Health Acts. The indictment for nuisance still lies for many offences which are now punishable in a summary manner under the powers of recent legislation. But for a long time it was the only, not as now a concurrent, remedy. Its obvious defect is that proceedings can only be taken after the mischief has been done. Old examples of nuisances dangerous to health and punishable at common law are the keeping of swine in a town, the dividing of a house in a town so that by reason of overcrowding it would be more dangerous in time of sickness or plague, and the carrying on of offensive trades, such as the melting of tallow. The court leet seems to have had some jurisdiction in sanitary matters, confined to the prevention of nuisances and the determination of the quality of provisions within its local limits. At a comparatively early date statutes were passed dealing with matters for which the common law had provided too cumbrous a remedy. The attention of parliament, though but to a slight extent, was directed to the health of London as early as the Statute of the City of London in 1285 (13 Edw. I. st. 5). The earliest legislative enactment affecting the public health generally appears to be 12 Ric. II. c. 13, 1388, forbidding the deposit of offensive matter in rivers and other waters, as well in the city of London as in other cities. Acts of a similar character were from time to time passed to meet particular offences, such as 4 and 5 Hen. VII. c. 3, by which no butcher was to slaughter cattle in London or other walled towns. The plague called forth the Act of 1 Jac. I. c. 31, which made it a capital offence for an infected person to go abroad after being commanded by the proper authority to keep his house. The Act for the rebuilding of London after the great fire, 19 Car. II. c. 3, contained various provisions as to the height of houses, breadth of streets, construction of sewers, and prohibition of noisome trades. In 1832 the fear of cholera led to 2 Will. IV. c. 10, empowering the privy council to take certain preventive measures against the spread of the disease. Numerous local Acts gave the authorities of the more important towns power over the public health. To this day London is governed by separate legislation. The Towns Improvement Act, 1847, contained provisions of a sanitary kind for incorporation in local Acts. But it was not until as recently as 1848 that a general Public Health Act, embracing the whole of England (except the metropolis), was passed. The Public Health Act, 1848, created a general board of health as the supreme authority in sanitary matters. The Local Government Act, 1858, amended the Act of 1848, chiefly in the direction of greater local sanitary control. By an Act immediately preceding the Act of 1858 the general board of health was superseded partly by the home office, partly by the privy council. The Local Government Board, the present central authority, was created in 1871 by 34 and 35 Vict. c. 70. The president of the Local Government Board is usually a member of the cabinet. Numerous other Acts dealing with public health were passed from 1849 to 1874. Finally in 1875 the existing law was digested into the Public Health Act, 1875 (38 and 39 Vict. c. 55).[1]

The tendency of sanitary legislation has been to place local sanitary regulations in the hands of the local authorities, subject to a general superintendence by a Government department. The Act of 1875, which registers the results of this tendency, is a consolidating not an amending Act, and did not materially alter the law. It is impossible in this place to do more than give a short notice of its comprehensive provisions. For the purposes of the Act England, except the metropolis, is divided into urban and rural sanitary districts, subject respectively to the jurisdiction of urban and rural sanitary authorities. The urban authority is either the corporation of a borough, improvement commissioners, or a local board, according to circumstances. A district becomes subject to a local board at the instance of either the Local Government Board or the owners and ratepayers of the district. The local board is elected by the owners and ratepayers. It must be elected before 15th April in every year. The members hold office for three years, one-third retiring every year. The Oxford local board is governed by regulations peculiar to itself, giving the university a large proportion of members. Rural districts are conterminous with poor-law unions, exclusive of any urban district. The guardians of the poor form the rural authority. There is a port sanitary authority in seaport towns. (See QUARANTINE.) The jurisdiction of a local authority is both preventive and remedial. The matters falling under this jurisdiction include (1) sewers, with certain exceptions, among which come sewers under the authority of commissioners of sewers, (2) scavenging and cleansing streets, (3) water-supply, (4) cellar-dwellings and lodging-houses, (5) nuisances,[2] (6) offensive trades, (7) unsound meat, (8) infectious diseases and hospitals, (9) prevention of epidemic diseases, (10) mortuaries and (by the Public Health Act, 1879) cemeteries, (11) highways, (12) streets, (13) buildings, (14) lighting, (15) public pleasure-grounds, (16) markets and slaughter-houses, (17) licensing of hackney carriages, horses, and boats. It is to be noticed that jurisdiction in some of these cases is confined to an urban authority. Contracts made by an urban authority, whereof the value or amount exceeds £50, must be in writing, and sealed with the common seal of the authority. Where the contract is of the value or amount of £100 or upwards tenders for its execution must be invited. A local authority has power, subject to the approval of the Local Government Board, to make bye-laws and impose penalties for their breach. The authority must appoint a medical officer and an inspector of nuisances; if an urban authority, it must in addition appoint a surveyor, clerk, and treasurer. Officers may not contract with a local authority. An urban authority has power to levy a general district rate, a private improvement rate (an additional rate levied in return for some special advantage beyond that obtained by the inhabitants in general), and (in certain cases) a highway rate. The expenses of a rural authority are either general or special, the latter being chiefly the expenses arising from sewerage and water-supply. General expenses are defrayed out of a common fund raised out of the poor rate. Special expenses are a charge upon the contributory places benefited. A local authority may, with the sanction of the Local Government Board, raise loans for the purposes of the Act. The loans are charged upon the general district rate. Legal proceedings under the Act are generally summary. Where proceedings are by action, one month's notice of action must be given where the cause of action is anything done, or intended to be done, or omitted to be done under the provisions of the Act. The action must be brought within six months after the accruing of the cause of action. The local authority and its officers are protected from personal liability for matters done in pursuance of the Act. An appeal from a court of summary jurisdiction lies to quarter sessions. In cases where the local authority decides a question as to liability to expenses, an appeal lies to the Local Government Board. The Local Government Board has power to alter areas and unite districts, to direct inquiries in relation to any matters concerning the public health in any place, to make provisional orders, and to enforce performance of duty by a defaulting local authority.

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[1] For the history of sanitary legislation in England, see the *Report of the Royal Sanitary Commission*, 1869; M. D. Chalmers, *Local Government*, ch. vii.; Stephen, *Commentaries*, vol. iii. bk. iv. pt. iii. ch. ix.; G. A. R. Fitzgerald, *The Public Health Act, 1875*, Introd.

[2] The list of nuisances which may be dealt with summarily under the Act is as follows:—"(1) any premises in such a state as to be a nuisance or injurious to health; (2) any pool, ditch, gutter, watercourse, privy, urinal, cesspool, drain, or ashpit so foul or in such a state as to be a nuisance or injurious to health; (3) any animal so kept as to be a nuisance or injurious to health; (4) any accumulation or deposit which is a nuisance or injurious to health; (5) any house or part of a house so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family; (6) any factory, workshop, or bakeshop (not already under the operation of any general Act for the regulation of factories or bakehouses) not kept in a cleanly state, or not ventilated in such a manner as to render harmless as far as practicable any gases, vapours, dust, or other impurities generated in the course of the work carried on therein, that are a nuisance or injurious to health, or so overcrowded while work is carried on as to be dangerous or injurious to the health of those employed therein; (7) any fireplace or furnace which does not, as far as practicable, consume the smoke arising from the combustibles used therein, and which is used for working engines by steam, or in any mill, factory, dyehouse, brewery, bakehouse, or gaswork, or in any manufacturing or trade process whatsoever; (8) any chimney (not being the chimney of a private dwelling-house) sending forth black smoke in such quantity as to be a nuisance." In relation to these statutory nuisances it is provided that no penalty is to be inflicted in respect of any accumulation or deposit if it is necessary for business purposes and if effectual means have been taken for preventing injury therefrom to the public health, or in respect of a nuisance from uncon-

In addition to the Public Health Act, 1875, there are various Acts incorporated with that Act under the name of the "Sanitary Acts," dealing with similar subjects. These are the Bakehouse Regulation Act (1863), the Artisans and Labourers Dwellings Act (1868), the Baths and Washhouses Acts, the Labouring Classes Lodging-House Acts (1851, 1866, 1867). Since 1875 numerous Acts amending and extending the Public Health Act have been passed, dealing with (among other matters) river-pollution, water-supply, hospitals for infectious diseases, nuisance arising from alkali-works, and lodging of fruit-pickers. There is besides a mass of legislation which in fact, if not in name, has for its object the sanitary welfare of the people. It is sufficient to mention the Vaccination Acts, the Factory Acts, the Artisans and Labourers Dwellings Acts subsequent to 1868, the Merchant Shipping Acts (insuring the carrying of medicines and antiscorbutics on board ships, the provision of sleeping space for seamen, and the inspection of seamen's lodging-houses), the Adulteration Acts, and the numerous Burial Acts. In many local Acts notification of infectious disease by the medical man in attendance to the local authority is made compulsory, but the legislature has not as yet adopted any general provision of the kind.

The scientific aspect of public health does not fall within the scope of the present article; it has been treated under the title HYGIENE. It is sufficient to say here that the effect of the attention which of late years has been given to the subject is seen in the reduction of the death-rate from 22·23 per thousand in the years 1841-51 to 21·27 for the years 1871-81.

London.—The metropolis is governed by a series of statutes, some peculiar to itself, others general Acts, repealed as to the rest of England, but specially preserved as to the metropolis by the Public Health Act, 1875. The limits of the metropolis for the purposes of public health depend primarily upon the Metropolis Management Act, 1855 (18 and 19 Vict. c. 120, s. 250, schedules A and B). The local authorities are the metropolitan board of works, the vestries and district boards, and (in the city of London) the commissioners of sewers. Asylums and hospitals are administered by the metropolitan asylums board. The water-supply is regulated by the Metropolis Water Acts, 1852 and 1871, gas by the Metropolitan Gas Act, 1860.

Scotland.—Sanitary legislation occurs as early as the reign of Alexander III. The *Statuta Gilde*, c. 19, forbade the deposit of dung or ashes in the street, market, or on the banks of the Tweed at Berwick under a penalty of eight shillings. At a later date the Act of 1540, c. 20, enacted that no flesh was to be slain in Edinburgh on the east side of the Leith Wynd; that of 1621, c. 29, fixed the locality of fleshers and candlemakers. The existing law of public health is contained in the Public Health (Scotland) Act, 1867 (30 and 31 Vict. c. 101). The local authority is the town council, the police commissioners or trustees, or the parochial board, according to circumstances. There is no distinction of urban and rural authority. The central authority is the board of supervision constituted by 8 and 9 Vict. c. 83. Proceedings by a local authority in cases of nuisance are by summary petition to a sheriff or a justice (in some cases only to a sheriff) upon requisition in writing under the hands of ten inhabitants. An appeal lies in cases of sufficient value from the sheriff-substitute to the sheriff and from the sheriff to the Court of Session. The list of nuisances in the Act differs, but not materially, from that in the English Act. The powers of local authorities in England and Scotland are very similar. There are no provisions as to contracts by local authorities corresponding to those in the English Act.

Ireland.—Several Acts of the Irish parliament dealt with specific nuisances, *e.g.*, 5 Geo. III. c. 15, forbidding the laying of filth in the streets of cities or county towns, and making regulations as to sweeping and scavenging. There were also numerous private Acts dealing with water-supply and the obstruction of watercourses. In 1878 the existing legislation was consolidated by the Public Health (Ireland) Act, 1878 (41 and 42 Vict. c. 52), a close copy of the English Act of 1875. The list of statutory nuisances is the same in both Acts. The urban authority is the corporation, the commissioners, the municipal commissioners, or the town commissioners, according to circumstances. Ireland has its own local government board.

United States.—After the Civil War boards of health were established in the chief cities. Public health is under the control of the local authorities to a greater extent than in England. By the Act of Congress of 25th February 1799 officers of the United States are bound to observe the health laws of the States. A national board of health was created by the Act of 3d March 1879, c. 202. Its main duties are to give advice to local authorities and to carry on investigations in sanitary matters. It has certain jurisdiction in quarantine and in epidemics of a peculiarly dangerous nature. (J. Wt.)

PUBLIC RECORDS. See RECORDS, PUBLIC.

PUBLILIUS (less correctly written PUBLIUS) **SYRUS**, a Latin writer of farces (*mimi*), flourished in the 1st century B.C. He was a native of Syria and was brought as a slave to Italy, but by his wit and talent he won the favour of his master, who freed and educated him. His farces, in which he acted himself, had a great success in the provincial towns of Italy and at the games given by Cæsar in 46 B.C. Publilius appeared on the stage at Rome and received from Cæsar himself the prize for a histrionic contest in which the actor vanquished all his competitors, including the celebrated Laberius. For the rest, we learn from Jerome that in 43 Publilius still enthralled the Roman playgoers. Cicero witnessed with pleasure the exhibition of his plays, and Seneca was a warm admirer of his wise and witty sayings. All that remains of his works is a collection of *Sentences* (*sententiæ*), a series of moral maxims in iambic and trochaic verse. This collection must have been made at a very early date, since it was known to Aulus Gellius in the 2d century A.D. Each maxim is comprised in a single verse, and the verses are arranged in alphabetical order according to their initial letters. In course of time the collection was interpolated with sentences drawn from other writers, especially from apocryphal writings of Seneca; the number of genuine verses is about 700. They include many pithy sayings, such as the famous "judex damnatur ubi nocens absolvitur." The best editions of the *Sentences* are those of E. Wölfflin (Teubner, 1869) and W. Meyer (Teubner, 1880).

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sumed smoke if it be proved to the court that the smoke has been consumed as far as practicable and that the fire has been carefully attended to.

PÜCKLER-MUSKAU, Hermann Ludwig Heinrich, Prince of (1785-1871), a German author, was born at Muskau in Lusatia on 30th October 1785. He served for some time in the body-guard at Dresden, and afterwards travelled in France and Italy. In 1811, after the death of his father, he inherited the barony of Muskau and a considerable fortune. As an officer under the duke of Saxe-Weimar he distinguished himself in the war of liberation and was made military and civil governor of Bruges. After the war he retired from the army and visited England, where he remained about a year. In 1822, in compensation for certain privileges which he resigned, he was raised to the rank of prince by the king of Prussia. Some years earlier he had married the countess of Pappenheim, daughter of Prince Hardenberg; but he separated from her in 1826. He again visited England and travelled in America and Asia Minor, living after his return at Muskau, which he spent much time in cultivating and adorning. In 1845 he sold this estate, and, although he afterwards lived from time to time at various places in Germany and Italy, his principal residence was the castle of Branitz in the district of Kottbus, where he formed splendid gardens as he had already done at Muskau. In 1863 he was made an hereditary member of the Prussian Herrenhaus, and in 1866 he attended the Prussian general staff in the war with Austria. He died at Branitz on 4th February 1871, and, in accordance with instructions in his will, his body was burned. As a writer of books of travel he held a high position, his power of observation being keen and his style lucid and animated. His first work was *Briefe eines Verstorbenen* (1830-31), in which he expressed many independent judgments about England and other countries he had visited and about prominent persons whom he had met. Among his later books of travel were *Semilasso's vorletzter Weltgang* (1835), *Semilasso in Afrika* (1836), *Aus Mehmed-Ali's Reich* (1844), and *Die Rückkehr* (1846-48). He was also the author of *Andeutungen über Landschaftsgärtnerei* (1834).

See Pückler-Muskau's *Briefwechsel und Tagebücher*; Ludmilla Assing, *Furst Hermann von Pückler-Muskau*; and Petzold, *Furst Hermann von Pückler-Muskau in seiner Bedeutung für die bildende Gartenkunst.*

PUDSEY, a township of the West Riding of Yorkshire, is situated on an acclivity rising above the valley of the Aire and on the Great Northern Railway, 4 miles east of Bradford and 6 south-west of Leeds. The principal buildings are the church of St Lawrence in the Gothic style, erected in 1821 and lately improved, and the mechanics' institute, a fine building, comprising class-rooms, a library, a public hall, and a lecture hall. The town has an important woollen trade and possesses dyeing and fulling mills. Pudsey appears in Domesday as "Podechesaie." It was sold by Edward II. to the Calverley family, from whom it passed to an ancestor of the Milners. By the Bradford Water and Improvement Act of 1881 part (37 acres) of the urban sanitary district of Pudsey was amalgamated with that of Bradford. The population of the diminished district (2409 acres) in 1871 was 12,173, and in 1881 it was 12,314.

PUEBLA, or in full La Puebla de los Angeles, a city of Mexico, formerly capital of the province of Tlaxcala, now of the state of Puebla, lies 76 miles south-east of Mexico, in 19° N. lat. and 98° 2′ W. long., at a height of 7220 feet above the sea. It is admirably situated on a spacious and fertile plateau, which, while almost destitute of trees, is, especially in the neighbourhood of the city, clothed with gardens and fields. To the south-west rises the summit of Popocatepetl, and Orizaba and Iztaccihuatl are also within the horizon. By Humboldt Puebla was ranked as the most important city of Spanish America after Mexico, Guanajuato, and Havana, and in the matter of population it still stands third among the state capitals. Its spacious streets run exactly east-west and north-south, and its houses, often of three stories, are solidly built of stone and in Spanish style. The cathedral, dedicated to the Immaculate Conception, was commenced in 1552 after the designs of Juan Gomez de Mora, but it was not completed until 1649, after Bishop Juan de Palafox y Mendoza had devoted eight years of strenuous effort to the enterprise. It is rather more than 320 feet long and 165 wide, and consists of a nave 80 feet high, with side aisles and a dome, the upper portion of which is constructed of pumice-stone for the sake of lightness. The main front, like the columns of the interior, is in the Doric style, but its two side towers are Ionic. In one is a great bell cast in 1637 and weighing upwards of 8 tons. Apart from the cathedral Puebla was famous for the number, and more especially for the lavish decoration of its churches, monasteries, and colleges. Several of these (such as the church and convent of Santo Domingo and the church of S. Felipe Neri) are still of note, and the city also contains a museum, a theatre, &c. Puebla has long been one of the great trading and manufacturing centres of the country, and it has recently become an important point in the rapidly-developing railway system, having in 1884 lines to Apizaco on the railway from Vera Cruz to Mexico (28 miles), to Villa de Libres (58 miles), to San Martin (24 miles), to Matamoros Izucar (31 miles), and to San Juan de los Llanos. Cotton and woollen goods, leather, earthenware, soap, and glass are the leading manufactures. The population, which was about 80,000 in 1746 and 52,717 in 1793, and which greatly decreased during the revolutionary period, is now (1885) stated at 75,000.

Puebla was founded in 1533-34 by Sebastian Ramirez de Fuenleal, archbishop of Santo Domingo, and the Franciscan friar Toribio Motolinia. In 1550 it became the seat of the bishopric which had originally been founded in 1526 at Tlaxcala. The epithet "de los Angeles," which is now practically dropped, was in the 17th and 18th centuries the chief part of the name, which often appears simply as Angeles. It is associated with a popular belief that during the building of the cathedral two angels every night added as much to the height of the walls as the workmen had managed to add in the preceding day. In 1845 Santa Anna made an unsuccessful attempt to capture the city. On 18th March 1863 it was invested by the French under Forey, and on 17th May taken by storm.

See Buschman's history of the city and cathedral in *Ztschr. f. allgem. Erdkunde*, 1863, vol. xv. pp. 195-212, and xvi. pp. 338-345.

PUERPERAL FEVER. See Septicæmia.

PUERTO CABELLO, a town and seaport in the South American republic of Venezuela, in the province of Carabobo, used to rank next to Cartagena, and possesses one of the finest natural harbours in that part of the world. It is backed at the distance of about 5 miles by a range of mountains 3000 feet high, across which pass, at a height of 1800 feet, the road (36 miles) and the railway now (1885) in course of construction to Valencia, the capital of the province. The old town used to lie on an island (originally a coral bank) joined to the mainland by a bridge; but since about 1850 the narrow channel between the town and the more extensive suburbs on shore has been filled up and covered with blocks of building, so that now Puerto Cabello occupies a kind of headland projecting into the bay. Formerly the lowness of its site and the mangrove swamps which fringed the whole coast rendered it appallingly unhealthy: at the time of Humboldt's visit, for example, the surgeon of the hospital reported that in seven years he had 8000 cases of yellow fever, and there were instances of the authorities having to take possession of vessels in the harbour because the entire crew had perished (Eastwick). But yellow fever has not been known at Puerto Cabello since about 1868, and the general death-rate of the place is quite normal. A good supply of water is obtained from the Rio Esteban by means of an aqueduct

3 miles long. The harbour, about 2 miles long and from one-fourth of a mile to a mile in breadth, is formed by a narrow spit of land or coral ledge running out for about 2 miles from the coast in a northerly and westerly direction. The entrance, about 90 feet deep, is so clear that no pilot is required; and in the outer bay (100 to 300 feet deep) there is safe anchorage. On a high rock to the south-east of the town is the Mirador of Solano, or castle of Puerto Cabello, which has often proved an obstacle to enemies advancing from the interior. In 1883 the municipality, with a population of 12,000, contained a tannery, a foundry and machine-shop, a coffee-mill, two soap and candle factories, and about fourteen wholesale warehouses. The exports consist of coffee, cocoa, hides, goat and deer skins, bark, woods, indigo, and cotton, but only the first in large quantities. Germany and the United States are the chief recipients. Within 6 miles of the town there are four villages of from 200 to 1500 inhabitants.

See Jülfs and Balleer, *Seehäfen der Erde*, Oldenburg, 1878; and *U.S. Consular Reports*, Nos. 24, 26, 30, &c.

PUERTO DE SANTA MARIA, probably the "Menesthei Portus" of Ptolemy, commonly called El Puerto ("The Port"), a town of Spain, in the province of Cadiz, 7 miles to the north-east of that city (21¼ miles by rail; see sketch map, vol. iv. p. 627), near the mouth and on the right bank of the Guadalete, which is here crossed by a suspension bridge. It is a pleasant and well-built though somewhat dull town, in a fertile country, and its houses resemble those of Cadiz, though they are often larger and profusely decorated with painting. Calle Larga, the principal street, is handsome and well-paved; there are several "alamedas" or public promenades, that of La Victoria being the finest. The place is famous for its bull-fights, that given here in honour of Wellington being the subject of the considerably idealized description in Byron's *Childe Harold.* Among the public buildings is a large Jesuit college, recently established. Puerto is chiefly important as a wine-exporting place; the "bodegas" or wine-stores are large and lofty, but hardly equal to those of Xerez. The harbour is formed by the river; its mouth is considerably obstructed by a bar. There is regular steam communication with Cadiz. Timber and iron are the chief imports. The population of the municipality in December 1877 was 22,125.

PUERTO PRINCIPE, or now more correctly Ciudad del Principe, a city at the head of the central department of the island of Cuba. When first founded in the beginning of the 16th century by Velazquez, it was, as its more familiar name implies, on the sea-coast; but it has been more than once shifted southward and inland, and is now nearly as far from the north as from the south side of the island. Though for some time after the surrender of San Domingo to France in 1800 Principe was the seat of the central government and supreme courts of the Spanish West Indies, it is no longer a place of much importance. The population is estimated at 31,000. Since 1840 the city has been connected by a railway with its port, which is sometimes called by its own name and sometimes by that of a smaller town on the bay about 11 miles from its entrance, San Fernando de Nuevitas. The harbour or bay is large, completely sheltered, and capable of admitting vessels of the largest draught; but it is entered by a narrow crooked passage 6 miles long, which, though there are no hidden dangers, makes the assistance of a pilot desirable.

PUERTO RICO. See Porto Rico.

PUFENDORF, Samuel (1632-1694), was born at Chemnitz, Saxony, on the 8th of January 1632, the same year which also saw the birth of three other illustrious political and philosophical writers—Locke, Cumberland, and Spinoza. He belonged to an ecclesiastical family, his father was a Lutheran pastor, and he himself was destined for the ministry. Having completed his preliminary studies at the celebrated school of Grimma, he was sent to study theology at the university of Leipsic, at that time the citadel of Lutheran orthodoxy. Its narrow and dogmatic teaching was profoundly repugnant to the liberal nature of the young student, who was not long in bidding adieu to the professors of theology and throwing himself passionately into the study of public law. He soon went so far as to quit Leipsic altogether, and betook himself to Jena, where he formed an intimate friendship with Erhard Weigel the mathematician, a man of great distinction. Weigel was imbued with the Cartesian philosophy; and it was to his teaching and to the impetus he gave to the application of the mathematical method that Pufendorf owes the exact and ordered mind, and the precision, frequently approaching almost to dryness, which characterize his writings. It was also under Weigel's influence that he developed that independence of character which never bent before other writers, however high their position, and which showed itself in his profound disdain for "ipsedixitism," to use the piquant phrase of Bentham.

Pufendorf was twenty-five years old when he quitted Jena. He hoped to find a career in some of the administrative offices which were so frequently the refuge of the learned in the small states of ancient Germany; but in this he was unsuccessful. In 1658, thanks to his eldest brother Isaiah, who had given up university teaching to enter the Swedish service, he went, in the capacity of tutor, into the family of Petrus Julius Coyet, one of the resident ministers of Charles Gustavus, king of Sweden, at Copenhagen. At this time Charles Gustavus was endeavouring to impose upon Denmark a burdensome alliance, and in the middle of the negotiations he brutally opened hostilities. The anger of the Danes was turned against the envoys of the Swedish sovereign; Coyet, it is true, succeeded in escaping, but the second minister, Steno Bjelke, and the whole suite were arrested and thrown into prison. Pufendorf shared this misfortune, and the future successor of Grotius was subjected to a strict captivity of eight months' duration. Like Grotius, he too had his Loevestein. The young tutor, deprived of books, occupied himself during his captivity in meditating upon what he had read in the works of Grotius and Hobbes. He mentally constructed a system of universal law; and, when, at the end of his captivity, he accompanied his pupils, the sons of Coyet, to the university of Leyden, he was enabled to publish the fruits of his reflexions under the title of *Elementa jurisprudentiæ universalis, libri duo.* The work was dedicated to Charles Louis, elector palatine, an enlightened prince and patron of science, who offered Pufendorf a chair of Roman law at Heidelberg, and when this was declined he created a new chair, that of the law of nature and nations, the first of the kind in the world. Pufendorf accepted it, and was thus in 1661, at the age of twenty-nine, placed in the most enviable of positions. He showed himself equal to his task, and by his science and eloquence proved himself to be an honour and an ornament to the university.

The keenly sarcastic tract *De statu imperii germanici, liber unus*, dates from this period of his life. Small in bulk, it is great in significance, and is one of Pufendorf's most important works. Written with the assent of the elector palatine, but published under the cover of a pseudonym at Geneva in 1667, it was supposed to be addressed by a gentleman of Verona, Severinus de Monzambano, to his brother Lælius. The pamphlet made a great sensation. Its author arraigned directly the organis zation of the holy empire and exposed its feebleness, denounced in no measured terms the faults of the house of Austria, and attacked with remarkable vigour the politics of the ecclesiastical princes. But he did not thus describe the evil without at the same time suggesting the remedy. Thinking that Germany could not attain to a true monarchy without a great revolution, he proposed to call together a confederation, with a perpetual council representing all the members and occupying itself with external affairs. Before Pufendorf, Philipp Bogislaw von Chemnitz, publicist and soldier, had written, under the pseudonym of "Hippolytus a Lapide," *De ratione status in imperio nostro Romano-Germanico.* Inimical, like Pufendorf, to the house of Austria, Chemnitz had gone so far as to make an appeal to France and Sweden. Pufendorf, on the contrary, rejected all idea of foreign intervention. But in his plan, in which national initiative was all in all, were propounded the ideas of an army supported at the general expense, the secularization of the ecclesiastical principalities, the abolition of convents, and the expulsion of the Jesuits His little book is perhaps the most important that was produced in relation to the public law and politics of Germany, and it is noteworthy that he reveals himself as a consummate statesman, having a broad comprehension of the present and a clear insight into the future. Subsequent events proved the justice of his conclusions.

In 1670 Pufendorf was called to the university of Lund. The influence of his brother Isaiah, as also some disagreements which he had had with his colleagues at Heidelberg, influenced his decision to accept the call; but by this acceptance he did not break with German culture, for in Scandinavia that culture was predominant. The sojourn at Lund was fruitful. In 1672 appeared the *De jure naturæ et gentium, libri octo*, and in 1675 a résumé of it under the title of *De officio hominis et civis.* The treatise *De jure naturæ et gentium* is the first systematic work on the subject. Grotius, whom Pufendorf has been accused of having too servilely followed, had more especially treated of international relations; and on the other hand Oldendorp, Hemming, and Winkler treated of the rudimentary part of the subject. Pufendorf took up in great measure the theories of Grotius and sought to complete them by means of the doctrines of Hobbes and of his own ideas. Judging of the work of Pufendorf as a whole, Mr Lorimer has felt justified in saying that "his conception was a magnificent one, and in the effort which he made to realize it he has left behind him a work which, notwithstanding the unpardonable amount of commonplace which it contains and its consequent dulness, is entitled to the respect of all future jurists. It was nothing less than an attempt to evolve from the study of human nature a system of jurisprudence which should be of universal and permanent applicability." The author derived law from reason, from the civil law, and from divine revelation, and established thus three "disciplines"—natural law, civil law, and moral theology. Natural law is all that is commanded to us by pure reason, and hence resulted the first important point in Pufendorf's theory, viz., that natural law does not extend beyond the limits of this life and that it confines itself to regulating external acts. Pufendorf combats Hobbes's conception of the state of nature, and concludes that the state of nature is not one of war but of peace. But this peace is feeble and insecure, and if something else does not come to its aid it can do very little for the preservation of mankind. As regards public law Pufendorf, while recognizing in the state (*civitas*) a moral person (*persona moralis*), teaches that the will of the state is but the sum of the individual wills that constitute it, and that this association explains the state. In this *a priori* conception, in which he scarcely gives proof of historical insight, he shows himself as one of the precursors of J. J. Rousseau and of the *Contrat social.* On the subject of international law, with which he occupies himself incidentally, it is to be noted that Pufendorf belongs to the philosophical school, and also that he powerfully defends the idea that international law is not restricted to Christendom, but constitutes a common bond between all nations because all nations form part of humanity. As was to be expected, the work made a sensation: it provoked enthusiastic admiration as well as anger and indignation: the author was praised to the skies on the one hand, and accused of irreligion and atheism on the other. The universities of Lund and Leipsic, above all, furnished adversaries and critics. Being passionately attacked, he defended himself with passion, and he may be held to have come victorious out of these conflicts in which his combative and sarcastic soul delighted, for Pufendorf dearly loved a fray.

In 1677 he was called to Stockholm in the capacity of historiographer-royal. To this new period belong among others the work *On the Spiritual Monarchy of the Pope*, which was afterwards inserted in his *Introduction to the History of the principal States in Europe at the present Day*, also the great *Commentariorum de rebus Suecicis, libri XXVI., ab expeditione Gustavi Adolphi regis in Germaniam ad abdicationem usque Christinæ* and a *History of Charles Gustavus.* In his historical works Pufendorf is hopelessly dry; but he professes a great respect for truth and generally draws from archives. The treatise *On the Spiritual Monarchy of the Pope* alone recalls Severinus de Monzambano. There we find the same vigour and the same passion, and all through its pages we feel the indignation of the Protestant who sees the noble cause of religious liberty menaced by the papacy and by its two allies Louis XIV. and James II. Of the same nature is another work of this period, *De habitu religionis christianæ ad vitam civilem*, in which he undertakes to trace the limits between ecclesiastical and civil power, and where he expounds for the first time completely the theory known under the name of "Kollegial System" or "Kollegialismus," which was actually applied later in Prussia. This work is dated 1687. In 1688 Pufendorf was called to the service of Frederick William, elector of Brandenburg. He accepted the call; but he had no sooner arrived than the elector died. His son Frederick III. fulfilled the promises of his father, and Pufendorf, historiographer and privy councillor, was instructed to write *The History of the Elector William the Great.* The king of Sweden did not on this account cease to testify his goodwill towards Pufendorf, and in 1694 he created him a baron. In the same year, on the 26th of October, Pufendorf died at Berlin and was buried in the church of St Nicholas, where an inscription to his memory is still to be seen.

The value of the man whose life has been thus briefly sketched was great; he was at once philosopher, lawyer, economist, historian, we may even add statesman. His influence also was considerable, and he has left a profound impression on thought, and not on that of Germany alone. Posterity has, however, done him scant justice, and has not acknowledged what it really owes to him. Much of the responsibility for this injustice rests with Leibnitz, who would never recognize the incontestable greatness of one who was constantly his adversary. Everybody knows the bitter criticism which he made on Pufendorf, "vir parum jurisconsultus et minime philosophus." This is only the condensed expression of a multitude of judgments passed by him on the author of the *De jure naturæ et gentium.* It was on the subject of the pamphlet of Severinus de Monzambano that the quarrel began. The conservative and timid Leibnitz was beaten on the battlefield of politics and public law, and the aggressive spirit of Pufendorf aggravated yet more the dispute, and so widened the division. From that time the two writers could never meet on a common subject without attacking each other. The combat was almost always decided in favour of Pufendorf, but the irony of fate has ratified the words of his adversary, and the future has accepted an estimate dictated by anger and spite.

See H. von Treitschke, "Samuel von Pufendorf," *Preussische Jahrbücher*, 1875, vol. xxxv. p. 614, and vol. xxxvi. p. 61; Bluntschli, *Deutsches Staats-Wörterbuch*, vol. viii. p. 424, and *Geschichte des allgemeinen Statsrechts und der Politik*, p. 108; Lorimer, *The Institutes of the Law of Nations*, vol. i. p. 74; Droysen, "Zur Kritik Pufendorfs," in his *Abhandlungen zur neueren Geschichte*; Roscher, *Geschichte der National-Oekonomik in Deutschland*, p. 304; Franklin, *Das deutsche Reich nach Severinus von Monzambano*. (E. N.)

PUFF-ADDER. See VIPER.

PUFF-BIRD, the name first given, according to Swainson (*Zool. Illustrations*, ser. 1, ii., text to pl. 99), by English residents in Brazil to a group of Birds known to ornithologists as forming the restricted Family *Bucconidæ*, but for a long time confounded, under the general name of Barbets, with the *Capitonidæ* of modern systematists, who regard the two Families as differing very considerably from one another. Some authors have used the generic name *Capito* in a sense precisely opposite to that which is now usually accorded to it, and the natural result has been to produce one of the most complex of the many nomenclatural puzzles that beset Ornithology. Fortunately there is no need here to enter upon this matter, for each group has formed the subject of an elaborate work—the *Capitonidæ* being treated by the Messrs Marshall,[1] and the *Bucconidæ* by Mr Sclater[2]—in each of which volumes the origin of the confusion has been explained, and to either of them the more curious reader may be confidently referred. The *Bucconidæ* are zygodactylous Birds belonging to the large heterogeneous assemblage in the present work generally looked upon as forming the "Order" *Picariæ* (see ORNITHOLOGY, vol. xviii. p. 41), and commonly considered nowadays to be most nearly allied to the *Galbulidæ* (JACAMAR, vol. xiii. p. 531), and like them confined to the Neotropical Region, in the middle parts of which, and especially in its Sub-Andean Sub-region, the Puff-birds are, as regards species, abundant; while only two seem to reach Guatemala and but one Paraguay. As with most South-American Birds, the habits and natural history of the *Bucconidæ* have been but little studied, and of only one species, which happens to belong to a rather abnormal genus, has the nidification been described. This is the *Chelidoptera tenebrosa*, which is said to breed in holes in banks, and to lay white eggs much like those of the Kingfisher and consequently those of the Jacamars. From his own observation Swainson writes (*loc. cit.*) that Puff-birds are very grotesque in appearance They will sit nearly motionless for hours on the dead bough of a tree, and while so sitting "the disproportionate size of the head is rendered more conspicuous by the bird raising its feathers so as to appear not unlike a puff ball. . . . When frightened their form is suddenly changed by the feathers lying quite flat." They are very confiding birds and will often station themselves a few yards only from a window. The *Bucconidæ* almost without exception are very plainly-coloured, and the majority have a spotted or mottled plumage suggestive of immaturity. The first Puff-bird known to Europeans seems to have been that described by Marcgrave under the name of "*Tamatia*," by which it is said to have been called in Brazil, and there is good reason to think that his description and figure—the last, comic as it is in outline and expression, having been copied by Willughby and many of the older authors—apply to the *Bucco maculatus* of modern Ornithology—a bird placed by Brisson (*Ornithologie*, iv. p. 524) among the Kingfishers. But if so, Marcgrave described and figured the same species twice, since his "*Matuitui*" is also Brisson's "*Martin-pescheur tacheté du Brésil*."

Mr Sclater in his *Monograph* divides the Family into 7 genera, of which *Bucco* is the largest and contains 20 species. The others are *Malacoptila* and *Monacha* each with 7, *Nonnula* with 5, *Chelidoptera* with 2, and *Micromonacha* and *Hapaloptila* with 1 species each. The most showy Puff-birds are those of the genus *Monacha* with an inky-black plumage, usually diversified by white about the head, and a red or yellow bill. The rest call for no particular remark. (A. N.)

PUFFIN, the common English name of a sea-bird, the *Fratercula arctica* of most ornithologists, known however on various parts of the British coasts as the Bottlenose, Coulterneb, Pope, Sea-Parrot, and Tammy-Norie, to say nothing of other still more local designations, some (as Marrott and Willock) shared also with allied species of *Alcidæ*, to which Family it has, until very lately, been invariably deemed to belong. Of old time Puffins were a valuable commodity to the owners of their breeding-places, for the young were taken from the holes in which they were hatched, and "being exceeding fat," as Carew wrote in 1602 (*Survey of Cornwall*, fol. 35), were "kept salted, and reputed for fish, as coming neerest thereto in their taste." In 1345, according to a document from which an extract is given in Heath's *Islands of Scilly* (p. 190), those islands were held of the crown at a yearly rent of 300 Puffins[3] or 6s. 8d., being one-sixth of their estimated annual value. A few years later (1484), either through the birds having grown scarcer or money cheaper, only 50 Puffins are said (*op. cit.*, p. 196) to have been demanded. It is stated by both Gesner and Caius that they were allowed to be eaten in Lent. Ligon, who in 1673 published a *History of the Island of Barbadoes*, speaks (p. 37) of the ill taste of Puffins "which we have from the isles of Scilly," and adds "this kind of food is only for servants." Puffins used to resort in vast numbers to certain stations on the coast, and are still plentiful on some, reaching them in spring with remarkable punctuality on a certain day, which naturally varies with the locality, and after passing the summer there, leaving their homes with similar precision. They differ from most other *Alcidæ* in laying their single egg (which is white with a few grey markings when first produced, but speedily begrimed by the soil) in a shallow burrow, which they either dig for themselves or appropriate from a rabbit, for on most of their haunts rabbits have been introduced. Their plumage is of a glossy black above—the cheeks grey, encircled by a black band—and pure white beneath; their feet are of a bright reddish orange, but the most remarkable feature of these birds, and one that gives them a very comical expression, is their huge bill. This is very deep and laterally flattened, so as indeed to resemble a coulter, as one of the bird's common names expresses; but moreover it is particoloured—blue, yellow, and red—curiously grooved and still more curiously embossed in places, that is to say during the breeding-season, when the birds are most frequently seen. But it had long been known to some observers that such Puffins as occasionally occur in winter (most often washed up on the shore and dead) presented a beak very different in shape and size, and to account for the difference was a standing puzzle. Many years ago Bingley (*North Wales*, i. p. 354) stated that Puffins "are said to change their bills annually." The remark seems to have been generally overlooked, but it has proved to be very near the truth, for after investigations carefully pursued during some years by Dr Bureau of Nantes he was in 1877 enabled to shew (*Bull. Soc. Zool. France*, ii. pp. 377-399)[1] that the Puffin's bill undergoes what may be called an annual moult, some of its most remarkable appendages, as well as certain horny outgrowths above and beneath the eyes, dropping off at the end of the breeding-season, and being reproduced the following year. Not long after the same naturalist announced (*op. cit.*, iv. pp. 1-68) that he had followed the similar changes which he found to take place, not only in other species of Puffins, as the *Fratercula corniculata* and *F. cirrhata* of the Northern Pacific, but in several birds of the kindred genera *Ceratorhina* and *Simorhynchus* inhabiting the same waters, and consequently proposed to regard all of them as forming a Family distinct from the *Alcidæ*—a view which has since found favour with Dr Dybowski (*op. cit.*, vii. pp. 270-300 and viii. pp. 348-350), though there is apparently insufficient reason for accepting it.

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[1] *A Monograph of the* Capitonidæ *or Scansorial Barbets*, by C. H. T. and G. F. L. Marshall, London, 1870-71, 4to.

[2] *A Monograph of the Jacamars and Puff-birds, or Families* Galbulidæ *and* Bucconidæ, by P. L. Sclater, London, 1879-82, 4to.

[3] There can not be much doubt that the name Puffin given to these young birds, salted and dried, was applied on account of their downy clothing, for an English informant of Gesner's described one to him (*Hist. Avium*, p. 110) as wanting true feathers, and being covered only with a sort of woolly black plumage. It is right, however, to state that Caius expressly declares (*Rarior. animal. libellus*, fol. 21) that the name is derived "a naturali voce pupin." Prof. Skeat states that the word is a diminutive, which favours the view that it was originally used as a name for these young birds. The parents were probably known by one or other of their many local appellations.

The name Puffin has also been given in books to one of the Shearwaters, and its Latinized form *Puffinus* is still used in that sense in scientific nomenclature. This fact seems to have arisen from a mistake of Ray's, who, seeing in Tradescant's Museum and that of the Royal Society some young Shearwaters from the Isle of Man, prepared in like manner to young Puffins, thought they were the birds mentioned by Gesner (*loc. cit.*), as the remarks inserted in Willughby's *Ornithologia* (p. 251) prove; for the specimens described by Ray were as clearly Shearwaters as Gesner's were Puffins. (A. N.)

PUGET, Pierre (1622-1694), born at Marseilles on 31st October 1622, painter, sculptor, architect, and engineer, is a rare instance of precocious genius and mature power. At the age of fourteen he carved the ornaments of the galleys built in the port of his native city, and at sixteen the decoration and construction of a ship were entrusted to him. Soon after he went to Italy on foot, and was well received at Rome by Pietro di Cortona, who employed him on the ceilings of the Barberini palace and on those of the Pitti at Florence. In 1643 he returned to Marseilles, where he painted portraits and carved the colossal figure-heads of men-of-war. After a second journey to Italy he painted also a great number of pictures for Aix, Toulon, Cuers, and La Ciotat, and sculptured a large marble group of the Virgin and Child for the church of Lorgues. A serious illness in 1665 brought Puget a prohibition from the doctors which caused him wholly to put aside the brush. He now sculptured the caryatides of the town-hall of Toulon (Louvre), went to Normandy, where he executed a statue of Hercules and a group of Janus and Cybele for the marquis of Vaudreuil, and visiting Paris made the acquaintance of Le Pautre and Fouquet, who determined to employ him at Vaux and sent him to Italy to choose marbles for his work. The fall of Fouquet found Puget at Genoa, where he remained employed by the nobles of the town. There he executed for Sublet des Noyers his French Hercules (Louvre), the statues of St Sebastian and of Alexandre Sauli in the church of Carignano, and much other work. The Doria family gave him a church to build; the senate proposed that he should paint their council-chamber. But Colbert bade Puget return to France, and in 1669 he again took up his old work in the dockyards of Toulon. The arsenal which he had there undertaken to construct under the orders of the duke of Beaufort was destroyed by fire, and Puget, disheartened, took leave of Toulon. In 1685 he went back to Marseilles, where he continued the long series of works of sculpture on which he had been employed by Colbert. His statue of Milo (Louvre) had been completed in 1681, Perseus and Andromeda (Louvre) in 1683, and Alexander and Diogenes (bas-relief, Louvre) in 1685; but, in spite of the personal favour which he enjoyed, Puget, on coming to Paris in 1688 to push forward the execution of an equestrian statue of Louis XIV., found court intrigues too much for him. He was forced to abandon his project and retire to Marseilles, where he remained till his death in 1694. His last work, a bas-relief of the Plague of Milan, which remained unfinished, was placed in the council-chamber of the town-hall.

Puget was the most vigorous representative of French sculpture in the 18th century; in spite of his visits to Paris and Rome his work never lost its local character: his Hercules is fresh from the galleys of Toulon; his saints and virgins are men and women who speak Provençal. His best work, the St Sebastian at Genoa, though a little heavy in parts, shows admirable energy and life, as well as great skill in contrasting the decorative accessories with the simple surface of the nude.

Cicognara, *Storia della scultura*; Lenoir, *Musée des Mon. Français*; Lagrange, *Vie de Pierre Puget*; Barbet de Jouy, *Sculvtures mod. au Louvre.*

PUGIN, Augustus Welby Northmore (1812-1852), architect, was the son of Augustus Pugin, a native of France, who practised as an architect in London. He was born in Store Street, Bedford Square, on 1st March 1812. After completing the ordinary course of education at Christ's Hospital (blue-coat school), he entered his father's office, where he displayed a remarkable talent for drawing. When he had mastered the elements of his profession he devoted a large portion of his time to the sketching of public buildings; he also accompanied his father on several professional tours in France. While still very young he was employed by his father to design furniture in the mediæval style for Windsor Castle, and in 1831 he designed the scenery for the new opera of *Kenilworth* at Her Majesty's Theatre. Shortly afterwards he involved himself deeply in money difficulties by an attempt to establish a manufactory of stained glass, metal work, and furniture at Hart Street, Covent Garden. From the time, however, that he devoted himself steadily to his profession as an architect he never failed to find full employment. Shortly after his secession from the Church of England to that of Rome he published *Contrasts; or a Parallel between the Architecture of the 15th and 19th Centuries* (1836), in which he severely criticized the architecture of Protestantism. His other principal works are *True Principles of Christian Architecture* (1841), a *Glossary of Ecclesiastical Ornament* (1844), and a *Treatise on Chancel Screens and Rood Lofts* (1851). Pugin was the designer of a large number of important Roman Catholic buildings, and also assisted Sir Charles Barry in the preparation of the designs for the new Houses of Parliament, Westminster. Early in 1852 he was attacked by insanity, which caused his death on 14th September of the same year.

Future historians who may write the architectural history of the 19th century will probably describe as its leading characteristic that enthusiastic revival of the Gothic style which took place in the second quarter of the century and continued with unabated vigour for more than thirty years. Among the many able architects who during this period contributed to cover England with churches and other buildings, designed in a style which for three centuries had been rejected as barbarous, the name of Pugin deserves to be the most conspicuous. No man so thoroughly mastered the true principles of the Gothic style in its various stages, both in its leading lines and in the minutest details of its mouldings and carved enrichments, and that too at a time when illustrated works on Gothic architecture, such as have since been produced in enormous quantities,[2] had scarcely begun to exist; thus young Pugin had to learn the alphabet of his chosen style by careful and laborious study of the glorious examples of Gothic, both ecclesiastical and domestic, in which England was then (far more than now) so extraordinarily rich. His father was for many years engaged in preparing a large series of works on the Gothic buildings of England, almost, if not quite, the first which were illustrated with accurate drawings of mediæval buildings; the early youth of A. W. Pugin was mostly occupied in making minute measured drawings for his father's books, and in this way his enthusiasm for Gothic art was first aroused. All through his life, both in England and during many visits to Germany and France, he continued to make, for his own instruction and pleasure, great numbers of drawings and sketches, especially in pen and ink, and with sepia monochrome. These are perhaps the most beautiful architectural sketches that have ever been produced, perfect in their delicacy and precision of touch, and masterpieces of skilful treatment of light and shade. They are mostly minute in scale, some almost microscopic in detail. Many of the Continental street scenes and interiors of cathedrals are of especial beauty from their contrasts of brilliant light and transparent shadow,[1] treated with Rembrandt-like vigour. At a very early age his wonderful mastery of Gothic detail was shown by the valuable aid he rendered to Sir Charles Barry in the construction of the new Houses of Parliament in 1836 and 1837.[2] For some time he worked as a paid clerk to Barry, and to Pugin is mainly due the very remarkable excellence of all the details in this great building, executed, it must be remembered, at a time when hitherto all examples of the revived Gothic were of the most ignorant and tasteless description. Pugin not only designed and even modelled a great part of the sculpture and other decorations of the building, but had actually to train a school of masons and carvers to carry out his designs with spirit and accuracy.[3]

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[1] A translated abstract of this paper—containing an account of what is perhaps the most interesting discovery of the kind made in ornithology for many years—is given in the *Zoologist* for 1878 (pp. 233-240) and another in the *Bulletin of the Nuttall Ornithological Club* for the same year (iii. pp. 87-91).

[2] These numerous illustrated works, with every detail shown to a workable scale, by doing away with the necessity for studying the

While still young Pugin became a Roman Catholic, and this, if possible, increased his intense zeal and enthusiasm for Gothic, or, as he preferred to call it, Christian architecture. His profession became to him a sort of religion, and his study of mediæval buildings was closely associated with his love for the mystic symbolism and the highly æsthetic outward form of the old faith. The result of this was that he was almost wholly employed by adherents of the Catholic religion. In one way this was a fortunate circumstance, for it saved him from the temptation of assisting in that great wave of falsification and vulgarization which, under the name of "restoration," has devastated the principal mediæval buildings of Great Britain and Ireland. In another way it was unfortunate, for his Catholic employers were mostly much pinched for money, and at the same time so devoid of all sympathy for the principles of which he was the chief exponent, that they almost always insisted on the greatest possible amount of display being made in the cheapest possible manner. On account of this it is unfair to judge of Pugin's genius from a critical examination of his executed works. In almost every case his design was seriously injured, both by cutting down its carefully considered proportions and by introducing shams (above all things hateful to Pugin), such as plaster groining and even cast-iron carving. The cathedral of St George at Southwark, and even the church of the Jesuits in Farm Street, Berkeley Square, London, are melancholy instances of this. Thus his life was one series of disappointments; no pecuniary success compensated him for the destruction of his best designs, as in him the man of business was thoroughly subordinate to the artist. He himself used to say that the only church he had ever executed with unalloyed satisfaction was the one at Ramsgate, which he not only designed but paid for. Pugin was very broad in his love for the mediæval styles, but on the whole preferred what is really the most suited to modern requirements, namely, the Perpendicular of the 15th century, and this he employed in its simpler domestic form with much success both in his own house at Ramsgate and in the stately Adare Hall in Ireland, built for Lord Dunraven. The cathedral of Killarney and the chapel of the Benedictine monastery of Douai were perhaps the ecclesiastic buildings which were carried out with least deviation from Pugin's original conception.

He was a skilful etcher and produced a number of works illustrated in this way by his own hand, and written with much eloquence, antiquarian knowledge, and even brilliant humour. This last gift is exemplified in a series of etched plates in his *Contrasts*: on one side is some noble structure of the Middle Ages, and on the other an example of the same building as erected in the 19th century.[4] His works on *Chancel Screens* and on *The True Principles of Christian Architecture* are very ably written and exquisitely illustrated.

Pugin's melancholy and premature end was to a great extent caused by the embittering influence of the constant frustration of his noblest artistic struggles and conceptions.

See Ben. Ferrey, *Recollections of A. Welby Pugin and his Father*, London, 1861.

PULCI, Luigi, Italian poet, was born at Florence on 3d December 1431 and died in 1487. The first edition of his *Morgante Maggiore* appeared at Venice in 1481. (See Italy, vol. xiii. p. 507 *sq.*)

PULGAR, Fernando de, Spanish prose-writer of the latter part of the 15th century, born probably at Pulgar near Toledo, was brought up at the court of John II. Henry IV. made him one of his secretaries, and under Isabella he became a councillor of state, was charged with at least one mission to France, and in 1482 was appointed historiographer-royal. His official *Chronicle* of the reign of the Catholic sovereigns for the period previous to his appointment is loose and inaccurate; but in the later portion, where he had the advantage of personal knowledge, he is always precise and often graphic. It is not brought down beyond the year 1492. It was first printed at Valladolid in 1565 under the name of Antonio de Lebrija. Pulgar's *Claros Varones de Castilla*, a series of sketches of forty-six of the most celebrated men of the reign and court of Henry IV., is of considerable interest both for its matter and for its style. He wrote, besides, a commentary on the ancient *Coplas de Mingo Revulgo*; and thirty-two of his *Letters* written to various persons of eminence, including some to the queen, are also extant. The first edition of the *Claros Varones* was that of Seville (1500); some of the letters did not appear until 1528.

PULKOWA. See Observatory, vol. xvii. p. 714.

PULLEY. See Mechanics and Block Machinery.

PULTENEY, William, Earl of Bath (1684-1764), a politician elevated by a living historian[5] into the important position in history of the first leader of the opposition, was descended from an ancient family with a pedigree duly recorded in Nichols's *History of Leicestershire* (iv. 320). His father, William Pulteney, died in 1715, and the future statesman was the offspring of his first wife, Mary Floyd, and was born in 1684. As his grandfather had been intimately connected with the city of Westminster, the boy was sent to Westminster school and from it proceeded to Christ Church, Oxford, acquiring in these institutions that deep classical knowledge which adorned his own speeches and enabled him to correct his great antagonist when he blundered in a quotation. On leaving Oxford he made the usual tour on the Continent. In 1705 he was brought into parliament by Henry Guy for the Yorkshire borough of Hedon, and at the death of that gentleman (a politician who had at one time held the office of secretary of the treasury) Pulteney inherited an estate of £500 a year and £40,000 in cash. This seat was held by him without a break until 1734, and though the family was then dispossessed for a time the supremacy was regained in the return of another Pulteney in 1739. Throughout the reign of Queen Anne William Pulteney played a prominent part in the struggles of the Whigs, and on the prosecution of Sacheverell he exerted himself with great zeal against that violent divine. When the victorious Tories sent his friend

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buildings themselves, and being used simply like "cribs" to an unknown language, are partly accountable for numberless recent buildings, which, while they are Gothic in form, are utterly devoid of the refinement, fitness, and true taste displayed in the buildings of the Middle Ages.

[1] Three volumes of photographs of these sketches have been published in a square octavo form, but have suffered from reduction in size.

[2] A comparison of the decorations of the Houses of Parliament with other contemporary and even later Gothic buildings shows in a very striking way the remarkable talent and industry displayed by Pugin in the work.

[3] A few years ago very ill-judged attempts were made to claim for Pugin the main credit of Barry's design—claims which he himself would have been the last to raise.

[4] Pugin's sense of humour was keener than is altogether convenient for a man of business; on one occasion when a certain Catholic bishop wrote asking him to design a handsome church, which was to cost an absurdly small sum of money, he replied, "My lord, say thirty shillings more and have a tower and spire."

[5] Justin M'Carthy, *History of the Four Georges*, vol. i. (1884).

Robert Walpole to the Tower in 1712, Pulteney championed his cause in the House of Commons and joined with the leading Whigs in visiting him in his prison-chamber. For these acts he was duly rewarded on the accession of George I. In the first ministry of the new king he held the post of secretary of war, a post which in the previous reign had been conferred upon St John, Walpole, and Granville successively, and when the committee of secrecy on the Utrecht treaty was formed the list included the name of William Pulteney. Two years later (6th July 1716) he became one of the privy council. In the following year the Whig ministry was rent in twain by internal dissension. On the proposition of the Government for granting a supply against Sweden the friends of Lord Townshend and Sir Robert Walpole voted against the administration, which only escaped defeat by a majority of four. Townshend was immediately dismissed from his post of lord-lieutenant of Ireland, and Walpole at once resigned his places, and amongst the Whigs who followed him in his retirement was Pulteney. Devotion like this merited some signal mark of favour on the return to power of the displaced ministers; yet, when the crash of the South Sea Company restored Walpole to the highest position of authority, all that he offered to Pulteney was a peerage, a distinction which entailed the misfortune of banishment from the House where his faculties found their highest opportunities for display. The offer was rejected, but in 1723 Pulteney stooped to accept the lucrative but insignificant post of cofferer of the household. In this obscure position he was content for some time to await the future; but when he found himself neglected he broke out into sarcasms on the civil list and in 1725 was dismissed from his sinecure. From the day of his dismissal to that of his ultimate triumph Pulteney remained in opposition, and, although Sir Robert Walpole attempted on his quarrel with Townshend to conciliate him, all his overtures were spurned. Pulteney's resentment was not confined to his speeches in parliament. With Bolingbroke he set on foot the well-known periodical called *The Craftsman*, and in its pages the minister was incessantly denounced for many years. The war of pamphlets raged without ceasing. Lord Hervey published an attack on the *Craftsman*, and Pulteney, either openly or behind the person of Amhurst, defended its strictures of the minister. Whether the question at issue was the civil list, the excise, the income of the prince of Wales, or the state of domestic affairs Pulteney was ready with a pamphlet, and the minister or one of his friends came out with a reply. For one of these efforts he was challenged to a duel by Lord Hervey; for another he was struck off the roll of privy councillors and dismissed from the commission of the peace in several counties. In print Pulteney was inferior to Bolingbroke alone among the antagonists of Walpole, but in parliament, from which St John was excluded, he excelled all his comrades. When the sinking fund was appropriated his voice was the foremost in denunciation; when the excise scheme was stirring popular feeling to its lowest depths the passion of the multitude broke out in his oratory. Through Walpole's prudent withdrawal of the latter measure the fall of his ministry was averted, and dismay fell on the opposition leaders. Bolingbroke withdrew to France and Pulteney sought consolation in foreign travel

From the general election of 1734 until his elevation to the peerage Pulteney sat for Middlesex. For some years after this election the minister's assailants made little progress in their attack, but in 1738 the troubles with Spain supplied them with the opportunity which they desired. Walpole long argued for peace, but he was feebly supported in his own cabinet, and the frenzy of the people for war knew no bounds. In an evil moment for his own reputation he consented to remain in office and to gratify popular passion with a war against Spain. His downfall was not long deferred. War was declared in 1739; a new parliament was summoned in the summer of 1741, and over the division on the election petitions the ministry of Walpole fell to pieces. The task of forming the new administration was after some delay entrusted to his principal antagonist, whereupon Pulteney offered the post of first lord of the treasury to that harmless politician the earl of Wilmington, being content himself, as he had often declared his disdain for office, with a seat in the cabinet coupled with a peerage. At this act popular feeling broke out into open indignation. Exclamations that the country was betrayed were heard on all sides, and from the moment of his elevation to the Upper House Pulteney's influence dwindled to nothing. Horace Walpole asserts that when Pulteney wished to recall his desire for a peerage it was forced upon him through the ex-minister's advice by the king, and another chronicler of the times records that when victor and vanquished met in the House of Lords, the one as Lord Orford, the other as the earl of Bath, the remark was made by the exulting Orford: "Here we are, my lord, the two most insignificant fellows in England." On 14th July 1742 Pulteney was created baron Pulteney of Hedon, county York, viscount Pulteney of Wrington, county Somerset, and earl of Bath, and a few months previously he had been restored to his rank in the privy council. On Wilmington's death in 1743 he made application to the king for the post of first lord of the treasury, only to find that it had been conferred on Henry Pelham. For two days in 1746 he was at the head of a ministry, but in "48 hours, three quarters, seven minutes, and eleven seconds" this short-lived ministry collapsed. An occasional pamphlet and an unfrequent speech were afterwards the sole fruits of Lord Bath's talents. His praises whilst in retirement have been sung by two prelates of the established church of England, Bishops Pearce and Newton. He died on 7th July 1764, and was buried on 17th July in his own vault in Islip chapel, Westminster Abbey.

Pulteney's eloquence was keen and incisive, sparkling with vivacity and with allusions drawn from the literature of his own country and of Rome. Of business he was never fond, and the loss in 1734 of his trusted friend John Merrill, who had supplied the qualities which he lacked, was feelingly lamented by him in a letter to Swift. His chief weakness was a passion for money, which was born with him and grew as he grew. As he left no surviving issue[1] his vast fortune went to William Johnstone of Dumfries (the third son of Sir James Johnstone), who had married Frances, the daughter and heiress of his cousin Daniel Pulteney, and had taken the name of Pulteney. Lord Bath has left no trace of the possession of practical statesmanship, but for nearly twenty years he led the opposition in the House of Commons to the greatest minister of the age, and had at last the triumph of driving his adversary from office. (W. P. C.)

PULTOWA. See POLTAVA.

PUMA, a name, probably of native origin, introduced into European literature by the early Spanish writers on South America (as Garcilaso de la Vega and Hernandez) for one of the largest feline animals of the New World. It is generally called "cougouar" by the French, "leon" by the Spanish Americans, and "panther" by the Anglo-American hunters of the United States. It is the *Felis concolor* of Linnæus and all subsequent systematic zoological authors. In general and anatomical characters, teeth, &c., it is a typical member of the genus *Felis*. (See MAMMALIA, vol. xv. p. 434.) Though often spoken of as the American lion, chiefly on account of its colour, it rather resembles the leopard of the Old World in size and habits. It usually measures from nose to root of tail about 40 inches, the tail being rather more than half that length. The head is rather small compared with that of other cats and has no mane. The ears are large and rounded. The tail is cylindrical, with some bushy elongation of the hairs near the end, but not forming a distinct tuft as in the lion. The general colour of all the upper parts and sides of the adult is a tawny yellowish brown, sometimes having a grey or silvery shade, but in some individuals dark or inclining to red. The lower parts of the body, inner surface of the limbs, the throat, chin, and upper lip are dirty white; the outside of the ears, particularly at their base, and a patch on each side of the muzzle black; the end of the tail dusky. The young, as is the case with the other plain-coloured *Felidæ*, are, when born, spotted with dusky brown and the tail ringed. These markings gradually fade, and quite disappear before the animal becomes full-grown.

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[1] His wife, Anna Maria Gumley, daughter of John Gumley of Isleworth, usually styled "a wealthy glass manufacturer and army contractor," died on 14th September 1758, aged sixty-four.

Puma.

The puma has an exceedingly wide range of geographical distribution, extending over a hundred degrees of latitude, from Canada in the north to Patagonia in the south, and was formerly pretty generally diffused in suitable localities from the Atlantic to the Pacific Ocean, but the advances of civilization have in recent years considerably curtailed the extent of the districts which it inhabits. In Central America it is still common in the dense forests which clothe the mountain ranges as high as 8000 or 9000 feet above the sea-level, where the hideous sound of its howling is said to be almost continuously heard at night during the breeding season. Though an expert climber, it is by no means confined to wooded districts, being frequently found in scrub and reeds along the banks of rivers, and even in the open pampas and prairies. Its habits much resemble those of the rest of the group to which it belongs; and, like the leopard, when it happens to come within reach of an abundant and easy prey, as the sheep or calves of an outlying farming station, it kills far more than it can eat, either for the sake of the blood only or to gratify its propensity for destruction. It rarely attacks man, and, when pursued, escapes if possible by ascending lofty trees. Several instances have occurred of pumas becoming tame in captivity. Edmund Kean, the celebrated actor, had one which followed him about like a dog. When caressed they express their pleasure by purring like a domestic cat.

PUMICE a highly porous light mineral substance of volcanic origin, resulting from the solidification of foam or scum formed by the escape of steam or gas on the surface of molten lava. It is principally found of a whitish or clear grey colour, more rarely of a slaty blue or reddish tint. In composition it is allied to the obsidians, containing in every 100 parts about 72 of silica, 17 of alumina, 2 of iron oxide, and 9 of soda and potash; and under the blowpipe it fuses to a white enamel. Its porosity renders it so exceedingly light that in the dry condition it floats readily on the surface of water, sinking only when thoroughly saturated. Owing to this property it is found very widely diffused over the ocean-bed, even at points far removed from volcanic vents, considerable blocks having been brought up in the dredgings of the "Challenger" at all the points of its sea-bottom exploration. It is obtained for industrial purposes in the regions of recent volcanoes—the Lipari Islands, Iceland, Auvergne, Teneriffe, &c.—and is highly valued as a smoothing and polishing material for the metals, marble, horn, wood, bone, ivory, and leather. For some purposes it is reduced to the condition of a fine powder, and used either direct or spread upon paper or linen, as glass or emery-paper. A toilet soap is prepared containing a proportion of powdered pumice. An artificial pumice is made from a mixture of calcined and pulverized quartz and alumina baked in the form of a porous brick.

PUMP. See MINING, vol. xvi. pp. 458, 459; PNEUMATICS, vol. xix. p. 246; and HYDROMECHANICS, vol. xii. p. 533 *sq.*

PUMPKIN. See GOURD, vol. xi. p. 4, and HORTICULTURE, vol. xii. p. 283.

PUNCHINELLO (It. *Policinella*, *Pulcinella*), the most popular of the puppets, is of Italian origin, though its history is by no means free from obscurity. The earlier etymologists sought to trace the name to various mythical individuals, by whom, it was alleged, the type was first furnished. Galiani adopts the theory which derives it from the name of Puccio d'Aniello, a vintager of Acerra near Naples, who, having by his wit and grotesque appearance vanquished some strolling comedians in their own sphere, was induced to join the troop, and whose place, by reason of his popularity, was supplied after his death by a masked actor who imitated his dress and manner. The claims of other individuals—Paolo Cinella, Polliceno, and Pulcinella, a Neapolitan dealer in fowls—have also found supporters, and the derivation of the name and character from some old mystery representing Pontius (O.E. *Pownce*; Fr. *Ponce*) Pilate and Judas, or the Jews, was formerly popular. It has even been suggested that the title is a modification of πολὺ κινέω as expressive of the restlessness which is characteristic of the puppet; and the assumption that the character was invariably of diminutive size has given rise to its reference to the word *pollice*, the thumb (cf. *Däumling*, Tom Thumb). The most plausible theory, however, regards the name in its Italian form as a diminutive of *pulcino*, fem. *pulcina*, a chicken. It is sometimes stated that, in consequence of the habit of using the word "chicken" as a term of endearment, it came to mean "a little child," and hence "a puppet" (Skeat). But this again involves the assumption that the application of the name to the character was in some measure determined by the size of the puppets, whereas it would appear to have been transferred from the comic stage to the puppet show, and the Pulcinella of the stage was not necessarily a dwarf. The choice, therefore, seems to lie between the theory of Quadrio, that it was applied on account of the resemblance of the hooked nose to a beak, and that of Baretti, which ascribes its employment to the nasal squeak and timorous impotence of the original character. With respect to the development of the modern type, it has been assumed that the whole family of Italian *maschere* (Arlecchino, Brighetta, and the like) are modified survivals of the principal Oscan characters of the *Atellanæ*, and that Punchinello is the representative of Maccus, the fool or clown. In proof of this it is urged that Acerra, the supposed residence of Puccio d'Aniello and the traditional source of the character, is in the neighbourhood of Aversa, the old Atella: and reference is also made to a bronze statue of Maccus, discovered at Rome in 1727, an engraving of which has been preserved in Ficoroni's *Le Maschere Sceniche e le Figure Comiche d'Antichi Romani.* But the resemblance of the statue to the puppet is scarcely to be termed a striking one. and the large nose and deformed figure are somewhat hazardous ground on which to base a theory,—especially in view of the fact that such points of likeness as there are in it to the northern Punch are not to be found in the Neapolitan Pulcinella. It is possible that some relic of the old *Ludi Osci*, transmitted through the Vice of the mystery plays, is to be found in the character; but any direct descent from the Maccus of the Atellanæ seems precluded by the fact that, while there are traces of the gradual development of the northern Punch from the Neapolitan Pulcinella, the latter with its grey hat, white smock and trousers, masked face, and undistorted body is widely different from its alleged prototype. It seems necessary, therefore, to regard the Pulcinella as in large part a distinct creation of comparatively modern date. Prior to the 17th century there is no indication in the Italian burlesque poets of the existence of Pulcinella, though Riccoboni places the creation of the part before 1600.

Andrea Perrucci (1699) and Gimma assert with some show of authority that Silvio Fiorillo, a comedian named after his principal part Captain Matamoros (the Italian *Miles Gloriosus*), invented the Neapolitan Pulcinella. It was afterwards improved by Andrea Calcese, surnamed Ciuccio, who died of the plague in 1656, and who, according to Gimma, imitated in the character the peasants of Acerra. This would place the origin of the Italian Pulcinella somewhere about the commencement of the 17th century, the original character appearing to have been that of a country clown, hook-nosed, shrill-voiced, cowardly, boastful, and often stupid, yet given at times to knavish tricks and shrewd sayings. In thorough accordance with this date, we find that the earliest known appearance of Polichinelle in France is at the commencement of the reign of Louis XIV., in the show of the puppet-playing dentist Jean Brioché. It might have been expected that the shrewder and wittier side of the character would most commend itself to the French mind, and there is good reason to believe that the Polichinelle of Brioché was neither a blunderer nor a fool. The puppet was almost immediately seized upon as the medium of political satire of the kind exemplified in the *Letter of Polichinelle to Cardinal Mazarin* (1649), and it is described in the *Combat de Cyrano de Bergerac* as a "petit Ésope de bois, remuant, tournant, virant, dansant, riant, parlant, petant" and as "cet hétéroclite marmouset, disons mieux, ce drolifique bossu." In this there appear signs of transformation, whether the importation to France took place before or after the alleged improvements of Calcese. The hunchback had been long associated in France with wit and laughter, and there are, therefore, some grounds for Magnin's theory that the northern Punch is of French origin, a Gallic type under an Italian name, though there does not seem to be sufficient reason for adopting his suggestion that Polichinelle was a burlesque portrait of Béarnais. The date of its introduction into England has been disputed, Payne Collier being of opinion that Punch and King William came together, a second theory suggesting an earlier origin with the Huguenot refugees. In view of its popularity in France prior to the Restoration, however, it would be strange if its migration had been so long delayed, and it is more than probable that it crossed the Channel in the wake of the Royalists. Apart from the general references by Pepys (1662) and by Evelyn (1667) to an Italian puppet-show at Covent Garden, the former makes mention (1669) of some poor people who called their fat child Punch, "that word being become a word of common use for all that is thick and short." An allusion to "Punchinellos" is also to be found in Butler's satire on English imitation of the French, and Aubrey speaks of "a Punchinello holding a dial" as one of the ornaments of Sir Samuel Lely's house at Whitehall. But, though the puppet did not travel in the train of William of Orange, allusions to it become far more frequent after the Revolution of 1688, and the skill of the Dutch in their treatment of puppet mechanism may have enhanced its attractiveness. In 1703 it was introduced at Bartholomew Fair into a puppet play of the creation of the world; in 1709 (*Tatler*, No. 16) it was to be found in a representation of the Deluge, though in a different part from that of the Momus Polichinelle of Piron's *Arlequin-Deucalion* (1722); and in 1710 (*Spectator*, No. 14) it is mentioned as a leading figure in Powell's puppet-show at Covent Garden. The alleged satire on Robert Walpole, entitled *A Second Tale of a Tub, or the History of Robert Powel, the Puppet-Showman* (1715), furnishes some details of Punch performances, and has an interesting frontispiece representing Powell with Punch and his wife. The Judy (or Joan, as she appears to have been sometimes called) is not of a specially grotesque order, but the Punch is easily recognizable in all but the features, which are of the normal puppet type. Other allusions are to be found in Gay's *Shepherd's Week—Saturday* (1714) and Swift's *Dialogue between Mad Mullinix and Timothy* (1728). The older Punchinello was far less restricted in his actions and circumstances than his modern successor. He fought with allegorical figures representing want and weariness as well as with his wife and with the police, was on intimate terms with the patriarchs and the seven champions of Christendom, sat on the lap of the queen of Sheba, had kings and dukes for his companions, and cheated the Inquisition as well as the common hangman. Powell seems to have introduced a trained pig which danced a minuet with Punch, and the French have occasionally employed a cat in place of the dog Toby, whose origin is somewhat uncertain. A typical version of the modern play, with illustrations, was published by Payne Collier and Cruikshank in 1828. (R. M. W.)

PUNCTUATION. See PALÆOGRAPHY, vol. xviii. p. 163.

PUNJAB,[1] the most northern province of British India. Geographically the region called by this name is the triangular tract of country of which the Indus and the Sutlej (Satlaj) to their confluence form two of the sides, the third being the lower Himálaya hills between these two rivers. The British province now includes a large extent of country outside these boundaries, on all three sides—beyond the Indus to the range of hills running parallel to it on the west; beyond the Sutlej eastward to the Jumna (Jamna) and southward to a distance of 60 miles below Delhi; within the hills, a large highland tract on the east and another on the west, with the Kashmir and Chamba territories between. The British province stretches north and south from 35° 10′ N. lat. at the head of the hill district of Hazára to 27° 40′ at the south end of the Gurgáon district, and east and west from 69° 36′ E. long. on the Déra Ghází Khán and Sind frontier to 78° 55′ on the Jumna. The length of the central line of communication across the province from Delhi to Peshawar by rail is 645 miles.

The name *Punjab* signifies "[country of] five rivers," the five rivers being the great tributaries of the INDUS (*q.v.*), namely, the Jhelum, Chináb, Rávi, Biás, and Sutlej.[1] These are all rivers of large volume, but, on account of the great width of sandy channel in their passage through the plains, their changing courses, and shifting shoals, they are of very moderate value for steam navigation, though they all support a considerable boat-traffic. The Indus has a course of about 550 miles through the Punjab. The Jhelum enters the plains a little above the town of Jhelum. Thence it flows south-west about 200 miles to join the Chináb. The Chináb (called Chandrabhága in the hills, being formed by the union of the Chandra and the Bhága, both from the Bára Lácha Hills) enters the Punjab about 15 miles north of Sialkót. About 200 miles lower down it receives the Jhelum on the right, and about 60 miles farther the Rávi on the left. After a further course of about 120 miles it joins the Sutlej. The Rávi, after reaching the plains, follows a very winding course to its junction with the Chináb. A deserted channel runs generally parallel to the present river through part of the district of Montgomery. The Biás enters the Punjab in the Gurdáspur district, and has a course in the plains of nearly 100 miles to its junction with the Sutlej near Hari-ki-Patan. The Sutlej flows nearly 500 miles through the plains before it unites with the Chináb, which is the junction of the five tributaries. Thence the united rivers (sometimes called *Panj-nad* or "the five streams") flow in one channel about 50 miles to the Indus.

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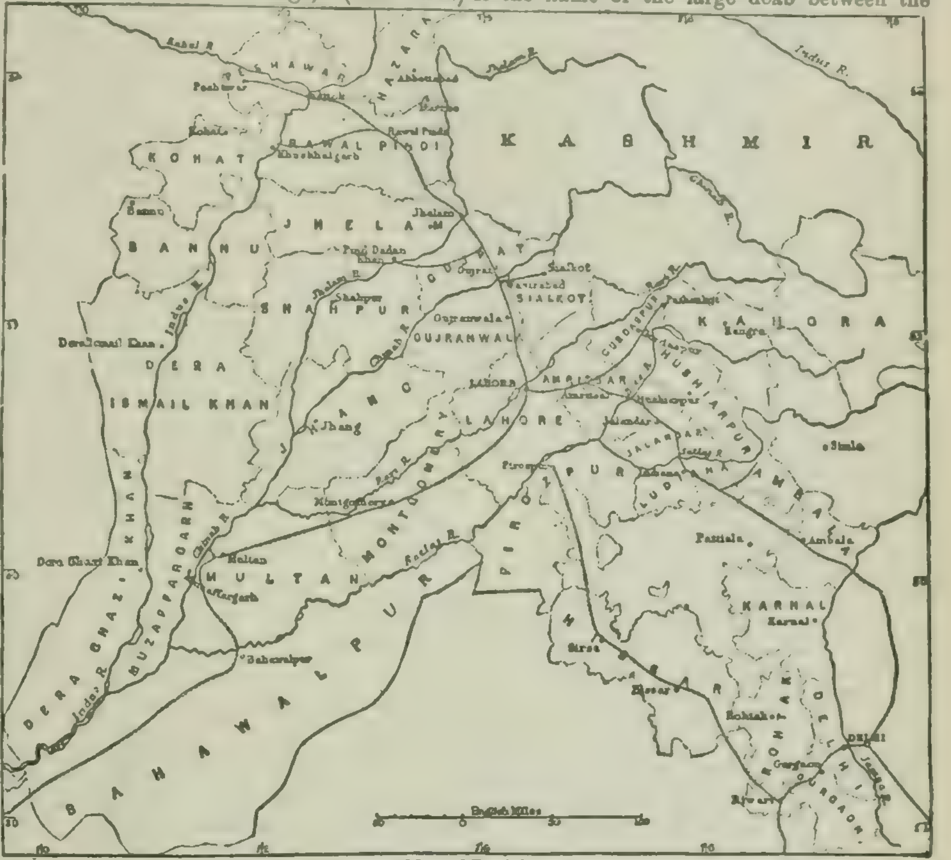
[1] *Panjab*, according to received modern spelling; but, as in other cases of important and familiar names, the old form is commonly retained.



Map of Punjab.

Whilst the general name Punjab is applied to the whole country of the five rivers, there are distinct names for each of the "doábs" (*do*, two; *áb*, water) or tracts between two adjoining rivers. The country between the Sutlej and the Biás is called the Jalandar Doáb; it includes the districts Jalandar and Hushiárpur. The long strip between the Biás-Sutlej and the Rávi, containing the greater part of the Gurdáspur, Amritsar, Lahore, Montgomery, and Múltán districts, is called the Bárí Doáb. And Rechna Doáb is the tract between the Rávi and the Chináb, embracing the Sialkót and Gujránwála districts with the trans-Rávi portions of the districts of the Bárí Doáb. Chaj or Jach is the doáb between the Chináb and the Jhelum (Gujrát and Sháhpur districts and part of Jhang), and Sind Ságar (Indus Sea) is the name of the large doáb between the Jhelum and the Indus, including the Ráwal Pindí, Jhelum and Muzaffargarh districts, with parts of Sháhpur, Bannú, Déra Ismail Khán. The higher and drier parts of the doábs are called "bár." They are waste but not barren, scantily covered with low shrubs, capable, when watered of being well cultivated. The bár is the great camel grazing land. Large areas of the Muzaffargarh and Múltán districts are "thal," barren tracts of shifting sand. The middle part of the Bárí Doáb, in the Amritsar district, bears the distinctive name of Mánjha (middle) as the centre and headquarters of the Sikh nation, containing their two sacred tanks of Amritsar and Táran Táran, and a dense and fine population of Játs, Rájputs, and Gújars. The Malwa Sikhs, again, are those of the cis-Sutlej country.

Besides the great rivers, the distinguishing feature of the Punjab, there are some others deserving of notice. The Cabul river joins the Indus above Attock after receiving, about 12 miles north-east of Peshawar, the Swát river, which enters British territory at Abazai. The Kunhár, from the Kashmir hills, flows down the Kaghan valley (the upper part of the Hazára district) and joins the Jhelum at Muzaffarábád. The Siran and the Dór in Hazára unite and near Torbéla run into the Indus, which below Attock also receives the Harro from Hazára. The Kurram, rising in Afghanistan and flowing through the Bannú district, falls into the Indus near Isa Khíl, and the Sohán, from the lower hills of Kashmir, joins it above Kálábágh. The Bimbar, from the Kashmir Hills, below the Pír Panjál Pass, runs into the Chináb near Wazírábád. The Dég, from the Jammú Hills, joins the Rávi near Gugaira. South of the Sutlej the Markanda, the Saraswati, the Gaggar, and the Chitang, from the lower hills of Sirmur, which are violent torrents during the rainy season but nearly dry at other times, flow towards the Indus, but never reach it, being lost in the sands of the Bikanír and Baháwalpur desert.

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[1] The name first given by the Aryans after their immigration was *Sapta Sindhú*, "[land of] seven rivers," these being the five rivers of the modern Punjab with the addition of the Indus on the one side and of the Saraswati on the other. In the Vedic poems they are severally addressed as *Sindhú*, the Indus (*the* river); *Vitasta*, the Jhelum; *Asikni*, Chináb; *Airavati* and *Marudvridha*, Rávi; *Vipása*, Biás; *Sutudri*, Sutlej; and *Saraswati*, Sarsuti. It may be remarked that *Sindhú* itself means "river," and *Saraswati*, "having running water," and that each is applied as an epithet to other great rivers. The Saraswati, alone of the seven, is not now great. It is represented by a channel or channels, occupying the position assigned to the ancient much-praised stream, but now nearly dry for a great part of the year; for, unlike the others, it comes only from the lower hills, not from perpetual snows. The large body of water which it carries for a time in the rainy season never reaches the Indus, towards which it directs its course, but is lost in the desert lands of northern Rájputána and Baháwalpur. In writings of the 6th or 7th century B.C. the Saraswati is said to disappear and pass underground to join the Ganges and Jumna at Prág (Allahábád), which triple confluence received therefore the name *Tribéni*. The Saraswati dropped out of the enumeration of the rivers of the early Aryan settlement; and, when in later days the Indus, which receives all the others, ceased to be reckoned along with them, the country took its name *Panchanada*, and afterwards, in Persian form, *Panjab*.

Physical features.

The area of the Punjab proper, the triangular tract of country between the Indus and the Sutlej, is about 62,000 square miles; the whole area of the British province is 106,632, and of the feudatory states 35,817, making a total of 142,449 square miles. This area is for the most part a great alluvial plain. The north-east side of the province is a belt of hill-country, the outer margin of the Himálayas, on which are the valuable hill-stations of Murree, Dalhousie, Dharmsala, Kassauli, Sabáthú, Dagshai, and Simla. In the Delhi and Gurgáon districts is the north end of the Aravali range. A part of the extremity of these hills became well known at the time of the siege of Delhi in 1857 under the name of the "Ridge," which was held by the British troops. Between the Jhelum and the Indus is the hilly region known by the general name of the Salt Range, containing the inexhaustible stores of rock-salt which have been worked for many centuries. The salt is dug from enormous caverns entered by narrow tunnels. The salt-hills are continued west of the Indus, where the salt is dug from open quarries. A double range of low hills runs south-westward from the Indus near the mouth of the Kurram. The part near the south end called Sheikh Budín (Sheikh Shaháb-uddín) is a useful sanatorium, though of no great height or great extent. The western boundary of the province is the fine range of the Sulimán Mountains, dividing the Punjab from Afghanistan. The British possessions do not extend beyond the base of the hills, which are occupied by very independent tribes. It is only within a short time past that any exact knowledge has been obtained of the interior of these hills, beyond the parts visited in the course of the numerous frontier expeditions for the punishment of inroads into British territory. A survey was made for the first time in 1883 of the fine mountain mass containing the snowy peak Takht-i-Sulimán (Solomon's throne) and its surroundings.

Mineral products.

Besides the rock-salt the mineral products of the Punjab are not many. Limestone, good for building, is obtained at Chaniót on the Chináb and at a few other places. There are extensive alum-beds at Kálábágh on the Indus. A small quantity of coal is found in the Salt Range in disconnected beds, mostly at a considerable height above the plain, and not very accessible, the beds thinning out westwards from the Jhelum to the Indus. Petroleum is found in small quantities at a number of places in the Ráwal Pindí, Kohát, and Bannú districts, being gathered from the surface of pools or collected in shallow pits. It is used for making gas for the station of Ráwal Pindí. In almost all parts of the Punjab there is "kankar," rough nodular limestone, commonly found in thick beds, a few feet below the surface of the ground, used for road metalling and burned for lime.

As in other parts of India, there are commonly two harvests in the year. The spring crops are wheat, barley, gram, various vegetables, oil-seeds, tobacco, and a little opium; the autumn crops, rice, millets, maize, pulses, cotton, indigo, and sugar-cane. Tea is now extensively cultivated in the Kángra district. Flax has been produced successfully, but the cultivation has not been extended. Hops have been grown experimentally, for the Murree brewery, on neighbouring hills; the cultivation in Kashmir has been more encouraging. Potatoes are grown extensively on cleared areas on the hills. The Punjab produces freely many of the Indian fruits, but none of special excellence except the peaches of Peshawar. Grapes are grown in many of the Himálayan valleys, where the rain is not excessive, also at Peshawar; but they are inferior to those brought from Cabul.

The forest area of the Punjab consists of 4694 square miles reserved, under the management of the forest department, and 13,000 square miles under the district officers. The demarcation of protected and reserved forests is being extended. The wasteful destruction of trees is checked in the hill forests rented from native states by the British Government. The principal reserved forests are the deodár (*Cedrus Deodara*) and chíl (*Pinus longifolia*) tracts in the hills, the plantations of shísham (*Dalbergia Sissu*) and sál (*Shorea robusta*) in the plains, and the fuel rakhs or preserves (*Acacia*, *Prosopis*, &c.). The average nett surplus of forest income for the ten years 1875-85 was Rs.161,800.

Climate.

The rainfall in the Punjab varies greatly in different parts and from year to year. The maximum (126·55 inches in the year) is at Dharmsala, on the face of the high north wall of the Kángra valley; the minimum (5·96) is in the Muzaffargarh district. In a country so open and so far from the sea there are extremes of heat and cold. A temperature of 128° Fahr. in the shade has been recorded, and a winter temperature of 25° at sunrise is not infrequent. At Lahore, on the grass, the thermometer has been known to fall to 17°.

Cultivation.

Of the whole area of British Punjab (106,632 square miles) 36,755 square miles are cultivated and 64,263 uncultivated, the remaining 5614 being reckoned uncultivable. An area of 75,434 square miles (48,377,760 acres) is held by 33,020 village communities, formed of small proprietors having joint interests and joint responsibility for the land revenue, but cultivating each his own land. Among the Patháns of the trans-Indus districts the tribe and not the village community is in some cases the jointly responsible body. There are 3406 estates of larger proprietors, with a total area of 4,531,415 acres; and there are 10,216,872 acres of waste land, the property of the Government, of which less than one-half is capable of cultivation. The total area under wheat is seven millions of acres. There is an increasing export of wheat, gram, rice, and oil-seeds.

Irrigation.

Irrigation for large areas is from canals and from reservoirs, and for smaller areas from wells. The canals are of two kinds, those carrying a permanent stream throughout the year, and those which fill only on the periodical rising of the rivers, the latter commonly known as "inundation canals." There are only a few parts of the country presenting facilities for forming reservoirs, by closing the narrow outlets of small valleys and storing the accumulated rainfall. The old canals made by the Mohammedan rulers, of which the principal are Firóz's Canal from the Jumna and the Hasli Canal from the Rávi, have been improved or reconstructed by the British Government. The principal new canals are the Sirhind, drawn from the Sutlej near Rúpar, and irrigating parts of the native states of Patiála and Nabha as well as British territory; the Bárí Doáb Canal from the Rávi; the Swát Canal, drawn from the Swát river at Abazai; and inundation canals in the districts of Firózpur, Sháhpur, Múltán, and the Déraját, from the Sutlej, the Jhelum, the Chináb, and the Indus. Water was admitted into the Sirhind Canal on 1st July 1882. Its branches are still under construction.

The population of the British province in 1881 numbered 18,850,437, of the feudatory states 3,861,683; total, 22,712,120. This total number consists of :—

	British Territory.	Native States	Total.
Mohammedans	10,525,150	1,137,284	11,662,434
Hindus	7,130,528	2,121,767	9,252,295
Sikhs	1,121,004	595,110	1,716,114
Jains	35,826	6,852	42,678
Christians	33,420	279	33,699
Buddhists	2,864	387	3,251
Parsis	462	[illegible]	465
Others	1,183	1	1,184
	18,850,437	3,861,683	22,712,120
The Christians are thus distributed :—			
European, British subjects	10,761	159	10,920
Other European and American	17,015	8	17,023
Eurasian	1,821	23	1,844
Native	3,823	89	3,912
	33,420	279	33,699

The Punjab has one-fourth of the Mohammedan inhabitants of India, one-twentieth of the Hindus, and eleven-twelfths of the Sikhs. Of the Hindus the classes most largely represented are Játs (4,432,720) and Rájputs (1,677,569). There are in the Punjab certain criminal tribes, always under surveillance, of which the population is at present 13,957.

The tribes of the western hill frontier are Mohammedans and Pathâns in the north and Baluchis in the south (with one Pathán tribe among them). There are sixteen principal Pathán tribes, of which the most important are the Momand, Afrídi, and Orakzai on the Peshawar border, and the Wazírí adjoining Bannú and the Déraját; and seven Baluch tribes on the Dera Ghází Khán border, the chief of which are the Bózdár, Marrí, and Bugtí.

Administrative divisions. The British province is divided for administrative purposes into thirty-one districts, each under a deputy commissioner, grouped in six divisions, each under a commissioner.

Division.	District.	Area.	Population.	Division.	District.	Area.	Population.
		sq.m.				sq. m.	
Delhi	Delhi	1,276	643,515	Ráwal Pindí	Ráwal Pindí	4,861	820,512
	Gurgáon	1,938	641,848		Jhelum	3,910	589,373
	Rohtak	1,811	553,609		Sháhpur	4,691	421,508
	Hissár[1]	5,042	630,820		Gujrát	1,973	689,115
	Karnal	2,396	622,621		Gujránwála	2,587	616,892
	Ambala	2,570	1,067,263		Sialkót	1,958	1,012,148
	Simla	18	42,945	Déraját	Muzaffargarh	3,139	338,605
Jalandar	Ludiána	1,375	618,835		Dera Ghází Khán	4,517	363,346
	Firózpur[1]	4,254	777,156		Déra Ismail Khán	9,296	441,649
	Jalandar	1,322	789,555		Bannú	3,868	332,577
	Hushiárpur	2,180	901,381	Peshawar	Peshawar	2,504	592,674
	Kángra	9,069	730,845		Hazára	3,039	407,075
Lahore	Gurdáspur	1,822	823,695		Kohát	2,838	181,540
	Amritsar	1,574	893,266		Khyber Pass	..	8,173
	Lahore	3,648	924,106			106,632	18,850,437
	Jhang	5,702	395,296				
	Montgomery	5,574	426,529				
	Múltán	5,880	551,964				

Native states. The native states in feudal subordination to the British Government and in connexion with the Punjab are thirty-six in number, thirty-one Hindu and five Mohammedan. Of these many are very insignificant, the rulers being petty Rájput chiefs of old family and small means. The highest chief in rank and importance is the mahárájá of Kashmir and Jammú, a Dógra Rájput (see vol. xiv. p. 12). The next is the mahárájá of PATIÁLA (*q.v.*). The Mohammedan state of Baháwalpur on the Sutlej is next, with a population under half a million and a revenue of about 20 lakhs. Next in order are the rájás of Jínd and NÁBHA (*q.v.*), cis-Sutlej states. They are Játs, like the mahárájá of Patiála, of the Phúlkian clan (named from Phúl, the founder of these three houses, in the middle of last century). Next comes the rájá of KAPÚRTHALA (*q.v.*) in the fertile Jalandar Doáb, of the Ahlúwália family. Of the rest the most important in point of revenue are the states of Mandi in the hill country west of the Sutlej, and Sarmúr in the hills east of that river, under Rájput rulers, and Farídkót and Malér Kotla in the plains, cis-Sutlej, the former Hindu, the latter Mohammedan.

Of the 22,700,000 people in the Punjab, in British territory and the native states, about 14,000,000 speak the provincial language, Panjábi, which varies in character in different parts of the province. About 4,250,000 speak HINDUSTANI (*q.v.*), this number including those whose ordinary vernacular is Hindi, but who understand and are gradually adopting the more comprehensive Hindustani. These two languages are the most generally used throughout the province, but not equally in all parts. The other languages in use are more or less local. Játki, spoken by about 1,500,000, belongs chiefly to the south-east districts. The language of the eastern hill country is a form of Hindi, spoken by about 1,500,000. Dógri is the language of the northern hills, and Kashmírí of a few large bodies of Kashmir workpeople at Ludiána, Núrpúr, Amritsar, and some other places. The language of the Patháns of the northern part of the trans-Indus frontier is Pushtu (see vol. i. p. 238). Baluchi is spoken on the same frontier, farther south, adjacent to Baluchistan, Sindí at the extreme south, next to Sind, and Bágrí, a variety of Hindi, in the cis-Sutlej district bordering on Bikanír. There are also some minor local dialects, and a few people speaking languages not of the Punjab,—Persian, Bengali, Mahrathi, Turki, Tibetan, Nipalese. Hindustani is the language of the law courts and of all ordinary official and other communications with chiefs and people.

Many books, periodicals, and newspapers are published in some of these spoken languages, the greatest number in Hindustani, others in Hindi, Panjábi, Pushtu, and Persian, also some in Sanskrit and classical Arabic, which are not spoken. During the last quarter of which the details are published 360 books were registered, 161 Hindustani, 135 Hindi, 36 English, 16 Arabic, the rest bilingual. There are 7 English and 28 vernacular periodicals, monthly and fortnightly, and 28 vernacular newspapers are published in the British province and 3 in native states.

Education. The number of children under instruction in schools in the Punjab is 184,000 (9000 girls). There are 1559 primary schools for boys, 206 middle schools, 25 high schools, and 3 industrial schools, also a training college and 4 normal schools. For girls there are 321 primary schools, 4 middle, 1 high, 1 industrial, and 4 normal schools. The higher and special educational institutions are the Lahore Government College, the Cambridge University Mission College at Delhi, the Oriental College of the Punjab University, the Medical School, and the Mayo School of Art, the last three at Lahore. A ward's school, for the orphans of Sikh chiefs, established at Ambala in 1867, is about to be extended to receive other upper-class students. The Government department of public instruction was established in 1856. In 1868 the first proposal of a university for the Punjab was made, chiefly at the instance of the literary society called the Anjuman-i-Punjab, with the support of the native chiefs. The institution took the form in 1870 of the Punjab University College, and it was raised in November 1882 to the status of a university. There are several other literary societies in the Punjab besides the Anjuman at Lahore.

The police force numbers 19,827 men, with 580 officers, 68 of whom are Europeans. There is in addition a special frontier police.

Army. The military force in occupation of the Punjab consists of (1) British troops (of which it has a larger proportion than any other province); (2) native troops of the regular Indian army; (3) the Punjab frontier force, a local body of cavalry, infantry, and artillery, ordinarily employed only on the military duties of the western frontier; and (4) the frontier militia, composed of men of the border tribes, both within and without British territory, employed as auxiliary to the regular troops, to garrison certain of the smaller fortified posts along the frontier. There is also a volunteer rifle corps of Europeans at the large stations and on the lines of railway. The total military force, including police, of the native states in connexion with the Punjab is 21,500.

Most of the native manufactures of the Punjab are those common to other parts of India, such as the ordinary cotton fabrics, plain woollen blankets, unglazed pottery, ropes and cord, grass matting, paper, leather-work, brass vessels, simple agricultural implements, and the tools used in trades.[2] Other manufactures, not so general, yet not peculiar to the Punjab, are woollen fabrics, carpets and shawls, silk cloths and embroidery, jewellery and ornamental metal-work, wood and ivory carving, turned and lacquered woodwork, glazed pottery, arms and armour, and musical instruments. But some of these classes of manufacture are represented by work of special kinds or special excellence in particular parts of the Punjab, notably the silk fabrics of Múltán and of Baháwalpur, the capital of the native state; the carpets of Lahore, Peshawar, &c.; the "káshi" (see KASHI) or glazed tile-work (an ancient art still practised in a few places); "kóft-kári," inlaid metal-work (gold wire on steel), chiefly made at Gujrát and Sialkót; shawls and other fine woollen fabrics, made by Kashmírí workpeople at Ludiána and Núrpúr, as well as in Kashmir; "lungis," waist and turban scarfs, made at Peshawar, Bannú, &c.; silk embroidery for shawls, scarfs, and turbans, at Delhi, Lahore, and Múltán; embroidery on cloth for elephant-trappings, bed and table covers, &c., at Lahore and Múltán; enamelled ornaments, in Kángra and Múltán; quill embroidery on leather, in Kángra and Simla; lacquered woodwork, Pák Pattan. At Kohat there is a special manufactory of gun-barrels made of twisted iron straps. There is much excellent carved wood-work on houses and on boats. Among the Punjab arts should be mentioned the artificial nose-making practised by a special class of surgeons at Kángra. Injury has been done to some of the native arts of the Punjab, as of other parts of India, by unwise copying of European patterns. The Lahore School of Art is expected to correct this and promote the study and execution of native forms and designs. The Lahore Museum contains illustrations of the arts and manufactures, as well as raw products, of the Punjab, and a large collection of the sculptures, mostly Buddhist, and many of Greek workmanship, found in the north-west of the province, chiefly trans-Indus. Upwards of 200 Græco-Buddhist sculptures were excavated in Yusufzai in 1883 and 1884. The number of visitors to the Lahore Museum during the year 1884 was upwards of 251,000. The value of the imports into the Punjab during the same year was £981,167, and of the exports £1,083,919. The chief lines of export and import traffic, apart from the trade with the immediately adjoining countries, are on the one side the railway to Delhi and the North-West Provinces, and on the other the Indus River and Indus Valley Railway to Sind and the sea. The Punjab exports wheat, tea, rock-salt, sugar, and other products, and articles of local manufacture. English piece-goods, cutlery and other metal-work, fruits (especially from Afghanistan and Kashmir), rice, drugs, and spices are among the chief imports. The most important trade-centres are Delhi, Peshawar, Múltán, and Amritsar. There is a large amount of both export and import trade with the countries on the north-west frontier. Efforts were made for some time by the Government to promote trade between the Punjab and Kashgar, but without much result. The endeavour is now being carried on by private enterprise. There are great difficulties in the hill country between, where the goods have to be carried on mules and ponies.

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[1] The figures for the Hissár and Firózpur districts are only approximate, but the sum of the two together is correct. In the redistribution which is now (1885) being carried out the former district of Sirsa has been abolished; the eastern part is added to Hissár and the western to Firózpur. In the above statement half of the area and population has been assigned to each.

[2] The India Museum at South Kensington has an excellent series of representations of native artisans and their mode of working, from the pencil of the present director of the Lahore School of Art, Mr J. L. Kipling, formerly of the School of Art at Bombay.

The revenue of the British province is £3,232,349. Of this sum £1,605,243 (consisting of land revenue £1,220,880, and minor items £384,363) goes to the imperial treasury; £1,410,379 is provincial, raised and expended in the province in addition to an imperial grant; and £216,727 is derived from local rates and miscellaneous income, and is locally expended.

The total length of railways in the province now (1885) open for traffic is 1205 miles. The main central line from Delhi to Peshawar is 645 miles in length, of which 125 are east of the Jumna in the North-West Provinces, and 520 in the Punjab. Other lines now open are—Lahore to Múltán 208 miles, and 10 to Shir-Sháh, the port of Múltán on the Chináb, Múltán to Baháwalpur 63, Delhi to Riwari 52, Riwari to Hissár 89, Hissár to Firózpur 130, Amritsar to Pathankót 67, Wazírábád to Sialkót 27, Lála Músa (near Gujrát) to Pind Dádan Khán and the Salt Mines 62, Ráwal Pindí to Khushhálgarh 77. Other lines are under construction. There are 1467 miles of metalled road, 23,156 unmetalled, and 2676 miles of navigable river. In this country of great rivers, crossing lines of road, the value of boat-bridges is very great. During the five years following the construction of the bridge of boats over the Indus at Déra Ismail Khán the annual camel traffic between Afghanistan and the Punjab by the Gumal Pass, through the hills on the west, increased from 50,000 to 80,000, with corresponding increase of the "tirní" or grazing-tax paid by the Povinda camel-drivers. This trade-route and this class of carriers are of some importance. For a long time to come they are not likely to make way for other means of transport by road or railroad, though the trade will grow. The Povinda are a travelling tribe belonging to the Ghilzai country in Afghanistan. They make annual trade journeys into India by this route, which is an easy and good one, capable of being turned to more account. The Sikhs imposed heavy duties on the goods they brought. The remission of these duties by the British Government greatly encouraged the trade, which is now further helped by the boat-bridge across the Indus. There are many passes through the hills between British India and Afghanistan, of which the principal are—the Khyber in the north, close to Peshawar, the nearest way to Cabul; the Bolan in the south, approached from Shikárpur and Jacobábád in Sind, the way to Quetta and Candahar; and between them three others looking towards Ghazní, namely, Gumal Pass, the valley of the united Gumal and Zhob rivers opposite Déra Ismail Khán, and the Kurram and Dawar routes opposite Bannú.

While the amount of railway and other traffic has been steadily increasing with the facilities afforded, the demands on the post-office and telegraph have likewise been growing rapidly. The annual number of letters and post-cards, now about twenty millions, has nearly doubled in ten years. The telegraph has had a fluctuating increase in the number of messages, which during the year 1884 was upwards of 142,000.

History.—For the early history of the Punjab from the Aryan immigration to the rise of the Mogul dynasty the reader may consult the article INDIA (vol. xii. p. 779 *sq.*). It deserves, however, to be specially noted here with reference to that period that from the time of Alexander onwards Greek settlers remained in the Punjab, and that Greek artists gave their services for Buddhist work and introduced features of their own architecture in Indian as well as Grecian buildings. Besides the bases and capitals of large Greek columns at Sháh-deri (Taxila) and elsewhere, numerous sculptures of Greek workmanship have been found at various places. These are single statues (probably portraits), also figures of Buddha, and representations of scenes in his legendary history, and other subjects. They are obtained from ruins of monasteries and other buildings, from mounds, and the remains of villages or monumental topes. Of Buddhist buildings now remaining the most conspicuous as well as distinctive in character are the topes (*sthupa*), in shape a plain hemisphere, raised on a platform of two or more stages. One of the largest of these is at Manikyála, 14 miles east of Ráwal Pindí. These Buddhist buildings and sculptures are all probably the work of the two centuries before and the three or four after the beginning of the Christian era. The character of the sculptures is now well known from the specimens in the India Museum, South Kensington, and both originals and casts of others in the Lahore Museum. Unfortunately they have no names or inscriptions, which give so much value to the sculptures of the Bharhut tope.

Tribes and clans.

The several bodies of settlers in the Punjab from the earliest times have formed groups of families or clans (not identical with Indian castes, but in many cases joining them), which have generally preserved distinct characteristics and followed certain classes of occupation in particular parts of the country. Some of the existing tribes in the Punjab are believed to be traceable to the early Aryan settlers, as the Bhatti tribe, whose special region is Bhattian, south of the Sutlej, and who have also in the village of Pindí Bhattián a record of their early occupation of a tract of country on the left bank of the Chináb, west of Lahore. The Dógra, another Aryan clan, belong to a tract of the lower hills between the Chináb and the Rávi. Others similarly have their special ancient localities. To the earlier settlers—the dark race (Dasyú) whom the Aryans found in the country, and who are commonly spoken of as aborigines—belonged, as is supposed, the old tribe called Takka, whose name is found in Taksha-sila or Taxila. And from the later foreigners again, the Indo-Scythians, are probably descended the great Ját tribe of cultivators, also the Gújars, a pastoral people and traders, and others. Some of the tribes or sections of them, having received the Hindu faith and the system of caste, have afterwards given large bodies of converts to Mohammedanism, so that there are now Hindus and Mohammedans of the same tribe continuing to bear the same name. There are Mohammedan Rájputs, and there are both Hindu and Mohammedan Játs, and so with others.

It was during the events which brought Bábar, the first of the Mogul dynasty, to the throne that the sect of the Sikhs arose. Nának, the founder, derived his first ideas of the movement he was to lead from Kabír of Banáras, a Mohammedan by birth (it is believed), who joined himself to a sect of Hindus and strove to give to their religion a new form and spirit free from idolatry. And the Sikh religion of the Punjab, founded on this model, was a reformed and monotheistic Hinduism. Nának was born in 1469 at Talwandi on the Rávi, and lived to the age of seventy, leaving a large number of followers at his death. The name Sikh means "disciple," and the strength of the movement lay in the relation of the disciple to the "gurú" or spiritual guide. In the time of Bábar's successor, Humáyún (who was only in the Punjab during the temporary success of his rival, Shír Khán Súr), the Sikhs were under the direction of the second of their gurús, Angad (1539-1552), and of the third, Amar Dás (1552-1574). During the long reign of Akbar (1556-1605) the Sikhs increased in number and power under the mild and liberal rule of a Mohammedan emperor who was more than tolerant in all matters of religion. He himself sought diligently for knowledge of other faiths, and Amar Dás, the Sikh gurú, was one of those who had conferences with him. Ram Dás, son-in-law of Amar Dás, succeeded him in 1574. He received from Akbar a gift of a piece of land, on which he dug the large square tank afterwards called Amritsar ("the pool of immortality"). In the last year of this gurú's life the Punjab was visited, on Akbar's invitation, by several Jesuit fathers from Goa, who were received with great favour. To them the emperor gave a site for a church in the city of Lahore, and the church was built at his expense. In 1581 Ram Dás was succeeded by his son Arjun Mal, a man of note. In the middle of his father's tank at Amritsar he built the temple, which was called at first Hari Mandar, and afterwards Darbár Sáhib, the name by which it is now known. The town which began to rise round the tank and temple was made the headquarters of the Sikhs. Arjun gave further coherence to the body of his followers by levying a regular tax in place of the free and varied offerings they used to give; and he was the compiler of the sacred book called the *Adi Granth*, the materials for which he had received unarranged from his father. Akbar lived much in the Punjab. In 1586 he directed a campaign against the Afghans of the Peshawar valley, which was attended with no important results except the death of his able minister Bír Bal. In the next year he conquered Kashmir. On his visit to this new acquisition he was accompanied by one of the Portuguese Jesuits, Jerome Xavier (nephew of the celebrated Francis), who was a special friend of the emperor and was with him at the time of his death at Agra in 1605. Arjun's power and prosperity lasted only during Akbar's lifetime. Jahangír was equally favourable to the Christian missionaries; but the Sikh gurú incurred his displeasure. Believed to be a partisan of the emperor's rebellious son Khusrú, Arjun was imprisoned in 1606 and died soon after. His successor, Har Govind, was only twelve years of age at the time of Arjun's death, and as he grew up his relation to the Sikhs became that of commander more than gurú. The promulgation of the *Granth* for instruction of the people had made a way for this change in the character of the leadership. The work of the teacher was now in great measure transferred to the guardians of the sacred volume, who read it in the ears of the people. The gurú thenceforth was the organizing head more than the religious guide. As a young man Har Govind accompanied the emperor to Kashmir. Jahangír, on his way back from this favourite summer resort, died at Rájaori in 1627, and was buried at Sháh-dera on the Rávi, opposite Lahore. His widow, Núr Jahán, erected a beautiful monument over him, and was herself buried at the same place.

The reign of Sháh Jahán (1627-1658) added much to the prosperity of the Punjab. The emperor's large views found a fitting agent in Ali Mardán Khán, his minister and director of works. Under his orders the canal from the Rávi near the foot of the hills to Lahore was made, and the Jumna Canal, which had been constructed in the 14th century by Firóz Sháh, was restored and improved. Ali Mardán Khán also built the magnificent "saráis" or rest-houses for travellers on the high road to Kashmir, and other works of utility in the Punjab. In the contests between the two sons of Sháh Jahán the Punjab favoured the elder, Dara Shikó, whose intelligent interest in the welfare of the country, joined to literary tastes and liberal views, commended him to all classes of the people. His name is preserved in the town of Shikó-púra, 18 miles west of Lahore, Dara-nagar, and other places. The present military station of Lahore bears the name of Dara's religious instructor, Mián Mír, near whose tomb, erected by his royal pupil, the British cantonment is built.

Har Govind, the sixth Sikh gurú, died in 1645. Har Rái, who succeeded him, gave his support to Dara Shikó. Dara was not successful in maintaining his rights against his younger brother Alamgír (called Aurangzíb), who succeeded his father in 1658. Bernier, who was visiting India at this time, was a companion of the elder brother when in misfortune and of the younger when in power. Like his three predecessors, Aurangzíb was fond of visiting Kashmir, and his journey through the Punjab on one of these occasions (1663-64) furnishes one of the most lively pictures of Bernier's Indian experiences. Har Rái died in 1661, and his successor, Har Kishan, a boy, held the nominal leadership of the Sikhs only three years, being followed in 1664 by Tegh Bahádur, a son of Har Govind. When, on his return to the Punjab from a visit to Bengal, he was thought to be exercising authority inconsistent with loyalty to the emperor, he was put to death by Aurangzíb in 1675. This roused the Sikhs to greater zeal in the adoption of a military constitution. The next gurú, Govind Rái, son of Tegh Bahádur, after passing some years in retirement and study, came forth a vigorous and enthusiastic leader, with high aims. He set himself to the task of organizing the Sikhs of the Punjab, now becoming formidable from their number, their physique, and their warlike propensities. The first adherents of Nának, the founder of the sect, had been mostly Játs and Khattrís. Many were men of great stature and powerful frame. As Sikhs they acquired a distinctive appearance by giving up the Hindu practice of shaving the head and face. They were forbidden the use of tobacco; and their discipline in other things prepared them for being indeed the soldiers they looked. Govind Rái adopted the designation "Singh" (lion), and this became the distinctive addition to the names of all Sikhs. He called the whole body the "khalsa" or free, and he devised a rite of initiation called the "pahal." He compiled a supplement to the *Granth*, containing instruction suited to the altered condition of the Sikh people. After the death of Aurangzíb in 1707 he accepted the invitation of Bahádur Sháh to join him in a campaign against the Mahrattás. At Nadér, on the Godávari, he was murdered in 1708. His principal associate, Banda, led the Sikhs back to the Punjab and turned his arms against the Government. After a long series of fights with the Mogul's troops, during the reigns of Bahádur Sháh and Farrukh Siyar, Banda was at length taken in 1716 and put to death.

Persian and Afghan invasion.

Mohammed Sháh was on the throne of Delhi, much occupied in contests with the Mahrattás, when Nádir Sháh invaded India. Nádir's march through the Punjab in the beginning of 1739 met with no great opposition; but the Sikhs kept up a system of desultory plunder both of the invaders and of the people fleeing from them. Lahore submitted and was spared; and it escaped again, on Nádir's return, after the defeat of Mohammed Sháh at Karnál and the massacre at Delhi, by having a large sum of money ready to meet the expected demand. The Punjab offered no more effective resistance to the invasion in 1747 of Ahmad Sháh Abdáli, who kept possession of Afghanistan after Nádir's death. He began by claiming the revenues of the parts of the Punjab and Sind which had been ceded to Nadir. On his third invasion (1752, he obtained possession of Lahore and Múltán. The king of Delhi was now also an Ahmad Sháh, and the invader was, for distinction, called in India Ahmad Khán Afghán. His son Timúr, whom he made governor of Lahore, was driven out by the Mahrattás., Ahmad found frequent visits to the Punjab necessary, and only after the total defeat of the Mahrattás at Panipat in 1761 did he retire finally to Cabul.

For a time the Sikhs seemed to have the prospect of holding the Punjab for themselves. Their number and power had greatly increased. They had grouped themselves in associations of kindred and neighbourhood called "misls," with distinctive names. Powerful members of certain of these clans, representing the aristocracy of the Sikh families, acquired the chiefship of large tracts of country on both sides of the Sutlej, some of which became nearly independent states. Then there were certain members of the Sikh confederation, not enrolling themselves in any clan nor owning any master, who assumed the rôle of religious enthusiasts and warriors, and the name "Akáli" or immortal. They were the gházis of Sikhism. They dressed in blue and wore a high-pointed turban on which they carried several chakras of different sizes, their own special weapon. The chakr or chakra is a thin knife-edged ring of flat steel, a severe missile in skilled hands, but not much used. The Sikhs south of the Sutlej enlarged their possessions and made marauding excursions across the Jumna and the Ganges even as far as to Rohilkand. The capital was held by three leading Sikh chiefs, when, in 1797 and the following year, Zamán Sháh, grandson of Ahmad, brought an army with the view of recovering the Punjab, but was recalled both times by troubles at home. He secured Lahore without opposition, and on leaving in 1798 he made it over to a young Sikh who had attracted his attention and done him good service. This was Ranjít Singh, son of Maha Singh, a Ját Sikh who had risen to considerable power, and who died in 1792. The young ruler of Lahore was soon to make himself master of the whole Punjab, while heavy misfortune was awaiting Zamán Sháh himself, who was to find shelter in the Punjab. The dethroned and blinded king was met in 1808 at Ráwal Pindí by Mountstuart Elphinstone when returning from his mission to Sháh Shujá at Peshawar. When Ranjít Singh was beginning his career at Lahore the English adventurer George Thomas was trying, with the army he had raised, to carve out a little principality for himself in the Sikh states south of the Sutlej. Ranjít was a man of strong will and immense energy, of no education but of great acuteness in acquiring the knowledge that would be of use to him. He soon began to bring all the separate bodies of Sikhs under his control, and to acquire authority over others besides the Sikhs. When he endeavoured to include the Sikh states south of the Sutlej within his jurisdiction, the heads of these states—chiefs of Sirhind and Malwa, as they were called—sought and obtained in 1808 the protection of the British, whose territories had now extended to their neighbourhood. The English were at this time desirous of alliance with Lahore as well as with Cabul, for protection against supposed French designs on India. A British envoy, Mr Charles Metcalfe, was received by Ranjít at Kasúr in 1809 and the alliance was formed. Ranjít steadily strengthened himself and extended his dominions. In 1809 he obtained possession of Kángra, which the Nepalese were besieging. In 1813 he acquired the fort of Attock on the other side of the Punjab; and the same year he obtained from Sháh Shujá, now in his turn a refugee in Lahore, what he coveted as much as territory, the celebrated Koh-i-núr diamond, which had been carried off by Nádir Sháh from Delhi. In 1818, after some failures in previous years, he captured Múltán. Kashmir, which had successfully opposed him several times, was annexed the following year, and likewise the southern part of the country between the Indus and the hills. The Peshawar valley he succeeded in adding four years later, but he found it best to leave an Afghan governor in charge of that troublesome district. These trans-Indus and other outlying tracts were left very much to themselves, and only received a military visit when revenue was wanted. Peshawar was never really ruled till General Avitabile was sent there in later years. When he was gradually raising his large and powerful army Ranjít received into his service certain French and other officers, who drilled his troops and greatly improved his artillery. He valued these European officers highly, and exerted himself much to retain them. One of them, M. Allard, used to say that, if it was sometimes difficult to get into Ranjít's service, it was more difficult to get out of it. Whilst he relied on these foreigners for military and sometimes also for administrative services, he drew around him a body of native ministers of great ability, of whom the brothers Guláb Singh and Dhián Singh of Jammú were the most influential. (They had another brother, Suchét Singh, less prominent and less at court.) Ranjít maintained friendly relations with the English Government till his death. This was of much importance when, immediately after his death in 1839, the British were putting Sháh Shujá back on the throne of Cabul. Ranjít was succeeded by his eldest son Kharrak Singh. He left two reputed sons, Shír Singh and Dhalíp Singh, and two adopted sons, Kashmira Singh and Peshaura Singh, named from expeditions on which Ranjít was engaged at the time they were taken into his family. When Kharrak Singh made Cheit Singh his chief minister in place of the Jammú brothers, Dhián Singh killed the new minister. And now for a time the history of the Punjab became a history of intrigues and deeds of violence, and of contests for power which, when gained, could not be kept. Kharrak Singh's successor, Nau Nihál Singh, was killed by the fall of a beam from the Roshnai gateway of the Huzuri Bagh at Lahore as he was returning from the deceased king's funeral. Shír Singh succeeded, a man addicted, like Ranjít, to intemperance, and he was soon put out of the way by Ajít Singh Sindhanwala. His son Partâb Singh was murdered by Lena Singh Majithia. Ranjít's adopted sons, Peshaura and Kashmara Singh, were also killed. Then came the turn of the ex-minister Dhián Singh, who was slain by the same hand that had put Shír Singh to death, and which now placed the young Dhalíp Singh on the throne. Other assassinations accompanied these chief ones. The leading Sindhanwalas were now all murdered, and with the accession of Dhalíp Singh the friends of his mother, the rání, came into power, some of the wise old servants of Ranjít also continuing to hold important offices.

First Sikh war. Ranjít had left an army of 92,000 infantry, 31,800 cavalry, with 171 garrison guns and 384 field-pieces. It was a force which could not be held in the feebler grasp of his successors. When one after another of those in nominal power had been assassinated and the treasury plundered, the army, unpaid and unmanageable, demanded to be led into British territory, and had their way. They crossed the Sutlej in December 1845. The battles of Mudkí, Firóz-shahr, Baddúwál, and Aliwál were followed by the rout of the Sikh army at Sobráon on 10th February 1846, when they were driven back into the Sutlej with heavy loss, and the British army advanced to Lahore. Of the Sikh guns 256 fell into the hands of the British in these actions on the Sutlej. A treaty was made at Lahore on 9th March with the Sikh darbár, the chiefs and ministry who were to hold the government on behalf of the young mahárájá, Dhalíp Singh. By this treaty the Jalandar Doáb and the hill district of Kángra were ceded to the British, also the possessions of the mahárájá on the left bank of the Sutlej. In addition the British demanded a money payment of £1,500,000. The services of Guláb Singh, rájá of Jammú, to the Lahore state, in procuring the restoration of friendly relations with the British, were specially recognized. His independent sovereignty in such lands as might be made over to him was granted. The Sikh Government, unable to pay the whole of the money demand, further ceded, as equivalent for £1,000,000, the hill country between the Biás and the Indus, including Kashmir and Hazára. Guláb Singh was prepared to give the amount in place of which Kashmir was to have become British, and by a separate treaty with him, 16th March 1846, this was arranged. The payment was seventy-five lákhs of Nánakshábí rupees, and Kashmir was added to Guláb Singh's territory. At the urgent request of the darbár a British force was left at Lahore for the protection of the mahárájá and the preservation of peace. To restore order and introduce a settled administration a British resident was appointed, who was to guide and control the council of regency, and assistants to the resident were stationed in different parts of the country.

Second Sikh war. Peace was not long preserved. The governor of Múltán, Diwán Mulráj, desired to resign. Two English officers sent by the resident to take over charge of the fort were murdered, 19th April 1848, and their escort went over to the diwán. Another of the assistants to the resident, Lieutenant Herbert Edwardes, then in the Déraját, west of the Indus, hearing of the attack on the two officers, hastened to their assistance. On hearing of their fate he collected a force with which to attack the Múltán army while the insurrection was yet local. This he did with signal success. But Múltán could not fall before such means as he possessed. The movement spread, the operations widened, and the Sikh and English forces were in the field again. Múltán was taken. The severe battle of Chilianwala on 13th January 1849 left the Sikhs as persistent as after the two terrible days of Firóz-shahr in the previous campaign. And it needed the crushing defeat of Gujrát, 21st February 1849, like Sobráon in 1846, to bring the war to a conclusion, and this time to give the Punjab to England. It was annexed on 2d April 1849.

For the government of the new province, including the Jalandar Doáb, previously annexed, and the cis-Sutlej states, a board of administration was appointed consisting of three members. In place of this board a chief commissioner was appointed in 1853, aided by a judicial commissioner and a financial commissioner. British troops, European and native, of the regular army were stationed at the chief cities and other places east of the Indus and at Peshawar. For the rest of the trans-Indus territory there was a special body of native troops called the Punjab frontier force, under the orders of the chief commissioner. During the Mutiny campaign of 1857 the Punjab, under Sir John Lawrence as chief commissioner, was able to send important aid to the force engaged in the siege of Delhi, while suppressing the disturbances which arose, and meeting the dangers which threatened, within the Punjab itself. In 1858 the Delhi territory, as it was called, west of the Jumna, was transferred from the North-West Provinces to the Punjab. The enlarged province was raised in rank, and on 1st January 1859 the chief commissioner became lieutenant-governor. In place of the judicial commissioner a chief court was constituted in 1866. The number of judges, at first two, was increased to three in 1869. The number is now (1885) three permanent and two temporary. The form and manner of government are for the most part like those of other British provinces in India, except that the employment, as in the earlier days, of military officers as well as civilians in the civil administration is continued to the present time.

Soon after the annexation of the Punjab Christian missions were begun in the new province by the Church Missionary Society and the American Presbyterian Board. In connexion with the English society there are twenty-four ordained English missionaries, four medical and two lay missionaries, and ten native clergy. At Delhi there is a mission of the Society for the Propagation of the Gospel and the Cambridge University Mission. Also a large number of English ladies are engaged in teaching native ladies, who by the customs of the country are obliged to remain at home. The number of native Christians in the Punjab is nearly 4000. In 1879 a new diocese, that of Lahore, was constituted, embracing the provinces of Punjab and Sind.

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PUPPETS. See MARIONETTES.

PURCELL, HENRY (1658-1695), English musical composer, was born in 1658 in St Ann's Lane, Old Pye Street, Westminster. His father, Henry Purcell, was a gentleman of the chapel-royal, and in that capacity sang at the coronation of Charles II. After his father's death in 1664 the boy was placed under the guardianship of his uncle, Thomas Purcell, a man of extraordinary probity and kindness. Through the interest of this affectionate guardian, who was himself a gentleman of His Majesty's chapel, Henry was admitted to the chapel-royal as a chorister, and studied first under Captain Henry Cooke, "master of the children," and afterwards under Pelham Humfrey. He is said to have composed well at nine years old; but the earliest work that can be certainly identified as his is an ode for the king's birthday, written in 1670. After Humfrey's early death in 1674 he continued his studies under Dr Blow. In 1676 he was appointed copyist at Westminster Abbey—not organist, as has sometimes been erroneously stated—and in the same year he composed the music to Dryden's *Aurenge-Zebe*, and Shadwell's *Epsom Wells* and *The Libertine*.[1] These were followed in 1677 by the music to Mrs Behn's tragedy, *Abdelazor*, and in 1678 by an overture and masque for Shadwell's new version of Shakespeare's *Timon of Athens*. The excellence of these compositions is proved by the fact that they contain songs and choruses which never fail to please, even at the present day. The masque in *Timon of Athens* is a masterpiece, and the chorus "In these delightful pleasant groves" in *The Libertine* is constantly sung with applause by English choral societies. In 1679 he wrote some songs for Playford's *Choice Ayres, Songs, and Dialogues*, and also an anthem, the name of which is not known, for the chapel-royal. From a letter written by Thomas Purcell, and still extant, we learn that this anthem was composed for the exceptionally fine voice of the Rev. John Gostling, then at Canterbury, but afterwards a gentleman of His Majesty's chapel. Purcell wrote several anthems at different times for this extraordinary voice, a *basso profundo*, the compass of which is known to have comprised at least two full octaves, from D below the stave to D above it. The dates of very few of these sacred compositions are known; but one, "They that go down to the sea in ships," though certainly not written until some time after this period, will be best mentioned here. In thankfulness for a providential escape of the king from shipwreck Gostling, who had been of the royal party, put together some verses from the Psalms in the form of an anthem, and requested Purcell to set them to music. The work is a very fine one but very difficult, and contains a passage which traverses the full extent of Gostling's voice, beginning on the upper D and descending two octaves to the lower.

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[1] *The Libertine* was suggested by Tirso de Molina's tale, *El Burlador de Sevilla*, afterwards dramatically treated by Molière and chosen by Da Ponte as the foundation of Mozart's *Don Giovanni*.

In 1680 Dr Blow, who had been appointed organist of Westminster Abbey in 1669, resigned his office in favour of his pupil; and Purcell, at the age of twenty-two, was placed in one of the most honourable positions an English artist could occupy. He now devoted himself almost entirely to the composition of sacred music, and for six years entirely severed his connexion with the theatre. But during the early part of the year, and in all probability before entering upon the duties of his new office, he had produced two important works for the stage, the music for Lee's *Theodosius* and D'Urfey's *Virtuous Wife*. There is also strong evidence that it was in 1680—not, as has been generally represented, in 1675—that he composed his opera *Dido and Æneas*, a work of far greater significance in the development of art than has generally been supposed, since it forms a very important landmark in the history of English dramatic music. It was written, to a libretto furnished by Nahum Tate, at the request of Josiah Priest, a professor of dancing, who also kept a boarding-school for young gentlewomen, first in Leicester Fields and afterwards at Chelsea. At the time of its production[1] the condition of dramatic music in England was very rudimentary indeed,—so much so that the opera, properly so called, cannot fairly be said to have existed even in embryo, though it had long flourished brilliantly in Italy, and was beginning to take firm root in France. No English composer had as yet soared above the songs and choruses introduced into the masques, the comedies, and the tragedies of the period, for the purpose of enlivening the performance,—music always of a purely incidental character, and always quite unconnected with the progressive action of the piece. Very different was the mixed form of entertainment thus produced from the true musical drama, the invention of which in Italy dated as far back as the closing years of the 16th century. At that period a number of literary and artistic savants—among them Vincenzo Galilei, the father of the astronomer, Jacopo Peri, Giulio Carcini, and the poet Rinuccini—were accustomed to meet in Florence for purposes of discussion at the house of Giovanni Bardi, count of Vernio. Deeply imbued with the principles of the Renaissance, these heated enthusiasts were determined to carry them from the domain of literature into that of music; and their first dream was the revival of the method of recitation practised by the early Greeks in the tragedies of Æschylus and Sophocles. This, however, was, if only for technical reasons, absolutely impossible. The art was lost for ever; but in seeking to resuscitate it they invented something much more precious—dramatic recitative. With this at command the construction of the veritable "dramma per la musica" was no difficult matter; and in fact Peri actually produced a true opera, *Euridice*, which in 1600 was performed at Florence in honour of the marriage of Maria de' Medici with Henry IV. of France. Purcell, who had never been in Italy, confesses himself, in the preface to his sonatas, "unskilful in the Italian language," and could never by any chance have heard an Italian opera; but he knew very well what Italian music was, and had not neglected to study it deeply. Yet it is doubtful whether all Italy could at that moment have produced a work so full of inborn genius as *Dido and Æneas*.[2] It is a musical drama in the strictest sense of the term, a genuine opera, in which the action is entirely carried on in recitative, without a word of spoken dialogue from beginning to end; and the music is of the most genial character—a veritable inspiration, overflowing with spontaneous melody, and in every respect immensely in advance of its age. It never found its way to the theatre, though it appears to have been very popular among private circles. It is believed to have been extensively copied, but one song only was printed by Purcell's widow in *Orpheus Britannicus*, and the complete work remained in manuscript until 1840, when it was printed by the Musical Antiquarian Society, under the editorship of Sir George Macfarren. There is a tradition that the part of Anna (erroneously called Belinda), written for an alto voice, was sung by the composer himself. Should this story be verified, it will tell strongly in favour of the opinion that Purcell really did compose *Dido and Æneas* at the age of seventeen, *i.e.*, in 1675; for it is certain that at the coronation of James II. he sang bass.

In 1682 Purcell was appointed organist of the chapel-royal, *vice* Edmund Lowe deceased, an office which he was able to hold conjointly with his appointment at Westminster Abbey. For some years after this his pen was busily employed in the production of sacred music, odes addressed to the king and royal family, and other similar works. In 1685 he wrote two of his finest anthems, "I was glad" and "My heart is inditing," for the coronation of James II. In 1687 he resumed his connexion with the theatre by furnishing the music for Dryden's tragedy *Tyrannic Love*. It is probable that the public were not at this time prepared for works of so advanced a character as *Dido and Æneas*; for, though the young composer's pen was constantly employed in the production of incidental music, overtures, and act tunes for pieces of the period, we find him attempting no more operas based upon the true principles so cordially accepted on the Continent. In this year also Purcell composed a march and quick-step which became so popular that Lord Wharton adapted the latter to the fatal verses of *Lillibulero*; and in January 1688 he composed his anthem "Blessed are they that fear the Lord," by express command of the king. A few months later he wrote the music for D'Urfey's play, *The Fool's Preferment*. In 1690 he wrote the songs for Dryden's version of Shakespeare's *Tempest*, including "Full fathom five" and "Come unto these yellow sands," and the music for Betterton's *Prophetess* (afterwards called *Dioclesian*) and Dryden's *Amphitryon*; and in 1691 he produced his dramatic masterpiece, *King Arthur* also written by Dryden, and first published by the Musical Antiquarian Society in 1843.

But Purcell's greatest work is undoubtedly his Te Deum and Jubilate, written for St Cecilia's Day, 1694, the first English Te Deum ever composed with orchestral accompaniments. In this he pressed forward so far in advance of the age that the work was annually performed at St Paul's Cathedral till 1712, after which it was performed alternately with Handel's Utrecht Te Deum and Jubilate until 1743, when it finally gave place to Handel's

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[1] The difficulty in fixing the exact date of its composition arises from a doubt as to whether or not it was performed in Leicester Fields before it was played in the new boarding-school at Chelsea.

[2] Alessandro Scarlatti was one year younger than Purcell, and produced his first opera, *L'Questa nell' amore*, in 1680.

Dettingen Te Deum. Purcell did not long survive the production of this great work. He died at his house in Dean's Yard, Westminster, on 21st November 1695, leaving a widow and three children, the former of whom soon afterwards published a number of his works, including the now famous collection called *Orpheus Britannicus.*

Besides the operas we have already mentioned, he wrote *Don Quixote, Bonduca, The Indian Queen, The Fairy Queen*, and others, a vast quantity of sacred music, and numerous odes, cantatas, and other miscellaneous pieces. (W. S. R.)

PURCHAS, Samuel (1577-1626), compiler of works on travel and discovery, was born at Thaxted, Essex, in 1577. He was educated at St John's College, Cambridge, where he graduated M.A. in 1600, and some time afterwards B.D., with which degree he was also admitted at Oxford in 1615. In 1604 he was presented by James I. to the vicarage of Eastwood, Essex, and in 1615 was collated to the rectory of St Martin's, Ludgate, London. He was also chaplain to Abbot, archbishop of Canterbury. Some years before his ecclesiastical duties called him to London Purchas had given over the care of his vicarage to his brother, and spent most of his time in the metropolis in the compilation of his geographical works. In 1613 he published *Purchas, his Pilgrimage or Relations of the World, and the Religions observed in all Ages*, which reached a fourth edition, much enlarged, in 1626; in 1619 *Purchas, his Pilgrim or Microcosmus, or the Historie of Man; relating the wonders of his Generation, varieties in his Degeneration, and necessity of his Regeneration*; and in 1625, in four volumes, *Purchas, his Pilgrimes; or Relation of the World in Sea Voyages and Lande Travels, by Englishmen and others.* This last work was intended as a continuation of Hakluyt's *Voyages*, and was partly founded on MSS. left him by Hakluyt. The fourth edition of the *Pilgrimage* is usually catalogued as vol. v. of the *Pilgrimes*, but the two works are quite distinct, and essentially different in character, as is indeed indicated in the names, the difference being thus explained by Purchas himself: in the *Pilgrimage* he makes use of his own matter though borrowed, while in the *Pilgrimes* the authors themselves act their own parts in their own words. He was also the author of the *King's Tower and Triumphal Arch of London*, a sermon on 2 Sam. xxii. 51, published in 1623. He died in September 1626, according to some in a debtor's prison, and although Anthony Wood affirms that he died in his own house there can be no doubt that the publication of his books had involved him in serious money difficulties.

PURGATORY (*Purgatorium*). The Roman Catholic Church has no more than two declarations of supreme authority on the subject of its distinctive doctrine of purgatory. The first is that of the council of Ferrara-Florence, in which it was defined, as regards the truly penitent who have departed this life in the love of God before they have made satisfaction for their sins of commission and omission by fruits meet for repentance, that their souls are cleansed by purgatorial pains after death, and for their relief from these the suffrages of the living —the sacrifice of the mass, prayers, alms, and other offices of piety—are helpful. The second is that of the council of Trent, which runs as follows:—"Since the Catholic Church, instructed by the Holy Spirit from the sacred writings and the ancient tradition of the fathers, hath taught in holy councils, and lastly in this œcumenical council, that there is a purgatory, and that the souls detained there are assisted by the suffrages of the faithful, but especially by the most acceptable sacrifice of the mass, this holy council commands all bishops to have a diligent care that the sound doctrine of purgatory delivered to us by venerable fathers and sacred councils be believed, maintained, taught, and everywhere preached." This decree is to be read in the light of an earlier canon of the same council, by which it is condemned as heretical to say that after the reception of the grace of justification the guilt of the penitent sinner is so remitted, and the penalty of eternal punishment so annulled, that no penalty of temporal punishment remains to be paid either in this world or in the future in purgatory before the kingdom of heaven can be opened. Thus the essential point of the doctrine is that Christian souls having any sin upon them at the moment of death pass into a state of expiatory suffering, in which they can be helped by the prayers and other good works of living believers. And this is all that modern Catholic theologians regard as being *de fide.* It is hardly necessary to say that the doctrine as popularly held and currently taught is generally much more detailed and explicit. In view of some of these developments, there is on all hands admitted to exist abundant room for the admonition of the council of Trent, when it proceeded to warn the clergy to exclude from popular addresses all the more difficult and subtle questions relating to the subject, and such as do not tend to edification or make for piety. "They must not allow uncertainties or things which have the appearance of falsity to be given forth or handled, and they are to prohibit as scandalous and offensive such things as minister to curiosity or superstition or savour of filthy lucre. Let the bishops see to it that the prayers of the living—to wit, the sacrifices, prayers, alms, and other works of piety which have been wont to be rendered by believers for the departed—are done piously and devoutly, according to the institutions of the church, and that those which are due by the wills of testators or otherwise be not rendered in a perfunctory manner but diligently and punctually, by priests and other ministers of the church who are bound to this service."

Among the details of the doctrine, which have been the subject of much speculation among Catholics, may be specified the questions relating to the locality of purgatory and the nature and duration of its sufferings. On none of these points has anything authoritative been delivered. It is of course conceived of as having some position in space, and as being distinct from heaven, the place of eternal blessedness, on the one hand, and from hell, the place of eternal woe, on the other. But any theory as to its exact latitude and longitude (such, for example, as underlies Dante's description) must be regarded as the effort merely of the individual imagination. As regards the nature of its pains, there has been a constant disposition to interpret with strict literality the expressions of Scripture as to the cleansing efficacy of fire, but the possibility of interpreting them metaphorically has never been wholly lost sight of. With respect to their duration, it must be inferred from the whole praxis of indulgences as at present authorized by the church that the pains of purgatory are measurable by years and days; but here also everything is left vague.

The thesis of all Protestants, as against the Roman Catholic doctrine of purgatory, is that "the souls of believers are at their death made perfect in holiness and do immediately pass into glory." Scripture authority is claimed on both sides, but the argument, which is a somewhat complicated one and depends mainly on the view arrived at as to the Scriptural doctrine of sin and satisfaction, cannot be entered upon here. When the two doctrines are compared in the light of ecclesiastical tradition it will be found that neither fully coincides with the opinions somewhat vaguely held by the early fathers, whose view of the intermediate state between death and the resurrection was largely affected by the pre-Christian doctrine of Hades or Sheol. On the one hand, Irenæus (*Hær.*, v. 31) regards as heretical the opinion that the souls of the departed do immediately pass into glory; he argues that, as Christ tarried for three days "in the lower parts of the earth," so must the souls of His disciples also go away into the invisible place allotted them by God, and there remain until the resurrection, when, receiving their bodies and rising as their Lord arose, they shall come into heaven and into the presence of God. On the other hand, it is impossible to point out in any writing of the first four centuries any passage which describes the state of any of the faithful departed as one of acute suffering, although Tertullian's belief that martyrs had the exceptional privilege of being taken to "paradise" at once clearly shows that for ordinary Christians the state after death was regarded rather as one of expectancy than of enjoyment. Still less would it be possible to show that the intermediate state was regarded by them as one in which satisfaction was made for sin. Origen's doctrine of *πῦρ καθάρσιον* is intimately connected with his doctrine of *apokatastasis*; in his view the application of purgatorial fire was not to take place until the last judgment, nor was its efficacy to be limited to those who had closed their life on earth as believers in Christ. In a different connexion Augustine, expounding 1 Cor. iii. 15 as referring more immediately to the purification of Christians by means of the trials of the present life, goes on to speak of it as a supposable thing that the process might be continued after death, but without committing himself to the belief ("incredibile non est, et utrum ita sit quæri potest"). Gregory the Great was the first to formulate in express terms the doctrine which afterwards became that of the whole Roman obedience "de quibusdam levibus culpis esse ante judicium purgatorius ignis credendus est." Such utterances as this were never accepted by the Greek Church, which in its doctrine of the intermediate state still occupies as nearly as possible the standpoint of the ante-Nicene fathers.

PURI or POOREE, a district of British India in the Orissa division of the lieutenant-governorship of Bengal, lying between 19° 28′ and 20° 16′ N. lat. and 85° 0′ and 86° 28′ E. long., with an area of 2472 square miles. It is bounded on the N. by the native states of Banki and Athgarh, on the E. and N.E. by Cuttack district, on the S. by the Bay of Bengal, and on the W. by the Ganjam district of the Madras presidency and by the tributary state of Rampur. For the most part the country is flat, the only mountains being a low range which, rising in the west, runs south-east in an irregular line towards the Chilka Lake, and forms a water-parting between the district and the valley of the Mahanadi. The middle and eastern divisions of the district, forming the south-western part of the Mahanadi delta, consist entirely of alluvial plains, watered by a network of channels through which the most southerly branch of that river, the Koyakhai, finds its way into the sea. The principal rivers in Puri are the Bhargavi, the Daya, and the Nun, all of which flow into the Chilka Lake and are navigable by large boats during the rainy season, when the waters come down in tremendous floods, bursting the banks and carrying everything before them. The chief lakes are the Sar and the Chilka, the former, a backwater of the Bhargavi, being 4 miles long by 2 broad. The Chilka Lake is one of the largest in India; its length is 44 miles, and its breadth in some parts 20 miles. It is separated from the sea only by a narrow strip of sand. The lake is saline and everywhere very shallow, its mean depth ranging from 3 to 5 feet. Puri district is rich in historical remains, from the primitive rock-hewn caves of Buddhism—the earliest relics of Indian architecture—to the mediæval sun temple at Kanarak and the world-renowned shrine of Jagannath. The chief roads in the district are the Calcutta and Madras trunk road and the pilgrim road from Cuttack to Puri. The climate of Puri is dry and healthy, and the average rainfall is 55·80 inches

The census of 1881 returned the population of Puri district at 888,487 (446,609 males and 441,878 females). By religion 873,064 were returned as Hindus, 14,903 as Mohammedans, and 510 as Christians. The only town with a population exceeding 5000 is PURI (*q.v.*). Puri is strictly a rice-growing tract, but pulses, jute, hemp, flax, and oil-seeds are also produced, while among its miscellaneous crops are tobacco, cotton, sugar-cane, and turmeric. The principal manufactures are salt, earthenware, and brass and bell-metal utensils and ornaments. In 1882-83 the total revenue of the district amounted to £79,493, towards which the land-tax contributed £60,255.

Puri first came under British administration in 1803. The only political events in its history since that date have been the rebellion of the maharaja of Khurda in 1804 and the rising of the paiks or peasant militia in 1817-18. Since then the country has been gradually restored to order and tranquillity

PURI or POOREE, chief town of the above district, and commonly known as Jagannath, is situated on the Orissa coast in 19° 48′ N. lat. and 85° 51′ E. long. Its chief interest is centred in the sacred shrine of Jagannath, a temple which dates from the 12th century, and which lies at the southern extremity of the town. In 1881 the population of Puri was 22,095 (males 11,769, females 10,326), of whom 21,913 were Mohammedans.

PURIM (פרים), a feast of the later Jews, celebrated in honour of the deliverance of the nation from the schemes of Haman recorded in the book of Esther. The historical value of this record has been discussed in the article ESTHER, where also mention is made of the now very prevalent opinion that the feast is an adaptation of a Persian festival. The derivation of the name "Purim," as well as the thing, from the Persian *Furdigan* (Pōrdigān, Pōrdiyān) has been raised above the level of a mere guess by Lagarde, who has shown that the readings *φουρμαια* and *φουρδια* in one of the Greek recensions of Esther point with great probability to a form *φουρδαια* (פורדיא) instead of Purim, exactly corresponding with the Persian word (*Ges. Abh.*, p. 164; *Armen. Stud.*, § 1339). The feast falls on the 14th and 15th of Adar, and is, in accordance with Esther ix. 22, of a joyous character, but quite secular in tône, with a great deal of hard drinking, the only quasi-religious features being the reading in the synagogue of the book of Esther and the section about Amalek, Exod. xvii. 8 *sq.* This celebration appears to have made its way among the Jews only gradually; according to Josephus, however, it was generally observed in his day in all parts of the Jewish world. On the other hand, the preparatory fast on the 13th of Adar, which is based on Esther ix. 31, cannot have been observed in Palestine till a later date, for in the *Megillath Ta'anith* (after the death of Trajan), Adar 13, "the day of Nicanor," is still one of the days on which fasting is forbidden.

PURITANS. See ENGLAND, CHURCH OF, vol. viii. p. 376 *sq.*; INDEPENDENTS, vol. xii. p. 726 *sq.*; and PRESBYTERIANISM.

PURNIAH, a district of British India in the Bhagalpur division of the lieutenant-governorship of Bengal, occupying an area of 4956 square miles, is situated between 25° 15′ and 26° 37′ N. lat. and 87° and 88° 33′ E. long. On the N. it is bounded by the state of Nepal and the district of Darjiling, on the E. by the Jalpaiguri, Dinajpur, and Maldah districts, on the W. by Bhagalpur, and on the S. by the Ganges, which separates it from the districts of Bhagalpur and the Santal Parganas. Purniah is a level depressed tract of country, but for the most part of a rich loamy soil of alluvial formation; it is traversed by several streams, which flow from the Himalayas lying to the north and afford great advantages of irrigation and water carriage, and is well cultivated; but in the west the soil is thickly covered with sand deposited by the Kusi river, which rises in the Nepal mountains and flows southwards to the Ganges. The country is destitute of anything that can be called forest, but much scrub jungle is found in the neighbourhood of the more swampy tracts. Among other rivers of the district is the Mahananda, which rises in the mountains of Sikkim and flows through the east of Purniah into Maldah. Wild animals are not so numerous as in the neighbouring districts, but the tiger is found in all parts of Purniah, particularly along the banks and among the sandy islands of the Kusi, and also in the scrub jungle that runs along the north of the district. The climate of Purniah is of an intermediate character; the average rainfall is 67 inches, and the mean temperature is about 76°·8.

The staple product of Purniah is rice, but jute and tobacco are also cultivated to a considerable extent. Its manufactures include indigo, cottons, woollens, and silks, but the chief is that of indigo, which is mostly carried on in the south of the district. In 1882-83 the gross revenue amounted to £179,750, nearly two-thirds (£120,541) being derived from the land. By the census of 1881 the population numbered 1,848,687 (937,080 males, 911,607 females). The majority of the people are Hindus (1,076,539 in 1881); of Mohammedans in the same year there were 771,130, and of Christians only 327. PURNIAH, the capital, is the only town in the district with a population exceeding 10,000.

This district was conquered by the Mohammedans in the 13th century, but it was not until four centuries later that its value was realized. During the 17th century the frontier was considerably extended; the country, however, remained in a state of anarchy until 1770, when it was governed by an English official with the title of "superintendent." Of late years the district has made considerable progress, and under all departments of local administration there has been steady improvement.

PURNIAH, chief town and administrative headquarters of the above district, is situated on the east bank of the river Saura, in 25° 46′ N. lat. and 87° 30′ E. long. It contains a population, according to the census of 1881, of 15,016. The town is neat and well-built, but very unhealthy; it is distant 283 miles north-west of Calcutta.

PURPLE (πορφύρα), the name given by the ancients to a dye derived from various species of *Murex* and *Purpura*. (See MOLLUSCA, vol. xvi. p. 648 *sq.*; DYEING, vol. vii. p. 571; and PHŒNICIA, vol. xviii. p. 804.) For the modern sources of the various shades of this colour, see DYEING, vol. vii. p. 579.

PURPURA, a disease characterized by the occurrence of purple-coloured spots upon the surface of the body, due to extravasations of blood in the skin, accompanied occasionally with hæmorrhages from mucous membranes. Difference of opinion has prevailed among physicians as to whether these symptoms are to be regarded as constituting a disease *per se*, since they are frequently seen in connexion with various morbid conditions. Thus in persons suffering from such diseases as rheumatism, phthisis, heart disease, cancer, Bright's disease, jaundice, as well as from certain of the infectious fevers, extravasations of the kind above-mentioned are not unfrequently present. But the term "purpura" is, strictly speaking, applicable only to those instances where the symptoms exist apart from any antecedent disease. In such cases the complaint is usually ushered in by lassitude and feverishness. This is soon followed by the appearance on the surface of the body of the characteristic spots in the form of small red points scattered over the skin of the limbs and trunk. They are not raised above the surface, and they do not disappear on pressure. Their colour soon becomes deep purple or nearly black; but after a few days they undergo the changes which are observed in the case of an ordinary bruise, passing to a green and yellow hue and finally disappearing. When of minute size they are termed "petechiæ" or "stigmata," when somewhat larger "vibices," and when in patches of considerable size "ecchymoses." They may come out in fresh crops over a lengthened period.

The form of the disease above described is that known as "purpura simplex." A more serious form of the malady is that to which the term "purpura hæmorrhagica" is applied. Here, in addition to the phenomena already mentioned as affecting the skin, there is a tendency to the occurrence of hæmorrhage from mucous surfaces, especially from the nose, but also from the mouth, lungs, stomach, bowels, kidneys, &c., sometimes in large and dangerous amount. Great physical prostration is apt to attend this form of the disease, and a fatal result sometimes follows the successive hæmorrhages, or is suddenly precipitated by the occurrence of an extravasation of blood into the brain.

The causes of purpura are not well understood. The condition of the blood has been frequently investigated, but no alteration in its composition detected. The view most commonly held is that the disease depends on an abnormal fragility of the minute blood-vessels owing to their mal-nutrition. It would seem sometimes to arise in persons enjoying perfect health; but in a large proportion of instances it shows itself among those who have been exposed to privation or insanitary conditions, or whose health has become lowered. Young persons suffer more frequently than adults, and repeated attacks may occur. Purpura has some points of resemblance to scurvy, but a clear distinction both as to causation and symptoms can be established between the two diseases.

The treatment will bear reference to any causes which may be discovered as associated with the onset of the disease, such as unfavourable hygienic conditions, and nutritive defects should be rectified by suitable diet. The various preparations of iron seem to be the best medicinal remedies in this ailment, while more direct astringents, such as gallic acid, ergot of rye, turpentine, or acetate of lead, will in addition be called for in severe cases and especially when hæmorrhage occurs.

PURSLANE, the vernacular equivalent of the botanical genus *Portulaca*. The species are fleshy annuals of small dimensions, with prostrate stems and entire leaves; the flowers are small and inconspicuous, or in some species brilliantly coloured, regular, with two sepals, five petals, seven to twenty stamens, an inferior ovary, with a style divided into from three to eight branches and ripening into a pod which opens by a transverse chink. *P. oleracea* is a native of India, which has been introduced into Europe as a salad plant, and in some countries has spread to such an extent as to become a noxious weed. This is the case in certain parts of the United States, where the evil qualities of "pussly" have become proverbial. Like many other succulent plants, its juice is cooling and is used in tropical countries as a refrigerant in fever, while the bruised leaves are employed as an application in cases of local inflammation. Some of the species, such as *P. grandiflora* and its varieties, are grown in gardens on rock-work owing to the great beauty and deep colouring of their flowers, the short duration of individual blossoms being compensated for by the abundance with which they are produced.

PUSEY, EDWARD BOUVERIE (1800-1882), originally Edward Bouverie, was born near Oxford in 1800. His family, which was of Huguenot origin, became through a marriage connexion lords of the manor of Pusey, a small Berkshire village near Oxford, and from it took their name a few years after Edward Bouverie's birth. In 1818 he became a commoner of Christ Church, Oxford, and after gaining high university distinctions was elected in 1824 to a fellowship at Oriel College. He thus became a member of a society which already contained some of the ablest of his contemporaries,—among them J. H. Newman and John Keble. But for several years his intercourse with them seems to have been slight. He divided his time between his country home and Germany, and occupied himself with the study of Oriental languages and of German theology. His first work, published in 1828, was a vindication of the latter from a strong attack which had been made upon it by one of the leaders of the nascent High-Church party, H. J. Rose. His work, which is entitled *An Historical Enquiry into the probable Causes of the Rational Character lately predominant in the Theology of Germany*, is an impartial and clear summary of the history of German theology since the Reformation In the same year (1828) the duke of Wellington appointed him to the regius professorship of Hebrew with the attached canonry of Christ Church, which he held for the rest of his life. Mr Rose's somewhat intemperate reply to him led to the publication in 1830 of a second part of his *Historical Enquiry*, which is not less liberal in its tone than the previous part. But in the years which immediately followed the current of his thoughts began to set in another direction. The revolt against individualism had begun, and he was attracted to its standard. By the end of 1833 "he showed a disposition to make common cause" with those who had already begun to issue the *Tracts for the Times* "He was not, however, fully associated in the movement till 1835 and 1836, when he published his tract on baptism and started the Library of the Fathers" (Cardinal Newman's *Apologia*, p. 136). The real work of his life then began. He became a close student of the fathers and of that school of Anglican divines who had continued, or revived, in the 17th century the main traditions of pre-Reformation teaching. In ten years after his first adhesion to the movement he had become, with his almost boundless capacity for accumulating information, saturated with patristic and "Anglo-Catholic" divinity; and a sermon which he preached before the university in 1843, *The Holy Eucharist a Comfort to the Penitent*, so startled the authorities by the re-statement of doctrines which, though well known to ecclesiastical antiquaries, had faded from the common view, that by the exercise of an authority which, however legitimate, was almost obsolete he was suspended for three years from the function of preaching. The immediate effect of his suspension was the sale of 18,000 copies of the condemned sermon; its permanent effect was to make Pusey for the next quarter of a century the most influential person in the Church of England. The movement, in the origination of which he had had no share, came to bear his name: it was popularly known as Puseyism and its adherents as Puseyites. His activity, both public and private, as leader of the movement was enormous. He was not only on the stage but also behind the scenes of every important controversy, whether theological or academical. In the Gorham controversy of 1850, in the question of Oxford reform in 1854, in the prosecution of some of the writers of *Essays and Reviews*, especially of Professor Jowett, in 1863, in the question as to the reform of the marriage laws from 1849 to the end of his life, in the revived controversy as to the meaning of everlasting punishment in 1877, he was always busy with articles, letters, treatises, and sermons. The occasions on which, in his turn, he preached before his university were all memorable; and some of the sermons were manifestoes which mark distinct stages in the history of the party of which he was the leader The practice of confession in the Church of England practically dates from his two sermons on *The Entire Absolution of the Penitent*, in 1846, in which the revival of high sacramental doctrine is complemented by the advocacy of a revival of the penitential system which mediæval theologians had appended to it The sermon on *The Rule of Faith as maintained by the Fathers and by the Church of England*, in 1851, stemmed the current of secessions to Rome after the Gorham judgment, which had seemed to show that on an important point of dogmatic theology the Church of England had no definite doctrine. The sermon on *The Presence of Christ in the Holy Eucharist*, in 1853, first formulated the doctrine round which almost all the subsequent theology of his followers has revolved, and which has revolutionized the current practices of Anglican worship. And the last university sermon which he composed, and which he was too ill to deliver himself, *Unscience, not Science, adverse to Faith*, in 1878, rendered not only to his party but to religion in general the signal service of abandoning the old quarrel between theology and science, as to the manner in which the world was created, by admitting the possibility of evolution Of his larger works the most important are his two books on the Eucharist—*The Doctrine of the Real Presence* (consisting of notes on his university sermon of 1853), published in 1855, and *The Real Presence . . . the Doctrine of the English Church*, published in 1857; *Daniel the Prophet*, in which he endeavours with great skill to maintain the traditional date of that book; *The Minor Prophets, with Commentary*, which forms his chief contribution to the study of which he was the professor; and the *Eirenicon*, in which he endeavoured to find, for those who accepted his premises, a basis of union between the Church of England and the Church of Rome. In 1836 he joined Newman, Keble, and Marriott in editing a series of translations from the fathers entitled *A Library of Fathers of the Holy Catholic Church anterior to the Division of East and West*, and contributed to it a revised translation of St Augustine's *Confessions* and several valuable prefaces; the series was accompanied by a translation of the *Catena Aurea* of Thomas Aquinas, and was followed by an edition of some of the texts which had been translated He also edited, with suitable omissions, several books of devotion by Roman Catholic writers, such as Avrillon and Scupoli.

In private life his habits were simple almost to austerity. He had few personal friends, and rarely mingled in general society; though bitter to opponents, he was gentle to those who knew him, and his munificent charities gave him a warm place in the hearts of many to whom he was personally unknown. In his domestic life he had some severe trials: his wife died, after eleven years of married life, in 1839; his only son, who was a scholar like-minded with himself, who had shared many of his literary labours, and who had edited an excellent edition of St Cyril's commentary on the minor prophets, died in 1880, after many years of great bodily affliction. From that time Pusey was seen by only a few persons. His own bodily infirmities increased, and on 16th September 1882, after a short illness, he died a painless death. He was buried at Oxford in the cathedral of which he had been for fifty-four years a canon His friends devised for him after his death a singular memorial: they purchased his library, and bought for it a house in Oxford which they endowed with sufficient funds to maintain three librarians, who were charged with the duty of endeavouring to perpetuate in the university the memory of the principles which he taught.

His name will be chiefly remembered as the representative of a great religious movement which, whatever may be its ultimate issue, has carried with it no small part of the religious life of England in the latter half of the 19th century. His chief characteristic was an almost unbounded capacity for taking pains. His chief influence was that of a preacher and a spiritual adviser. His *Parish Sermons* reproduce the substance of patristic homilies in the massive style of the Caroline divines. His correspondence as a spiritual adviser was enormous; his deserved reputation for piety and for solidity of character made him the chosen confessor to whom large numbers of men and women unburdened their doubts and their sins. But if he be estimated apart from his position as the head of a great party, it must be considered that he was more a theological antiquary than a theologian. He exhumed many forgotten theories and supported them by a large number of quotations from ancient writers; but the heterogeneous masses of information which he accumulated require a sifting which often leaves but a scanty residuum, and, however valuable to advanced scholars, cannot safely be commended to learners. Whatever he wrote was relative to the controversies of his time, and as a controversialist he holds a place which is unique among his contemporaries. He had an almost unrivalled power of massing his evidence, of selecting from an author just so much as was pertinent to the point under discussion, and of ignoring or depreciating statements which were at variance with the views which he advocated. As a party leader he combined great enthusiasm with indefatigable energy and tenacity of purpose; he chose his positions beforehand with great skill, and never afterwards abandoned them. But he does not seem to have had any great logical power: he builds elaborate arguments upon words of shifting connotation, such as "faith" and "church," and slides unconsciously from one meaning to another. Nor is there any evidence that he ever faced the historical difficulties which the position of the Church of England presents from the Catholic point of view, and which ultimately led to Newman's secession. He lived in Christian antiquity, and his arguments seldom touched any but sympathetic natures. Unlike Newman, who appealed to the cultured intellect of his time, he never caught the modern spirit. The result was that after Newman's departure the party of which Pusey was the head never made a single convert of mark. The intellect of Oxford and of England drifted away from it; and, in spite of the eloquence of some of its advocates, "Puseyism" does not now number among its adherents any one who exercises an appreciable influence upon the intellectual life of England.

In fact Pusey survived the system which had borne his name. His followers went beyond him, or away from him, in two directions. On the one hand, his revival of the mediæval doctrine of the Real Presence, coinciding as it did with the revival of a taste for mediæval art, naturally led to a revival of the mediæval ceremonial of worship. With this revival of ceremonial Pusey had little sympathy: he at first protested against it (in a university sermon in 1859); and, though he came to defend those who were accused of breaking the law in their practice of it, he did so on the express ground that their practice was alien to his own. But this revival of ceremonial in its various degrees is now the chief external characteristic of the movement of which he was the leader; and "Ritualist" has thrust "Puseyite" aside as the designation of those who hold the doctrines for which he mainly contended. On the other hand, the pivot of his teaching was the appeal to primitive antiquity. It was an appeal which had considerable force as against the vapid theology of the early part of the century, and as a criterion of the claims of Catholicism. But it lost its force, and his followers came to substitute for it an appeal to the principles of an *a priori* philosophy, some of which were borrowed from Thomism and some, though at second hand, from Hegelianism. Nor is it probable that Puseyism will revive again. On the one hand, an appeal to primitive times which is divorced, as was Pusey's appeal, from the history of those times must necessarily fail in an age in which the spirit of historical inquiry is abroad; on the other hand, however excellent the maxim may be which Pusey put in the forefront of his arguments. *Quod semper, quod ubique, quod ab omnibus*, yet, when limited, as Pusey limited it, to the statements of particular writers and the current beliefs of particular ages, it becomes a mere paradox and ceases to afford a logical basis for any system of doctrine. (E. HA.)

PUSHKIN. See Poushkin.

PUSHTU. See Afghanistan, vol. i. p. 238.

PUSTULE, Malignant, a contagious disease communicated to man from certain animals (especially cattle, sheep, and horses) suffering from splenic fever. This malady will be referred to under Woolsorter's Disease, of which it forms a variety.

PUTEOLI. See Pozzuoli.

PUTNEY, a suburb of London in the county of Surrey, is situated on the right bank of the Thames, about 8 miles above London Bridge by the river and 4½ miles west of Hyde Park Corner by road. The picturesque old timber bridge connecting it with Fulham on the left bank of the river, and erected in 1729, is superseded by a structure of iron and granite. Putney is the headquarters of London rowing and the starting-point for most important boat-races. It consists chiefly of the old-fashioned High Street leading to Putney Common, and various streets of villas and houses inhabited by the middle classes. The church of St Mary near the bridge was rebuilt in 1836, with the exception of the picturesque old tower. Among the benevolent institutions are the almshouses of the Holy Trinity, founded by Sir Abraham Dawes in the reign of Charles II.; the waterman's school, founded in 1684, for the education of watermen's sons; and the royal hospital for incurables. To the south-west of the town is Putney Heath, 400 acres in extent, formerly a great resort of highwaymen and duellists. Putney is included within the metropolitan area. The population of the registration sub-district (area, 2235 acres) in 1871 was 9439, and in 1881 it was 13,235.

Putney occurs in Domesday as "Putelei," and subsequently appears as "Puttenheth" and "Pottenheth," gradually contracted into "Putney." The ferry was in early times of considerable importance. During the Parliamentary wars the heath was frequently occupied by troops, the headquarters of the generals being in the village. Putney was the birthplace of Thomas Cromwell, earl of Essex, and of Gibbon the historian.

PUTREFACTION. See Fermentation, vol. ix. pp. 97, 98.

PUTTY is a kind of cement composed of fine powdered chalk intimately mixed with linseed oil, either boiled or raw, to the consistency of a tough dough. It is principally used by glaziers for bedding and fixing sheets of glass in windows and other frames, by joiners and painters for filling up nail-holes and other inequalities in the surface of wood-work, and by masons for bedding ashlar-work. The oxidation of the oil gradually hardens putty into a very dense adherent mass. When putty is required to dry quickly, boiled oil and sometimes litharge and other driers are used. "Putty powder" or "polisher's putty" is oxide of tin in a state of fine division used for the polishing of glass, hard metals, granite, and similar substances.

PUY, Le, or more precisely Le Puy en Velay, chief town of the department of Haute-Loire, France, 352 miles from Paris by rail and 270 in a direct line, rises in the form of an amphitheatre at a height of 2050 feet above sea-level upon Mont Anis, the hill that divides the left bank of the Dolézon from the right bank of the Borne (a rapid stream which joins the Loire 3 miles below). From the new town, which lies east and west in the valley of the Dolézon, the traveller ascends the old feudal and ecclesiastical town through narrow steep streets, paved with slippery pebbles of lava, to the cathedral commanded by the fantastic pinnacle of Mont Corneille. Mont Corneille, which is 433 feet above the Place de Breuil (in the lower town), is a steep rock of volcanic breccia, surmounted by a colossal iron statue of the Virgin (53 feet high, standing on a pedestal 23 feet high), cast after a model by Bonassieux out of 213 guns taken at Sebastopol. The monument is composed of eighty parts fitted together and weighs 98½ tons. Another statue, that of a bishop of Puy, also sculptured by Bonassieux, faces that of the Virgin. From the platform of Mont Corneille a magnificent panoramic view is obtained of the town, and of the volcanic mountains, which make this region one of the most interesting parts of France. The Romanesque cathedral (Notre Dame), dating from the 6th to the 12th century, has a particoloured façade of white sandstone and black volcanic breccia, which is reached by a flight of sixty steps, and consists of three tiers, the lowest composed of three high arcades opening into the porch beneath the nave of the church; above are three windows lighting the nave; and these in turn are surmounted by three gables, two of which, those to the right and the left, are of open work. Two side porches lead to the cathedral by the transept. The bell-tower (184 feet), which rises behind the choir in seven stories, is one of the most beautiful examples of the Romanesque transition period. The bays of the nave are covered in by octagonal cupolas; the central cupola forms a lantern. The choir and transepts are barrel-vaulted. The cathedral has mural paintings of the 12th and 13th centuries, an open-work Romanesque screen surrounding the sanctuary, and a manuscript Bible belonging to the 9th century. The cloister, to the north of the choir, is striking owing to its variously-coloured materials and elegant shafts: Viollet le Duc considers one of its galleries to belong to the oldest known type of cathedral cloister (8th and 9th centuries). Connected with the cloister are remains of fortifications of the 13th century, by which it was separated from the rest of the city. Near the cathedral the baptistery of St John (4th century), built on the foundations of a Roman building, is surrounded by walls and numerous remains of the period, partly uncovered by recent excavations. The church of St Lawrence (14th century) contains the remains of Du Guesclin. Le Puy possesses fragmentary remains of its old line of fortifications, among them a machicolated tower, which has been restored, and a few curious old houses dating from the 12th to the 17th century. Of the modern monuments the statue of La Fayette and a fountain in the Place de Breuil, executed in marble, bronze, and syenite, may be specially mentioned. The museum, named after Crozatier, a native metal-worker to whose munificence it principally owes its existence, contains antiquities, engravings, a collection of lace, and ethnographical and natural history collections. Among the curiosities of Puy should be noted the church of St Michel d'Aiguille, beside the gate of the town, perched on an isolated rock like Mont Corneille, the top of which is reached by a staircase of 271 steps. The church dates from the end of the 10th century and its chancel is still older. The steeple is of the same type as that of the cathedral. Three miles from Puy are the ruins of the Château de Polignac, one of the most important feudal strongholds of France. The population of Puy in 1881 was 18,567. The trade is chiefly in cattle, woollens, grains, and vegetables. The principal manufacture is that of laces and blondes (in woollen, linen, cotton, silk, gold, and silver threads), which is carried on by 130,000 workwomen in the neighbourhood, the yearly turnover being £1,000,000. The town is connected by rail with St Étienne and Lyons, and also with Brioude on the line from Clermont-Ferrand to Nîmes.

It is not known whether Le Puy existed previously to the Roman invasion. Towards the end of the 4th or beginning of the 5th century it became the capital of the country of the Vellavi, at which period the bishopric, originally at Revession, now St Paulien, was transferred hither. Gregory of Tours speaks of it by the name of Anicium, because a chapel "ad Deum" had been built on the mountain, whence the name of Mont Adidon or Ani, which it still retains. In the 10th century it was called Podium Sanctæ Mariæ, whence Le Puy. In the Middle Ages there was a double enclosure, one for the cloister, the other for the town. The sanctuary of Notre Dame was much frequented by pilgrims, and the city grew famous and populous. Rivalries between the bishops (who held directly of the see of Rome) and the lords of Polignac, revolts of the town against the royal authority, and the encroachments of the feudal superiors on municipal prerogatives often disturbed the quiet of the town. The Saracens in the 8th century, the Routiers in the 12th, the English in the 14th, the Burgundians in the 15th, successively ravaged the neighbourhood. Le Puy sent the flower of its chivalry to the crusades in 1096, and Raymond d'Aiguille, called d'Agiles, one of its sons, was their historian. Many councils and various assemblies of the states of Languedoc met within its walls; popes and sovereigns, among the latter Charlemagne and Francis I., visited its sanctuary. Pestilence and the religious wars put an end to its prosperity. Long occupied by the Leaguers, it did not submit to Henry IV. until many years after his accession.

PUY DE DÔME, a department of central France, four-fifths of which belonged to Basse-Auvergne, one-sixth to Bourbonnais, and the remainder to Forez (Lyonnais), lies between 45° 17′ and 46° 16′ N. lat. and 2° 23′ and 4° E. long. It is bounded on the N. by Allier, on the E. by Loire, on the S. by Haute-Loire and Cantal, and on the W. by Corrèze and Creuse. The chief town, Clermont-Ferrand, is 217 miles south of Paris in a direct line; and the department takes its name from a volcanic cone (4800 feet) which overlooks it. A meteorological observatory has stood on the summit, on the site of an old Roman temple, since 1876. The highest point of the department, the Puy de Sancy (6188 feet), is also the most elevated peak of central France; it commands the group of the volcanic Monts Dore, so remarkable for their rocky corries, their erosion valleys, their trap dykes and *orgues* of basalt, their lakes sleeping in the depths of ancient craters or confined in the valleys by streams of lava, and their wide plains of pasture-land. The Puy de Sancy, forming part of the watershed, gives rise on its northern slope to the Dordogne, and on the east to the Couze, a sub-tributary of the Loire, through the Allier. The Monts Dore are joined to the mountains of Cantal by the non-volcanic group of the Cézallier, of which the highest peak, the Luguet (5101 feet), rises on the confines of Puy de Dôme and Cantal. On the north the Monts Dore are continued by a plateau of the mean height of from 3000 to 3500 feet, upon which are seen sixty cones raised by volcanic outbursts in former times. These are the Monts Dôme, which extend from south to north as far as Riom, the most remarkable being the Puy de Dôme and the Puy de Pariou, the latter having a crater more than 300 feet in depth. To the east of the department, along the confines of Loire, are the Monts du Forez, rising to 5380 feet and still in part crowned with forests. Between these mountains and the Domes extends the fertile plain of Limagne. The drainage of Puy de Dôme is divided between the Loire, by its affluents the Allier and the Cher, and the Gironde, by the Dordogne. The Allier traverses the department from south to north, receiving on its right the Dore, which falls into the Allier at the northern boundary and lowest level of the department (879 feet); on its left are the Alagnon from the Cantal, the two Couzes from the Luguet and the Monts Dore, and the Sioule, the most important of all, which drains the north-west slopes of the Monts Dore and Dôme, and joins the Allier beyond the limits of the department. The Cher forms for a short space the boundary between the departments of Puy de Dôme and Creuse, close to that of Allier. The Dordogne, while still scarcely formed, flows past Mont-Dore-les-Bains and La Bourboule and is lost in a deep valley which divides this department from that of Corrèze. None of these streams are navigable, but boats can be used on the Allier during floods. The climate of Puy de Dôme is usually very severe, owing to its high level and its distance from the sea; the mildest air is found in the northern valleys, where the elevation is least. During summer the hills about Clermont-Ferrand, exposed to the sun, become all the hotter because their black volcanic soil absorbs its rays. On the mountains from 24 to 36 inches of rain fall in the year, but only half this amount (18 inches) in Limagne, around which the mountains arrest the clouds. Nevertheless the soil of this plain, consisting of alluvial deposits of volcanic origin, and watered by torrents and streams from the mountains, makes it one of the richest regions of France.

Of a total area of 1,964.685 acres 925.146 are arable. 266.226 meadow and grass land, 232,210 under wood, 78,006 under vines, while 397,683 are uncultivated or coarse pasturage. Out of a total of 566,064 inhabitants 292,177 are engaged in agriculture. Puy de Dôme possesses [illegible] horses, 1600 mules, 4850 asses, [illegible] oxen or bulls, 174,000 cows or heifers, 60,500 calves. 309,900 sheep, 90,500 pigs, 22,550 goats, and 25,900 beehives, which in 1881 produced 95 tons of honey and 33 tons of wax. In 1882 there were produced 369,313 quarters of wheat. 493,134 of rye, 197,241 of barley, 320,138 of oats, 25,172 of buckwheat, 5,172,408 bushels of potatoes, and in 1881 234,504 bushels of dried vegetables, 1.986,208 bushels of beetroot, 33 tons of tobacco. 1625 tons of hemp, 21 tons of flax, 26,176 bushels of rape-seed, a great quantity of colza oil, and 13,054,052 gallons of wine. The Limagne produces fruits of all kinds—apricots, cherries, pears, apples, and walnuts, and there are also plantations of mulberry trees. The department possesses numerous mineral fountains. The coal-mines, occupying a surface-area of 7660 acres, employ 1381 men, and in 1882 produced 188,234 tons. The most important, at Brassac on the Allier, on the borders of Haute-Loire, employ 1200 or 1500 men (in the two departments). Next come those of St Eloi near the department of Allier, and of

Bourg-Lastic and Messeix on the borders of Corrèze. The department also works peat, asphalt, and bituminous schists. Mines of argentiferous lead employ 640 men and produce 33,695 tons of lead or silver, worth £45,600. The most important mines and foundries are at Pontgibaud on the Sioule. Copper, arsenic, iron, antimony, barium sulphate, alum, manganese, white lead, sulphur, sulphuretted zinc, loadstone, and (of precious stones) amethysts, jacinths, rubies, agates, chalcedonies, opals, are also found in the department. Quarries of porphyry and lava are worked (Volvic with 900 men), as well as marl, limestone, and gypsum. The hot springs of Mont Dore, known in the days of the Romans, contain a mixture of arsenic and iron bicarbonates, and are used especially for affections of the respiratory organs. The waters of La Bourboule, containing sodium chlorides and bicarbonates, are particularly rich in arsenic, and efficacious against affections of the lymphatic glands, scrofula, diseases of the skin and air-passages, and rheumatism. The springs of St Nectaire, containing sodium and iron chlorides and bicarbonates, are efficacious in liver complaints, rheumatism, and gravel. Some of them are petrifying, as the spring of St Allyre at Clermont-Ferrand. The waters of Royat, in use in the time of the Romans, containing sodium and iron chlorides and bicarbonates, sparkling and rich in lithia, are used in cases of anæmia, rheumatism, gout, diabetes, and gravel. The waters of Châteauneuf (on the Sioule), also known to the Romans, contain iron bicarbonates and are resorted to for skin diseases. Those of Châtelguyon, like the waters of Carlsbad and Marienbad, are used for disorders of the digestive organs, congestions of the liver, rheumatism, &c. The waters of Châteldon are used for the table. There are other chalybeate waters at St Martial, Beaulieu, Pontgibaud, St Myon, St Maurice, Arlanc, and many other mineral springs of varied character. Manufactures are for the most part grouped around Thiers, which produces a large amount of cheap cutlery, pasteboards (especially adapted for stamps or playing-cards), and leather; 20,000 workmen are thus employed, and the annual turn-over amounts to £1,200,000. The department contains important paper-mills, factories for lace and braid (in the mountains), for buntings, and camlets. Those for wool, cotton, and hemp contain 3500 spindles and more than 400 looms. There are wool-carding works and factories for linens, cloths, and counterpanes,—also silk-mills, tanneries, manufactories for chamois and other leathers, for caoutchouc, important sugar-works, starch-works, manufactures of edible pastes with a reputation as high as those of Italy, and manufactures of fruit-preserves. The saw-mills and the cheese industry in the mountains complete the list, which includes 201 establishments employing 75,553 persons. The department exports grain, fruits, cattle, wines, cheese, wood, and mineral waters. Traffic is carried on over 294 miles of Government roads, 9591 miles of other roads, and 178 miles of railway. The department is crossed from north to south by the railway from Paris to Nîmes, and that of Vichy to Thiers; from west to east by that from Bordeaux to Lyons by Tulle, Clermont-Ferrand, and Thiers, with branches from Eygurande to Largnac and from Vertaison to Billom. It is skirted on the north-west by the line from Montluçon to Gannat, with a branch line for goods to the mines of St Éloi. Twenty thousand inhabitants of the department, belonging chiefly to the district of Ambert, leave it during winter and find work elsewhere as navvies, chimney-sweeps, pit-sawyers, &c. The department in 1881 contained 566,064 inhabitants and includes five arrondissements—CLERMONT-FERRAND (*q.v.*), Ambert (town, 3940 inhabitants), Issoire (6137), Riom (9590), Thiers (10,583)—50 cantons, and 467 communes. It is attached to the bishopric of Clermont-Ferrand and to the 13th Army Corps in the same town; the superior court is at Riom. (G. ME.)

PYÆMIA. See PATHOLOGY (vol. xviii. p. 401) and SURGERY.

PYATIGORSK, a district town and watering-place of Caucasus, Russia, in the government of Terek, 124 miles by rail to the north-west of Vladikavkaz. It owes its origin to its mineral waters, which had long been known to the inhabitants of Caucasus, and even at the beginning of the present century attracted many Russians, who used to stay at the Konstantinogorsk fort, 2 miles off. The first buildings at the mineral springs were erected, however, in 1812, and in 1830 the name of Pyatigorsk ("town of the five mountains"), referring to the five summits of the Beshtau, was given to the new settlement. Its subsequent rapid increase was greatly stimulated by the completion of its railway connexion with Rostoff, and it has now nearly 14,000 inhabitants (13,670 in 1882). The town is charmingly situated on a small plateau on the south-western slopes of the Mashuka mountain, by which and the Beshtau it is protected on the north. The snow-covered summits of the Elburz are seen on the south.

The sulphur springs, about fifteen in number, come from a great depth, from trachytic rocks, and vary in temperature from 72° to 115° Fahr.; they are used both for drinking and for bathing. Before the opening of the railway the summer patients already numbered thousands and have become more numerous since; but defective accommodation and high prices tend to prevent their further increase, notwithstanding the very high esteem in which these mineral waters are held by medical authorities, both Russian and West European. The industries of Pyatigorsk are insignificant, but its trade has always had some importance, and it is still visited during its fairs by a few Persian merchants.

PYGMALION is the Greek form of a Phœnician name probably derived from the name of a god, פעם (*C.I.S.*, par. i. t. i. p. 133). Pygmalion or, as Josephus writes, Phygmalion, brother of Dido (Elissa), has been spoken of in PHŒNICIA (vol. xviii. p. 807). Another Pygmalion, son of Cilix and grandson of Agenor, king of Cyprus, is the subject of a famous story. He fell in love with an ivory statue he had made; Aphrodite granted life to the image, and Pygmalion married the miraculously born virgin (Ovid, *Metam.*, x. 243 *sq.*).

PYGMIES. The name "pygmy" (Greek *πυγμαῖος*, from *πυγμή*) means one whose height is measured by the distance between the elbow and the knuckles of an ordinary man, or rather less than an ell. The pygmies appear in Homer (*Il.*, iii. 6) as a tiny folk who dwelt by the streams of Ocean in the far southern land whither the cranes fly at the approach of our northern winter. The cranes made war on them and slaughtered them. These battles between the pygmies and the cranes are often mentioned by later writers and are frequently represented on vases. Philostratus describes a picture of the sleeping Hercules beset by swarms of pygmies, as Gulliver was by the Lilliputians. Aristotle held that the pygmies were a race of little men inhabiting the marshes out of which he supposed the Nile to flow. Other writers localized them in various parts of the world. Ctesias describes at some length a race of pygmies in the heart of India. They were black and ugly; the tallest of them were only two ells high; their hair and beards were so long that they served them as garments; they were excellent bowmen, and hunted hares and foxes with hawks, ravens, and eagles; their language and customs were those of the rest of the Indians, and they were very honest; their cattle were small in proportion. Pygmies are also mentioned in Thrace (where they were called Catizi by the natives, according to Pliny) and in Caria. Eustathius speaks of pygmies in the far north, near Thule. Strabo was inclined to regard them as fabulous; no trustworthy person, he says, had seen them. There is, however, a story in Herodotus which would seem to show that the belief in the pygmies originated in well-founded reports of a race of undersized men in the heart of Africa. According to Herodotus (ii. 32), five men of the Nasamonians (a Libyan people near the Greater Syrtis) journeyed westward through the desert for many days till they came to a tribe of little black men of a strange speech, by whose city ran a great river flowing from west to east, and in it there were crocodiles; moreover, there were fruit-bearing trees in that country and great marshes. This story is not improbable; the river may have been the Niger (Joliba or Quorra) and the people may have been allied to the Akka, an undersized race discovered within recent years near the equator by Schweinfurth, who thinks that they, as well as the Bushmen of South Africa, are remnants of an aboriginal population of Africa now becoming extinct.

PYM, JOHN (1584-1643), was born at Brymore in Somerset in 1584. In 1599 he entered Broadgates Hall, now Pembroke College, Oxford, as a gentleman commoner. He is said by Clarendon to have held at a later date an office in the exchequer, in which he no doubt acquired that familiarity with financial business which afterwards distinguished him. His wife, Anna Hooker, died in 1620, and in the following year he entered parliament for the first time as member for Calne, the statement that he sat in the Addled Parliament being now known to have been erroneous. To the patronage of the earl of Bedford no doubt Pym owed the position which he thus acquired. The use which he made of it was all his own. He had none of the fire of Eliot's genius, but he early showed himself to be possessed of the two qualities which in combination make a leader of men, a thorough and honest sympathy with the ideas of the time and a moderation in their application. There was more of measured force in him than there was in Eliot. His powers as a party leader were as yet unsuspected.

Pym's name was first prominently brought forward by his speech of 8th November 1621, directed against the Catholics. He strove to distinguish between an attempt "to punish them for believing and thinking" what they did and the disabling of them from doing "that which they think and believe they ought to do." His remedy was an oath of association to be taken by all loyal Protestants. Those who object to Pym's counsel as divisive must nevertheless acknowledge that there was a singular consistency in his advocacy of it. By organizing the resistance of the majority of Englishmen, he wished to baffle parties which might be dangerous by their organization or by the assistance which they might receive from abroad.

After the dissolution Pym was confined for three months in his house in London. In the following parliament he pleaded for the execution of the penal laws against recusants and for the restoration of the silenced Puritan clergy. In 1626 he was one of the managers of Buckingham's impeachment. In 1628 he was equally prominent in advocating the Petition of Right and in carrying on the impeachment of Mainwaring. The political question and the religious question were in Pym's mind fused into one. His intellect was intensely conservative, not easily admitting new ideas or projecting itself into the future to deal with growing changes in society, but seeking to rest on the conservatism of existing society rather than on the maintenance of artificial forces. He looked for support to the nation itself, and he found it hard to believe that the national judgment could much differ from his own. In 1629 he found himself differing from those with whom he usually acted. Eliot carried the House with him in turning the dispute with the king on the question of tonnage and poundage into one of parliamentary privilege, whilst Pym thought that the main question of the king's right to levy the duties without a parliamentary grant should be first attacked. He was beaten at the time, but his defeat was full of promise for the future. It is much in a man's favour that he is ready to look a difficulty fully in the face. It is characteristic of Pym that nothing is heard of him either during the riotous proceedings in which this parliament closed or during the eleven years which passed without a parliament at all. He had neither the virtues nor the failings which accompany excitability of temperament.

With the Short Parliament Pym's three and a half years of authority begin. His speech of 17th April 1640 on grievances lasted for two hours, a length of time without precedent in the parliaments of those days. It was not eloquent in the sense in which Eliot's speeches were eloquent, but it summed up in a telling manner the grievances under which, in the opinion of the vast majority of thinking Englishmen, the commonwealth laboured. Before the session closed he showed his powers as a parliamentary tactician by proposing to bring forward the Scottish grievances and to make a peace with the Scots the condition of the grant of supplies. This proposal led to a hasty dissolution of parliament, but it laid down the basis of a policy which afterwards stood Pym in good stead. That policy was precisely what had been foreshadowed in his speech of 1621, the association of the majority who thought alike in civic union against official authority; but that which in 1621 was to be a union of Englishmen alone in 1640 included Scots as well.

With the dissolution of the Short Parliament Pym once more sinks out of sight. There is, however, good reason to suppose that the summer months of 1640 were for him a time of unusual activity, and that he was a leading spirit in those negotiations with the Scots the exact nature of which cannot now be traced. At all events in the end of August he was in close communication with the leaders of the opposition, and he then drew up, in co-operation with St John, the petition in which twelve peers demanded the redress of grievances and the summoning of parliament. The rout of Newburn gave emphasis to the language of the peers, and on 3d November 1640 the Long Parliament met.

Pym's leadership of the Commons rested on his sympathy with the feelings of the House combined with his skill in directing those feelings into a practical course. He expressed the general sentiment in the impeachment of Strafford and Laud, and in the passing of the Triennial Act, which was to make the long intermission of parliaments impossible for the future. In the trial of Strafford he showed himself resolute. Being determined to give to an act of state policy the character of a vindication of the law, Pym had to contend against the impatience of his followers and against the efforts of Charles, and still more of Henrietta Maria, to save Strafford by force. Overwhelmed for a moment by the impatience of the House, which converted the impeachment into a bill of attainder, he yet carried his point that the change should be no more than nominal, and that the legal arguments should proceed just as if the impeachment had been continued.

The struggle within the House itself was the least part of Pym's labours. In meeting the army plot and the other intrigues of the court he had to develop the powers of a commissioner of police, to be as ready in collecting and sifting information as he was prompt in counteracting the danger which he feared. In the protestation which was adopted by the Commons on 3d May he fell back on his old remedy, banding together the majority in resistance to an unscrupulous minority. By the legislation which followed on the death of Strafford—the abolition of the special courts which had been erected to defend the Tudor monarchy, and the abandonment by the crown of its claim to levy customs without a parliamentary grant—he brought the king under the obligation to govern according to law. Much, however, remained to be done. Pym had to provide against the breach by force or fraud of the compact made, and also to provide for the harmonious working of the executive and legislative bodies. He proposed to attain these ends by demanding that the king's ministers should be responsible to parliament. To effect this it was necessary that parliament should be united, and to obtain this end it was necessary to solve the religious difficulty. In the autumn of 1641 it appeared that a majority of the Peers and a large minority of the Commons wished to maintain the worship of the Prayer Book very nearly intact, whilst a minority of the Peers and a majority of the Commons wished to make very considerable alterations in it. To bind these two parties together against the king needed constructive statesmanship of the highest order, and this neither Pym nor any one else in the House showed signs of possessing. In the Grand Remonstrance, instead of indicating terms of compromise, he proposed to throw the regulation of the church on an assembly of divines to be chosen by parliament,—that is to say, he combined the terrors of a vague threat of impending change with the entire absence of any security that those changes would be moderate. From that moment there were two parties in the state neither of which would give way to the other. Charles's attempt to arrest Pym and four other members on 4th January 1642 embittered but did not produce the conflict. For some months there was much fencing between the two parties, and the Civil War was not begun till Charles raised his standard at Nottingham.

During the remaining months of Pym's life he was the most prominent leader of the war party in the House of Commons. Peace may be made in two ways, by one side capitulating to the other, or by the discovery of a compromise which may give effect to the better aims of both sides. Pym was resolutely set against a capitulation, and he did not rise to the height of a mediator. His adversaries of the peace party, led by Holles and Maynard, had as little idea of a compromise as he had, and they were foolish enough to suppose it possible to obtain the assent of Charles and his supporters to the establishment of a Puritan Church.

Pym's policy was at least coherent with itself. In 1621, on his first prominent appearance in political life, he had advocated the formation of an association against popery. The protestation of 1641 was an attempt to carry this plan into practice and to make it at the same time available against Royalist intrigues. The Parliamentary covenant promulgated after the discovery of Waller's plot in June 1643 was an enlargement of the same project, and the Solemn League and Covenant in September 1643 embraced the three kingdoms. As long as he lived Pym was the soul of the Parliamentary resistance to the king, but it is in the covenants and associations which he brought into existence that his permanent contribution to English political development is to be found. Eliot hoped to rally parliament and the constituencies as a whole to the cause which he maintained to be just. Strafford hoped to rouse the devotion of the nation as a whole to the king whose crown was supported by his own masterful intellect. Pym was the founder of party government in England. He recognized from the first that there were differences of religious opinion amongst his fellow-countrymen, and he hoped to rally round a common purpose those who on the whole felt as he did himself, with such liberty of opinion as was possible under such conditions. If the enterprise failed it was partly because he was assailed by intrigue as well as by fair opposition, and in his fierce struggle against intrigue learned to cling to doctrines which were not sufficiently expansive for the government of a nation, partly because the limitations of government itself and the insufficiency of force to solve a complicated religious and political problem were in his time very imperfectly understood. At least Pym prepared the way for the immediate victory of his party by summoning the Scots and by the financial measures which made the campaigns of 1644 and 1645 possible.

He did not, however, live to reap the harvest which was due to his efforts. Worn out by the strain of constant and agitating work, his health broke down, and on 8th December 1643 he died. His body was followed by both Houses when it was carried to be interred in Westminster Abbey. (S. R. G.)

PYRAMID. This name for a class of buildings, though first taken from a part of the structure,[1] and mistakenly applied to the whole of it by the Greeks, has now so far acquired a more definite meaning in its geometrical sense that it is desirable to employ it in that sense alone. A pyramid therefore should be understood as meaning a building bounded by a polygonal base and plane triangular sides which meet in an apex. Such a form of architecture is only known in Middle Egypt, and there only during the period from the IVth to the XIIth Dynasty (before 2000 B.C.)—having square bases and angles of about 50°. In other countries various modifications of the tumulus, barrow, or burial-heap have arisen which have come near to this type; but these when formed of earth are usually circular, or, if square, have a flat top, and when built of stone are always in steps or terraces. The imitations of the true Egyptian pyramid at Abydos, Meroe, and elsewhere are puny hybrids, being merely chambers with a pyramidal outside and porticos attached; and the structures found at Cenchreæ, or the monument of Caius Sestius at Rome, are isolated and barren trials of a type which never could be revived: it had run its course in a country and a civilization to which alone it was suitable.

In the earliest monuments of Egypt there are three types, which were ruled by the external shape. For the temples (such as those of the kings of the IVth Dynasty at Gizeh) varied in shape according to their arrangements; but the pyramid, the obelisk, and the mastaba[2] are designs whose importance was outward; and these types, which started apparently at the same epoch (the earliest actually dated examples of each being all within the two reigns of Seneferu and Khufu), only lasted during the life of that archaic system to which they belonged. The pyramid type faded out in the middle kingdom (XIIth Dynasty); the obelisk was adapted in later times to a different purpose, as a member of bilateral temple decoration, instead of a solitary monument complete in itself and surrounded by an enclosure, as it was in the old kingdom; and the mastaba gave way to the rock-hewn chapel or the bastard pyramid.

In considering the origin of the pyramid type there are three theories to be dealt with—(1) that it is merely a higher and refined form of the tumulus; (2) that it was derived from the mastaba; (3) that it was a fresh idea, an invention *de novo*. The objection to the first view is that there is no graduated series of examples of lesser sizes before the large ones, possibly not any before the very largest, and that tumulus or mound burial is unknown in Egypt, ancient or modern; and to accept this view we must suppose that all the earlier stages were wrought in another land, and that the pyramid-builders migrated into Egypt when at the height of their architectural power. But their history does not agree to this, and in no other land can we find their training-ground. The second view is strongly suggested by the facts before us in Egypt. The only buildings that have been reasonably supposed to be earlier than the great pyramid are the two so-called pyramids of Sakkara and Medum. These structures are not and never were true pyramids; they are mastabas added to by successive accretions at various times, again and again finished off with a polished casing, only to be afresh enlarged by coats of rough masonry and another fine casing on the outside, until they have been extended upwards and around into a great stepped mass of masonry (Petrie, *Pyramids, &c.*, p. 147), the successive faces of which rise at the characteristic mastaba angle of 75° (or 4 on 1). These buildings then present the outline of a pyramidal pile, broken by successive steps, and it is but one stage further to build in one smooth slope from base to top; such a form would readily be designed when once it was intended to build a large mass complete at once on one uniform plan, as certainly was the case for the largest pyramids. The third view has some support in the absence of any datable pyramids before the largest and the second largest that ever existed, and in the steady deterioration of work that is known to have taken place. Remembering also what bold steps architecture has taken occasionally in later times (as in the Pantheon and St Sophia) without a series of graduated examples, we should not condemn this view too readily by *a priori* reasoning.

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[1] The vertical height was named by the Egyptians *pir-em-us* (see E. Revillout, *Rev. Eg.*, 2d year, 305-309), hence the Greek form *piramis*, pl. *pyramides* (Herod.), used unaltered in the English of Sandys (1615); from which the singular *pyramid* was formed.

[2] An oblong building with sloping sides and flat top, which contained usually the funeral chapel and place of offerings, and covered over the mouth of the sepulchral pit.

It is certain that the pyramids were each begun with a definite design of their size and arrangement; at least this is plainly seen in the two largest, where continuous accretion (such as Lepsius and his followers propound) would be most likely to be met with. On looking at any section of these buildings it will be seen how impossible it would have been for the passages to have belonged to a smaller structure (Petrie, 165). The supposition that the designs were enlarged so long as the builder's life permitted was drawn from the compound mastabas of Sakkara and Medum; these are, however, quite distinct architecturally from true pyramids, and appear to have been enlarged at long intervals, being elaborately finished with fine casing at the close of each addition.

Around many of the pyramids peribolus walls may be seen, and it is probable that some enclosure originally existed around each of them. At the pyramids of Gizeh the temples attached to these mausolea may be still seen. As in the private tomb, the false door which represented the exit of the deceased person from this world, and towards which the offerings were made, was always on the west wall in the chamber, so the pyramid was placed on the west of the temple in which the deceased king was worshipped. The temple being entered from the east (as in the Jewish temples), the worshippers faced the west, looking toward the pyramid in which the king was buried. Priests of the various pyramids are continually mentioned during the old kingdom, and the religious endowments of many of the priesthoods of the early kings were revived under the Egyptian renaissance of the XXVIth Dynasty and continued during Ptolemaic times. A list of the hieroglyphic names of nineteen of the pyramids which have been found mentioned on monuments (mostly in tombs of the priests) is given in Lieblein's *Chronology*, p. 32. The pyramid was never a family monument, but belonged—like all other Egyptian tombs—to one person, members of the royal family having sometimes lesser pyramids adjoining the king's (as at Khufu's); the essential idea of the sole use of a tomb was so strong that the hill of Gizeh is riddled with deep tomb-shafts for separate burials, often running side by side 60 or 80 feet deep with only a thin wall of rock between; and in one place a previous shaft has been partially blocked with masonry, so that a later shaft could be cut partly into it, macled with it like a twin-crystal.

Turning now to the architecture of the buildings, their usual construction is a mass of masonry composed of horizontal layers of rough-hewn blocks, with a small amount of mortar; and this mass in the later forms became more and more rubbly, until in the VIth Dynasty it was merely a cellular system of retaining walls of rough stones and mud, filled up with loose chips, and in the XIIth Dynasty the bulk was of mud bricks. Whatever was the hidden material, however, there was always on the outside a casing of fine stone, elaborately finished, and very well jointed; and the inner chambers were of similarly good work. Indeed the construction was in all cases so far sound that, had it not been for the spite of enemies and the greed of later builders, it is probable that every pyramid would have been standing in good order at this day. The casings were not a mere "veneer" or "film," as they have been called, but were of massive blocks, usually greater in thickness than in height, and in some cases (as at South Dahshur) reminding the observer of horizontal leaves with sloping edges.

Inside of each pyramid, always low down, and usually below the ground level, was built a sepulchral chamber; this was reached in all cases by a passage from the north, sometimes beginning in the pyramid face, sometimes descending into the rock on which the pyramid was built in front of the north side. This chamber, if not cut in the rock altogether (as in Menkaura's), or a pit in the rock roofed with stone (as in Khafra's), was built between two immense walls which served for the east and west sides, and between which the north and south sides and roofing stood merely in contact, but unbonded. The gable roofing of the chambers was formed by great sloping cantilevers of stone, projecting from the north and south walls, on which they rested without pressing on each other along the central ridge; thus there was no thrust, nor were there any forces to disturb the building; and it was only after the most brutal treatment, by which these great masses of stone were cracked asunder, that the principle of thrust came into play, though it had been provided for in the sloping form of the roof, so as to delay as long as possible the collapse of the chamber. This is best seen in the pyramid of Pepi (Petrie), opened from the top right through the roof. See also the Abusir pyramids (Howard Vyse) and the king's and queen's chambers of the great pyramid (Howard Vyse, Piazzi Smyth, Petrie). The roofing is sometimes, perhaps usually, of more than one layer, in Pepi's pyramid it is of three layers of stone beams, each deeper than their breadth, resting one on another, the thirty stones weighing more than 30 tons each. In the king's chamber (Gizeh) successive horizontal roofs were interposed between the chamber and the final gable roof, and such may have been the case at Abu Roash (Howard Vyse).

The passages which led into the central chambers have usually some lesser chamber in their course, and are blocked once or oftener with massive stone portcullises. In all cases some part, and generally the greater part, of the passages slopes downwards, usually at an angle of about 26°, or 1 on 2. These passages appear to have been closed externally with stone doors turning on a horizontal pivot, as may be seen at South Dahshur, and as is described by Strabo and others (Petrie). This suggests that the interiors of the pyramids were accessible to the priests, probably for making offerings; the fact of many of them having been forcibly entered otherwise does not show that no practicable entrance existed, but merely that it was unknown, as, for instance, in the pyramids of Khufu and Khafra, both of which were regularly entered in classical times, but were forced by the ignorant Arabs.

The pyramids of nearly all the kings of the IVth, Vth, and VIth Dynasties are mentioned in inscriptions, and also a few of later times. The first which can be definitely attributed is that of Khufu (or Cheops), called "the glorious," the great pyramid of Gizeh. Ratatef, who appears next to Khufu in the lists, is unknown in other monuments; he is perhaps the same as Khnumu-Khufu, apparently a co-regent of Khufu, who may have been buried in the so-called queen's chamber of the great pyramid. Khafra rested in the great pyramid, now known as the second pyramid of Gizeh. Menkaura's pyramid was called "the upper," being at the highest level on the hill of Gizeh. The lesser pyramids of Gizeh, near the great and third pyramids, belong respectively to the families of Khufu and Khafra (Howard Vyse). The pyramid of a [illegible] at Abu Roash is probably also of this period. The pyramid of Aseskaf, called "the cool," is unknown, so also is that of Userkaf of the Vth Dynasty, called the "holiest of buildings." Sahura's pyramid, the north one of Abusir, was named "the rising soul," much as Neferkara's (of unknown site) was named "of the soul." Raenuser's pyramid, "the firmest of buildings," is the middle pyramid of Abusir. The pyramid of Menkauhor, called "the most divine building," is somewhere at Sakkara. Assa's pyramid is unidentified: it was "the beautiful." Unas not only built the mastaba Farun, long supposed to be his pyramid, but had a pyramid called "the most beautiful of buildings" at Sakkara, which was opened in 1881 (see *Recueil des Travaux*, by M. Maspero, iii., for those opened at Sakkara). In the VIth Dynasty the "pyramid of souls," built by Ati (Rauserka), is unknown. That of Teta, "the most stable of buildings," was opened at Sakkara in 1881, as well as that of Pepi (Rameri), "the firm and beautiful." The pyramids of Rameren, "the beautiful rising," and of Neferkara, "the firm life," are unknown. Haremsaf's pyramid was opened at Sakkara in 1881. Of the last two kings of the VIth Dynasty we know of no pyramids. In the VIIth or VIIIth Dynasty most probably the brick pyramids of Dahshur were erected. In the XIth Dynasty the pyramid, "the most glorious building," of Mentuhotep II. is mentioned, and the mud pyramid of one of the Antef kings is known at Thebes. In the XIIth Dynasty the pyramids, the "lofty and beautiful" of Amenemhat I. and "the bright" of Usertesen II. are known in inscriptions, while the brick pyramid at Howara may be most probably assigned to Amenemhat III., who appears to have built the adjoining temple.

Of the architectural peculiarities of some particular pyramids some notice must now be given. The great pyramid of Gizeh (Khufu's) is very different in its internal arrangements from any other known (see vol. ii. p. 385 *sq.* and vol. vii. p. 771 *sq.*). The greater number of passages and chambers, the high finish of parts of the work, and the accuracy of construction all distinguish it. The chamber which is most normal in its situation is the subterranean chamber; but this is quite unfinished, hardly more than begun. The upper chambers, called the "king's" and "queen's," were completely hidden, the ascending passage to them having been closed by plugging blocks, which concealed the point where it branched upwards out of the roof of the long descending passage. Another passage, which in its turn branches from the ascending passage to the queen's chamber, was also completely blocked up. The object of having two highly-finished chambers in the mass may have been to receive the king and his co-regent (of whom there is some historical evidence), and there is very credible testimony to a sarcophagus having existed in the queen's chamber, as well as in the king's chamber. On the details of construction in the great pyramid it is needless to enter here; but it may be stated that the accuracy of work is such that the four sides of the base have only a mean error of six-tenths of an inch in length and 12 seconds in angle from a perfect square.[1]

The second pyramid of Gizeh has two separate entrances (one in the side, the other in the pavement) and two chambers (one roofed with slabs, the other all rock-hewn); these chambers, however, do not run into the masonry, the whole bulk of which is solid so far as is known. This pyramid has a part of the original casing on the top; and it is also interesting as having the workmen's barracks still remaining at a short distance on the west side, long chambers capable of housing about 4000 men. The great bulk of the rubbish from the work is laid on the south side, forming a flat terrace level with the base, and covering a steep rock escarpment which existed there. The waste heaps from the great pyramid were similarly tipped out over the cliff on its northern side. Thus the rubbish added to the broad platform which set off the appearance of the pyramids; and it has remained undisturbed in all ages, as there was nothing to be got out of it. The third pyramid was cased around the base with red granite for the sixteen lowest courses. The design of it has been enlarged at one bound from a small pyramid (such as those of the family of Khufu) to one eight times the size, as it is at present; the passages needed therefore to be altered. But there is no sign of gradual steps of enlargement: the change was sudden, from a comparatively small design to a large one. The basalt sarcophagus of this pyramid was ornamented with the panel decoration found on early tombs, unlike the granite sarcophagi of the two previous pyramids, which are plain. Unhappily it was lost at sea in 1838.

Farther south are the pyramids of Abusir, the most complete account of which is in the work of Colonel Howard Vyse. Next come those of Sakkara. The construction of the step-pyramid or cumulative mastaba has been noticed above; its passages are very peculiar and intricate, winding around the principal chamber, which is in the centre, cut in the rock, very high, and with a tomb-chamber built in the bottom of it, which is closed with a great plug of red granite, a circular stopper fitting into a neck in the chamber roof. A doorway faced with glazed tiles bearing a king's standard existed here; the tiles were taken to Berlin by Lepsius. The other pyramids of Sakkara are of the VIth Dynasty, of Unas, Pepi, Haremsaf, &c. They are distinguished by the introduction of very long religious texts, covering the whole inside of the chambers and passages; these are carefully carved in small hieroglyphics, painted bright green, in the white limestone. Beyond these come the pyramids of Dahshur, which are in a simple and massive style, much like those of Gizeh. The north pyramid of Dahshur has chambers roofed like the gallery in the great pyramid by successive overlappings of stone, the roof rising to a great height with no less than eleven projections on each side. The south pyramid of Dahshur has still the greater part of its casing remaining, and is remarkable for being built at two different angles, the lower part being at the usual pyramid angle, while the upper part is but 43°. This pyramid is also remarkable for having a western passage to the chambers, which was carefully closed up. Beyond the Memphitic group are the scattered pyramids of Lisht, Illahun, and Howara, and the cumulative mastaba of Medum. Illahun is built with a framework of stone filled up with mud bricks, and Howara is built entirely of mud bricks, though doubtless cased with fine stone like the other pyramids.

Beyond these there are no true pyramids, but we will briefly notice those later forms derived from the pyramid. At Abydos a large cemetery is covered with more than a hundred mud-brick chambers, the outsides of which are sloped to the form of an acute pyramid, and which have a door (or in later forms a large chamber) projecting on one side. These differ from true pyramids in (1) having an attachment more or less large on one face, (2) being always built on a square plinth, (3) having the principal face generally south, and but rarely to the north, (4) not being oriented, and (5) having the chambers occupying the greater part of the structure. The sizes are about 18 feet wide and 24 high, with a chamber 11 feet wide and 13 high, and in the later and less acute forms 20 feet base and 21 in height (see Mariette, *Abydos, Description des Fouilles*, ii. 43). At Thebes are also some similar structures belonging to the kings of the XIth Dynasty; the tomb-chamber is, however, in the rock below. The size is not so insignificant, but is under 50 feet square. These, like those at Abydos, are not oriented, and have a horizontal entrance, quite unlike the narrow pipe-like passages sloping down into the regular pyramids (see Mariette, in *Bib. Arch. Trans.*, iv. 193). In Ethiopia, at Gebel Barkal, are other so-called pyramids of a very late date. They nearly all have porches; their simplicity is lost amid very dubious decorations; and they are not oriented. They are all very acute, and have flat tops as if to support some ornament. The sizes are but small, varying from 23 to 88 feet square at Gebel Barkal and 17 to 63 feet square at Meroe. The interior is solid throughout, the windows which appear on the sides being useless architectural members (see Hoskin's *Ethiopia*, 148, &c.). The structures sometimes called pyramids at Biahmu in the Fayum seem to have no possible claim to such a name, though they are certainly of early work. Judging by the account of Herodotus (which seems intended to apply to them), by the present name (Pharaoh's thrones), and the actual remains, it appears that they were two great enclosed courts with sloping sides, in the centres of which were two seated statues raised on pedestals high enough to be seen over the walls of the courts. This form would appear like a pyramid with a statue on the top; and a rather similar case in early construction is shown on the sculptures of the old kingdom. Obelisks then were single monuments (not in pairs) and stood in the midst of a great courtyard with sides sloping like a mastaba; such open courtyards on a small scale are found in the mastabas at Gizeh, and are probably copied from the domestic architecture of the time.

On the vexed question of inscriptions on the pyramids it will suffice to say that not one fragment of early inscription is known on the casing of any pyramid, either *in situ* or broken in pieces. Large quantities of travellers' "graffiti" doubtless existed, and some have been found on the casing of the great pyramid; these probably gave rise to the accounts of inscriptions, which are expressly said to have been in many different languages.

The mechanical means employed by the pyramid-builders have been partly ascertained. The hard stones, granite, diorite, and basalt were in all fine work sawn into shape by bronze saws set with jewels (either corundum or diamond), hollows were made (as in sarcophagi) by tubular drilling with tools like our modern diamond rock-drills (which are but reinvented from ancient sources, see *Engineering*, xxxvii. 282), and small articles were turned in lathes fitted with mechanical tool-rests and jewel-pointed tools. The details of the questions of transport and management of the large stones remain still to be explained.

Works referred to above.—Colonel Howard Vyse, *Operations at the Pyramids*, 1840; Professor C. Piazzi Smyth, *Life and Work at the Great Pyramid*, 1867; W. M. Flinders Petrie, *Pyramids and Temples of Gizeh*, 1883. (W. M. F. P.)

PYRENEES, a range of mountains stretching with a general trend 18° to the north of west between France and Spain, from Cape Creus, or more properly Cape Cerbera, on the Mediterranean to the Bay of Biscay. The length of the range is about 240 miles, the greatest breadth little more than 50 miles (exclusive of the lower parallel ranges on the Spanish side), and the area covered by it about 13,000 square miles. For the most part the crest of the main chain constitutes the Franco-Spanish frontier; the principal exception to this rule is formed by the valley of Aran, which, belonging orographically to France but politically to Spain, is closed at the head by a transverse ridge running north and south and connecting the eastern and western halves of the chain.

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[1] With respect to the construction of this and other pyramids, see Howard Vyse; on measurements of the inside of the great pyramid and descriptions, see Piazzi Smyth; and on measurements in general, mechanical means, and theories, see Petrie.

The whole range is remarkable for its regularity. The main chain is on the whole easy to trace; its continuity is unbroken, and the variations in its height are mostly confined within narrow limits. The same regularity is seen in the arrangement of the valleys. Except that of Aran, all the principal valleys are given off at right angles, or nearly so, like the pinnæ of a fern-frond, on both sides of the chain, and they are again subdivided by similar minor valleys at right angles to them. In all these respects the Pyrenees contrast in a very marked manner with the Alps. They have none of the great longitudinal valleys so characteristic of the latter range, none of the great lakes by which such valleys are occupied, and but few passes like those which are found in plenty leading across the great chains of the Alps at a level much below that of the adjoining peaks. In this last particular, indeed, the Pyrenees are conspicuously deficient. Between the two extremities of the range, where the principal highroads and the only railways run between France and Spain, there are only two passes practicable for carriages,—the Col de la Perche between the valley of the Tet and the valley of the Segre, and the Col de Somport or Port de Canfranc (where it is now proposed to pierce the range by a railway tunnel) on the old Roman road from Saragossa to Oloron.

This latter pass marks the western extremity of what are known as the Central Pyrenees, which extend eastwards to the valley of Aran and include the highest summits of the whole range—Pic de Néthou or Maladetta (11,165 feet), Posets (11,047 feet), Mont Perdu (10,994 feet, Reclus; other authorities, 11,430 feet). In the Atlantic Pyrenees to the west of that pass the average height gradually but steadily diminishes till we come to the Mediterranean, while in the Eastern Pyrenees, with the exception of one break at the eastern extremity of the Pyrénées Ariégeoises, the mean elevation is maintained with remarkable uniformity, till at last a rather sudden decline occurs in the portion of the chain known as the Albères.

Narrow as the range is, the inclination of a straight line drawn from the base to the crest on the French side is not more than 3°, or a rise of about 6 in 100. On the Spanish side it is said to be somewhat steeper, but this has not been definitely ascertained. This fact, however, gives no idea of the general character of the Pyrenean slopes. The descent from the crest to the plains is marked by a succession of terraces terminating in abrupt precipices. On the French side a long cliff marks the northern limit of the chain for the greater part of its length, and this feature is particularly well defined in the department of Aude, where a steep precipice marks the division between the true Pyrenees and the Corbières, a minor chain remarkable for the complexity of its geological structure, stretching in that department from south-west to north-east.

Besides these longitudinal precipices marking the steps in the descent from the summit-line to the plains, the transverse valleys almost everywhere form profound ravines, at the bottom of which brawl the innumerable mountain-torrents ("gaves," as they are locally called) that form the principal feature in the hydrography of the range. Frequently they form lofty cascades, surpassed in Europe only by those of Scandinavia. The highest is that of Gavarnie at the head of the Gave de Pau, 1515 feet high. The wildness which thus in general marks the scenery of the Pyrenees is even greater on the Spanish than on the French side.

A peculiar and very striking feature in the Pyrenean valleys is the frequency with which their upper end assumes the form of a semicircle of precipitous cliffs. Such basins are called "cirques," and the most noted is that at the head of the valley just mentioned, the Cirque de Gavarnie. The origin of this form of valley is still a matter of discussion among geologists. Geologically the Pyrenees consist, like the Alps, of a core of granite overlaid by sedimentary strata of various age down to the Tertiary period. The granite is exposed chiefly in the east and centre, and appears in the west only in comparatively small isolated patches. Above the granitic core Cambro-Silurian rocks are very extensively developed, especially in the west, and it would appear that the first upheaval on the site of the present Pyrenees took place after the deposition of the rocks of this age, since those of the next epochs in geological history, the Old Red Sandstone, the Carboniferous, and probably also the Permian, are almost entirely unrepresented. The Secondary rocks down to the Lower Cretaceous were deposited perfectly conformably upon one another, probably against the slopes of a gentle ridge rising out of the water. Among these, Triassic rocks occupy a considerable area in the west on both slopes of the mountains; those of Jurassic age are likewise found on both slopes, but at different points; while the Lower Cretaceous form an almost continuous band on the north and one quite continuous on the south. After the deposition of the last-mentioned strata a second upheaval took place, and then another period of quiet deposition, during which the Upper Cretaceous and Eocene beds were laid down, was brought to a conclusion by the grand upheaval which elevated the Pyrenees into one of the great mountain-chains of Europe and imparted to them the general outline of their present relief. The last deposits of the Eocene sea in this quarter, represented on the French side by the conglomerates of Palusson, have been raised by this upheaval up the slopes of the mountains, and are succeeded by the Miocene lacustrine molasse, which lies perfectly horizontally at their base. The next and last upheaval was one that did not affect the Pyrenees separately, but raised the whole area on which they stand, causing the emergence from beneath the sea of the region of the Landes and draining the lake that washed the foot of the Pyrenees on the east, thus establishing the present land connexion between France and the Iberian Peninsula.

The later rocks of the Pyrenees are to a large extent limestones, among which are conspicuous the characteristic hippuritic limestone of the southern Chalk and the nummulitic limestone of the southern Eocene. For the most part the highest peaks belong to the granitic core of the mountains. But this is not always the case. In some instances limestone rocks have been carried up to the very crest of the mountains, as in Mont Perdu and in Marboré; the name of the latter, meaning "marble," indicates the nature of its constituent rock. Such limestone summits have a characteristic square massive form, very different from the sharp peaks of the granite and the schists. As in other limestone regions, caves are numerous in the Pyrenees, and several of these are of great interest to geologists and anthropologists on account of the traces of recent geological changes observable in them, and the remains of early man, both Palæolithic and Neolithic, which they have yielded.

The metallic ores of the Pyrenees are not in general [illegible] importance, though there are considerable iron mines at [illegible] in Ariége and at the foot of Canigou in Pyrénées Orientales. [illegible] deposits capable of being profitably worked are situated chiefly on the Spanish slopes, but the French side has numerous beds of lignite. Mineral springs are abundant and very remarkable, and specially noteworthy are the hot springs, in which the Alps, on the contrary, are very deficient. The latter, among which those of Bagnères de Luchon and Eaux-Chaudes may be mentioned, are sulphurous and mostly situated high, near the contact of the granite with the stratified rocks. The lower springs, such as those of Bagnères de Bigorre (Hautes-Pyrénées), Rennes (Aude), and Campagne (Aude), are mostly selenitic and not very warm.

The amount of the precipitation, including rain and snow, is much greater in the Western than in the Eastern Pyrenees, which leads to a marked contrast between the two halves of the chain in more than one respect. In the first place, the Eastern Pyrenees are without glaciers, the quantity of snow falling there being insufficient to lead to their development. The glaciers are confined to the northern slopes of the Central Pyrenees, and do not descend, like those of the Alps, far down in the valleys, but have their greatest length in the direction of the mountain-chain. They form in fact a narrow zone near the crest of the highest mountains. Here, as in the other great mountain ranges of central Europe, there are evidences of a much wider extension of the glaciers during the Ice age. The case of the glacier in the valley of Argelès in the department of Hautes-Pyrénées is the best-known instance. The snow-line is stated to lie in different parts of the Pyrenees at from 8800 to 9200 feet above sea-level.

A still more marked effect of the preponderance of rainfall in the western half of the chain is seen in the aspect of the vegetation. The lower mountains in the extreme west are very well wooded, but the extent of forest declines as we go eastwards, and the Eastern Pyrenees are peculiarly wild and naked, all the more since it is in this part of the chain that granitic masses prevail. There is a change, moreover, in the composition of the flora in passing from west to east. In the west the flora, at least in the north, resembles that of central Europe, while in the east, though the difference of latitude is only about 1°, on both sides of the chain from the centre whence the Corbières stretch north-eastwards towards the central plateau of France it is distinctly Mediterranean in character. The Pyrenees are relatively as rich in endemic species as the Alps, and among the most remarkable instances of that endemism is the occurrence of the sole European species of *Dioscorea* (yam), the *D. pyrenaica*, on a single high station in the Central Pyrenees, and that of the monotypic genus *Xatardia*, only on a high alpine pass between the Val d'Eynes and Catalonia. The genus most abundantly represented in the range is that of the saxifrages, several species of which are here endemic.

In their fauna also the Pyrenees present some striking instances of endemism. There is a distinct species of ibex (*Capra pyrenaica*) confined to the range, while the Pyrenean desman or water-mole (*Mygale pyrenaica*) is found only in some of the streams of the northern slopes of these mountains, the only other member of this genus being confined to the rivers of southern Russia. Among the other peculiarities of the Pyrenean fauna are blind insects in the caverns of Ariége, the principal genera of which are *Anophthalmus* and *Adelops*.

See Murray's *Handbook of France*; A. Leymerie, *Description géologique et paléontologique des Pyrénées de la Haute-Garonne* (to which a general account of the chain is prefixed), Toulouse, 1881; De Charpentier, *Les Pyrenées*, 1854; for the vegetation, Bentham, *Catalogue des Plantes indigènes des Pyrénées et du Bas-Languedoc*, Paris, 1826, and Grisebach, *Vegetation der Erde*, Leipsic, 1872; and for an account of the caverns, Geikie, *Prehistoric Europe*, and the authorities there cited. For the French side of the Pyrenees the best map is that of the Government survey on the scale of $\frac{1}{80000}$ (about an inch to the mile). The first sheet of a map by Fr. Schrader of the Spanish slopes on the scale of $\frac{1}{100000}$ has been published under the title *Pyrenées Centrales avec les grands Massifs du Versant espagnol*; and a sketch map of the whole of the Spanish slopes based on the tracings of MM. Schrader, Wallon, and Saint-Saud was published in vol. vii (1880) of the *Annuaire du Club alpin français*, and also separately. See also the maps in Murray's *Handbook*. (G. G. C.)

PYRÉNÉES, the name of three departments in the south of France.

1. **Basses-Pyrénées**, a department of south-western France, at the angle of the Bay of Biscay, was formed in 1790, two-thirds of it from Béarn and the rest from three districts of Gascony—Navarre, Soule, and Labourd—which together constitute the Basque region of France. The department lies between 42° 46′ and 43° 36′ N. lat. and between 0° 6′ E. and 1° 47′ W. long., and is bounded on the N. by Landes and Gers, on the E. by Hautes-Pyrénées (which has two enclaves, forming five communes, within this department), on the S. by Spain, and on the W. by the ocean. The name is due to the fact that the peaks of the Pyrenees on its southern frontier are lower than in the neighbouring department. Their height increases gradually from west to east. The peak of the Rhune, to the south of St Jean de Luz, rises only to 2950 feet; and on the border of the Basque country, which occupies the western half of the department, the mean height of the summits is not much greater. The peak of Orhy alone, in the south of the valley of Mauléon, reaches 6618 feet. But beyond that of Anie (8215 feet), on the meridian of Orthez, which marks the boundary of Béarn, much loftier elevations appear,—Mourrous (9760 feet), on the border of Hautes-Pyrénées, and the southern peak of Ossau (9465 feet). The frontier between France and Spain follows the crest-line of the main range, except in a few cases mentioned below. The general direction of the rivers of the department is towards the north-west, through a hilly country for the most part wooded or vine-clad, except on the higher slopes, which are grassy. The northern half of the department is covered with bracken or heath, indicating the proximity of the "landes." The streams almost all meet in the Adour through the Gave de Pau, the Bidouze, and the Nive. In the north-east the two Luys flow directly to the Adour, which they join in Landes. In the south-west the Nivelle and the Bidassoa flow directly into the sea. The lower course of the Adour forms the boundary between Basses-Pyrénées and Landes; it enters the sea a short distance below Bayonne over a shifting bar, which has often altered the position of its mouth. The Gave de Pau, a larger stream than the Adour, passes Pau and Orthez, but its current is so swift that it is only navigable for a few miles above its junction with the Adour. On the left it receives the Gave d'Oloron, formed by the Gave d'Ossau, descending from the Pic du Midi, and the Gave d'Aspe, which rises in Spain. The second important affluent of the Gave de Pau, the Saison or Gave de Mauléon, descends from the Pic d'Orhy. From the Pic des Escaliers, which rises above the forest of Iraty, the Bidouze descends northwards; while the forest, though situated on the southern slope of the chain, forms a part of French territory. The Nive, a pretty river of the Basque country, takes its rise in Spain; after flowing past St Jean Pied de Port, it joins the Adour at Bayonne. The Nivelle also belongs only partly to France and ends its course at St Jean de Luz. The Bidassoa, which is only important as forming part of the frontier, contains the Île des Faisans, where the treaty of the Pyrenees was concluded (1659), and debouches between Hendaye (France) and Fontarabia (Spain)

The climate of the department is essentially that of the Gironde in the valleys,—mild and damp. The spring is rainy; the best seasons are summer and autumn, the heat of summer being moderated by the sea. The winters are mild. The very calm air of Pau (see Pau) agrees with invalids and delicate constitutions. St Jean de Luz and Biarritz are much frequented by winter visitors.

The department is mainly agricultural, 287,719 of its inhabitants being dependent on this industry (Reclus). In 1881, of a total area of 1,883,667 acres 129,132 were under wheat and produced 217,412 quarters; the other figures were—barley, 4188 acres, 7137 quarters; buckwheat, 455 acres, 761 quarters; oats, 12,800 acres, 22,327 quarters; maize, 161,736 acres, 354,055 quarters; meslin, 2600 acres, 3987; rye, 2308 acres, 3536; flax, 13,399 acres, 9348 quarters; potatoes, 7067 acres, 158,592 bushels; vineyards, 63,511 acres, 4,019,466 gallons of wine (the most highly esteemed vintage being that of Jurançon). From 25,205 acres were produced 642,760 bushels of dried vegetables, and 18,781 acres of chestnut trees yielded 314,480 bushels of chestnuts. There are 163,613 acres of pastures and grazing-lands, 132,342 of permanent meadows and orchards, 28,595 under green crops, and 612,000 acres of waste lands. The live stock numbered 27,845 horses, 9110 mules, 15,409 asses, 139,818 horned cattle, 434,130 sheep (giving 300 tons of wool, worth £18,000), 78,310 pigs, 150,608 goats, and there were 16,000 hives of bees (producing 63 tons of honey and 16 of wax). One-half of the 386,000 acres of forest belongs to private persons, the other almost wholly to the communes or the department, scarcely any woods belonging to the Government. Forest management receives careful attention. The number of inhabitants employed in manufactures was 67,455. There are mines of anthracite, copper, iron, lead, zinc, silver, and kaolin in small quantity. The salt produced amounted to 9663 tons and is used partly for the famous Bayonne hams (so called, but really prepared in the neighbourhood of Orthez). The department has valuable mineral springs.

The Eaux-Bonnes, hot and cold, containing sodium and sulphur, are employed especially for disorders of the chest and respiratory organs. The Eaux-Chaudes, of like composition, are efficacious in catarrh, rheumatism, and skin diseases. Those of Cambo on the Nive, some hot and sulphurous, some chalybeate and cold, are much frequented by the Basques on the eve of St John. The waters of St Christau, near Oloron, containing copper, are efficacious in skin diseases. The manufactures of the department include woollen caps and sashes, the fez worn by the people of the district, nets, Béarn linen, cord slippers, chocolate, and there are also tanneries and flour-mills. The only shipping port is Bayonne, which town is also the meeting-place of the roads to St Sebastian and Pamplona in Spain. Within the department there are 265 miles of Government roads and 7160 of departmental or parish roads. There are also 142 miles of railroad, connecting Bayonne with Toulouse, Dax with Puyoo (for Pau), Bayonne with Biarritz, Puyoo with St Palais, and Pau with Laruns (Eaux Bonnes). The population in 1881 was 434,366 (57 per square kilometre), almost entirely Catholic. There are five arrondissements—Pau, Bayonne, Oloron, Orthez (population of town, 4657), and Mauléon (2038), divided into 40 cantons and 558 communes. Basses-Pyrénées constitutes the diocese of Bayonne, and is attached to the superior court of Pau and belongs to the district of the 18th Army Corps (Bordeaux).

2. **HAUTES-PYRÉNÉES**, a department of southern France, on the Spanish frontier, was formed in 1790, half of it being taken from Bigorre and the remainder from Armagnac, Nébouzan, Astarac, and Quatre Vallées, districts which all belonged to the province of Gascony. It lies between 42° 40′ and 43° 37′ N. lat. and between 19′ W. and 39′ E. long., and is bounded on the S. by Spain, on the W. by Basses-Pyrénées, on the N.W. by Landes, on the N.E. by Gers, and on the E. by Haute-Garonne. Except on the south its boundaries are conventional. Some of the Pyrenean peaks in this department reach or exceed the height of 10,000 feet, the Vignemale (10,820 feet) being the highest in French territory. The imposing corries, with their glaciers and waterfalls, and the pleasant valleys attract a large number of tourists, the most noted point being the famous Gavarnie. The northern portion of the department consists of plains, or rather fertile valleys, clothed with corn-fields, vineyards, and meadows. To the north-east, however, the cold and wind-swept plateau of Lannemezan (about 2000 feet), the watershed of the streams that come down on the French side of the Pyrenees, presents in its bleakness and barrenness a striking contrast to the plain that lies below. The department is drained by three principal streams, the Gave de Pau, the Adour, and the Neste, an affluent of the Garonne. The sources of the first and third lie close together in the Cirque of Gavarnie and on the slopes of Troumouse, whence they flow respectively to the north-west and north-east. An important spur of the Pyrenees, which carries the Pic de Néouvielle and the Pic du Midi de Bigorre, projects to the northward between these two valleys. From the Pic du Midi the Adour descends, which, after watering the pleasant valley of Campan, leaves the mountains at Bagnères and then divides into a multitude of channels, which irrigate the rich plain of Tarbes. Beyond Hautes-Pyrénées it receives on the right the Arros, which flows through the department from south to north-north-west; on the left it receives the Gave de Pau. This latter stream, rising in Gavarnie, is joined at Luz by the Gave de Bastan from Néouvielle, and at Pierrefitte by the Gave de Cauterets, fed by streams from the Vignemale. The Gave de Pau, after passing Argelès and the grotto of Lourdes on its left and the château of Lourdes on its right, leaves the mountains and turns sharply from north to north-north-west; it has a greater volume of water than the Adour, but, being more of a mountain torrent, is regarded as a tributary of the Adour, which is navigable in the latter part of its course. The Neste d'Aure, descending from the peaks of Néouvielle and Troumouse, receives the Neste de Louron from the pass of Clarabide at Arreau and flows northwards through a beautiful valley as far as Labarthe, where it turns to the north-east; it is important as furnishing the plateau of Lannemezan with a feeding canal, the waters of which are partly used for irrigation and partly for supplying the streams that rise there and are dried up in summer,—the Gers and the Baïse, affluents of the Garonne. This latter only touches the department. The climate of Hautes-Pyrénées, though very cold on the highlands, is warm and moist in the plains, where there are hot summers, fine autumns, mild winters, and rainy springs. The mean annual temperature is 68° Fahr. On the plateau of Lannemezan, while the summers are dry and scorching, the winters are very severe. A meteorological observatory has been built on the Pic du Midi.

Of the total area of 1,119,292 acres 259,334 are arable, 214,782 under wood, 160,624 pastures and grazing lands, [illegible] permanent meadows and orchards, and [illegible] vineyards. The mountain slopes are covered with pasture to a height of more than [illegible] feet. In 1881 the live stock included 114,900 horned cattle (the milch cows of Lourdes and the oxen of Tarbes being the most esteemed), 18,000 horses (mostly of the Tarbes breed crossed with Arab blood), 11,880 asses, 3200 mules (part of which are bred for Spain), 222,300 sheep, 74,800 pigs, and 8718 goats. The more important cereals are successively, as the elevation increases, maize, wheat, and rye; in the mountain districts oats, barley, and buckwheat are grown. In 1882 the harvest yielded 158,620 quarters of wheat, 197,931 of maize, 70,690 of rye, 47,586 of oats, 15,069 of barley, 27,586 of buckwheat, 61,241 of meslin, and 1,793,104 bushels of potatoes. The formerly extensive forests have suffered considerably from the weather and other causes. Vines, trained upon trees as in Italy, yield on an average 2,464,000 gallons of wine annually. On the lower slopes chestnut trees and fruit trees take the place of the vines. There are various quarries of fine marbles, which are sawn and worked at Bagnères, and numerous slate quarries. The mines of iron, nickel, lead, cobalt, manganese, and zinc are worked only irregularly. There is no coal, but a few hundred tons of peat are annually extracted. The mineral waters of Hautes-Pyrénées are numerous and much resorted to. The principal in the valley of the Gave de Pau are Cauterets (twenty-four hot springs containing sulphur and sodium), St Sauveur (two springs with sulphur and sodium), and Baréges (twelve hot springs with sulphur and sodium), and in the valley of the Adour Bagnères (fifty-two hot or cold springs containing calcium sulphates, iron, and arsenic) and Capvern near Lannemezan (two springs containing calcium sulphates). There are 2 paper-mills employing 101 workmen, 28 spinning or weaving factories employing 908 workmen (4000 spindles and 750 looms, of which 220 are power-looms). The light woollen materials known under the name of "baréges" and the knitted work of the department are widely known beyond its limits. A company has been formed for establishing cheese-factories in the mountains, as in Switzerland. There are also saw-mills, flour-mills, tanneries, and at Tarbes very important artillery establishments and a bell-foundry.

The passes (*ports*) into Spain rise more than 6500 feet; none of them are accessible to carriages, and only three—Gavarnie, Ourdissetou, and Plan—to beasts of burden. Within the department there are 222 miles of Government roads, 2837 miles of other roads, and 129 miles of railroad. It is traversed from west to east by the line from Bayonne to Toulouse, which has branches from Lourdes to Pierrefitte for Cauterets, from Tarbes to Bagnères de Bigorre, and from Montrejeau to Bagnères de Luchon. It is crossed also by lines from Tarbes to Bordeaux and from Tarbes to Agen, which separate at Vic de Bigorre. The population in 1881 was 236,474. There are three arrondissements, those of Tarbes (chief town), Argelès (town, 1682 inhabitants), and Bagnères de Bigorre (7634 inhabitants), 26 cantons, 480 communes. Hautes-Pyrénées constitutes the diocese of Tarbes, and is attached to the superior court of Pau and to the 18th Army Corps (Bordeaux).

3. **PYRÉNÉES-ORIENTALES**, a department of southern France, bordering on the Mediterranean and the Spanish frontier, was formed in 1790 out of the old province of Roussillon and to some slight extent out of small portions of Languedoc. It lies between 42° 20′ and 42° 56′ N. lat. and 1° 43′ and 3° 10′ E. long., and is bounded on the N. by Ariége and Aude, on the E. by the Mediterranean, on the S. by Catalonia, and on the W. by Ariége. Its boundaries are almost all natural and on the north follow the line of the Corbières (from 2500 to 3000 feet high), on the north-west and south-west that of branches of the

Pyrenees (from 8000 to 10,000 feet), and on the south-east that of the Albères (from 4000 to 5000 feet), which end in the sea at Cape Cerbera. Deep and sheltered bays in this vicinity are succeeded farther north by flat sandy beaches, along which lie lagoons separated from the sea by belts of sand. The lagoon of St Nazaire is 5400 acres in extent, and that of Leucate on the borders of Aude is 20,000 acres. Mont Canigou (9137 feet), though not the highest mountain in the department, is the most remarkable, since it stands out to almost its full height above the plain, and exhibits with great distinctness the succession of zones of vegetation. From the base to a height of 1400 feet are found the orange, the aloe, the oleander, the pomegranate, and the olive; the vine grows to the height of 1800 feet; next come the chestnut (2625 feet), the rhododendron (from 4330 to 8330 feet), pine (6400), and birch (6560); while stunted junipers grow quite to the summit. The drainage of the department is shared by the Tet, Tech, and Agly, which flow direct into the Mediterranean. The Aude, the Ariége (an affluent of the Garonne), and the Sègre (an affluent of the Ebro) also take their rise within the department and include a small part of it in their respective basins. The Tet rises 9430 feet above the sea and descends rapidly into a very narrow valley before it debouches at Ille (between Prades and Perpignan) upon a large plain, where it flows over a wide pebbly bed and supplies numerous canals for irrigation. It is nowhere navigable, and its supply of water varies much with the seasons, all the more that it is not fed by any glacier. The Agly, which passes Rivesaltes (famous for its wines), rises in the Corbières, and serves almost exclusively for irrigation, though admitting of navigation in the lower part of its course. The Tech, which after the Tet is the most important river of the department, flows through Vallespir (*Vallis aspera*), which, notwithstanding its name, is a green valley, clothed with wood and alive with industry; in its course the river passes Prats de Mollo and Amélie-les-Bains, before reaching Arles and Céret. In the lowlands the climate is entirely that of the Mediterranean, and the productions are the same as those of Corsica or Sicily; Amélie-les-Bains is much frequented on account of its mild climate and sheltered position. The thermometer ranges from 85° to 95° Fahr. in summer, and in winter only occasionally falls as low as 26° or 27°. The average number of rainy days in the year is 70; the mean amount of the rainfall is 27 inches on the coast, but increases towards the hills. The most common wind is the "tramontane" from north-north-west, as violent as the mistral of Provence and extremely parching. The "marinada" blows from the south-south-east.

Of a total area of 1,018,632 acres 211,960 are arable, 172,980 under vines, 167,740 under wood, 193,367 pasture-land, 27,305 meadow-land, and 148,270 barren moors (*garrigues*). In 1881 the live stock numbered 7287 horses, 6261 asses, 4373 mules, 17,768 horned cattle, 121,016 sheep (125 tons of wool in 1878), 12,864 goats, 23,838 pigs, and fowls and game in abundance; there were also 6163 beehives, yielding 24 tons of wax and 19 tons of honey known as "miel de Narbonne." Thirty tons of cocoons (silk) were produced in the same year. The main source of wealth to the department is its wine, of which 48,840,000 gallons were produced in 1881; some kinds are strongly alcoholic and others are in request as liqueur wines (Rivesaltes, Banyuls). The harvest of 1881 yielded 26,551 quarters of wheat, 3793 of meslin, 37,930 of rye, 6896 of barley, 3448 of buckwheat, 34,480 of oats, 55,172 of maize, 1,655,168 bushels of potatoes, 67,448 of dried vegetables, 22,640 of chestnuts, 110,336 of beetroot, 39 tons of hemp, 39 of flax, and 23,000 of olives. Market-gardening (artichoke, asparagus, tomatoes, melons) and fruit culture (peaches, apricots, plums, pears, quinces, pomegranates, almonds, apples, cherries, walnuts, chestnuts) yield abundant returns. The woods produce timber for the cabinetmaker, cork, and bark for tanning. In iron Pyrénées-Orientales is one of the richest departments in France. The greater part of the ore is transported to Aveyron, Gard, or Allier, but 25,000 tons are smelted in blast-furnaces and 1800 in Catalonian forges within the department. In 1881 12,100 tons of pig-iron were produced. The mineral resources of the department also include a bed of bismuth and mines of copper and silver, while both the Tet and the Tech are to some extent auriferous. A small amount of lignite is obtained (1639 tons), and various fine marbles are abundant. Granite, slate, gypsum, and limestone are quarried. The mineral waters are much resorted to. Amélie-les-Bains has twelve hot springs, chalybeate or sulphurous. In the arrondissement of Céret there are also the establishments of La-Preste-les-Bains, near Prats de Mollo, with hot sulphurous springs, and of Boulou, the Vichy of the Pyrenees. Near Prades are the hot sulphurous springs of Molitz, and a little north of Mont Canigou are the hot springs of Vernet, containing sodium and sulphur. In the valley of the Tet the sulphuros and alkaline springs of Olette reach a temperature of 172° Fahr. The baths of Escaldas near Montlouis are hot, sulphurous, and alkaline. There are numerous tanneries, oil-works, distilleries, and saw-mills, and the manufactures of the department include the making of corks, cigarette-paper, barrels, bricks, woollen and other cloths, and "espadrilles" (a kind of shoe made of coarse cloth with esparto soles). The ports of the department are Collioure, Port Vendres, and Banyuls, with 371 vessels and a total tonnage of 3638 in 1882. Port Vendres alone has any importance; in 1882 the ships entered numbered 380 (104,572 tons), those which cleared 368 (95,931 tons). There are 67 miles of railway, consisting of a portion of the line from Narbonne to Barcelona (Spain) by Perpignan, with its branches from Perpignan to Prades; there are 208 miles of Government roads and 2107 miles of other roads. The chief routes across the Pyrenees are from Perpignan and Montlouis to Puycerda (Puigcerda) in the Spanish province of Gerona, through the pass of La Perche, skirting in the French department an enclave of Spanish territory. Three other roads run from Perpignan to Figueiras (Figueras) through the passes of Perthus, Banyuls, and Balistres. In 1881 the population of Pyrénées-Orientales amounted to 208,855, the majority of whom were Catalans in speech and the rest Provençal. The chief towns of the three arrondissements are PERPIGNAN (*q.v.*), Céret (3104 inhabitants), and Prades (3687); there are 17 cantons and 231 communes. The department constitutes the diocese of Perpignan and is attached to the superior court and army corps of Montpellier. (G. ME.)

PYRITES (from πῦρ, fire), a name applied to the native bisulphide of iron, which occurs as a yellow metallic mineral, sufficiently hard to emit sparks when struck with either flint or steel. Nodules of pyrites are common in the lower beds of Chalk, and fragments of these nodules have occasionally been found on prehistoric sites under circumstances which suggest that the mineral was used as a fire-producing medium at a very early period of human culture. Even in late historic time it was often employed instead of flint, as in some of the old wheel-lock guns, whence it came to be known in France as "pierre d'arquebuse." It was afterwards found that pyrites might be made available as a source of sulphur, oil of vitriol, and other chemical products; and the mineral thus acquired such importance that in 1725 it was made the subject of a special treatise by Dr J. F. Henckel, of Freiberg in Saxony. In 1757 an English translation of this work appeared under the title of *Pyritologia; or a History of the Pyrites, the Principal Body in the Mineral Kingdom.*

By modern mineralogists the term "pyrites" has been extended to a number of metallic sulphides, and it is therefore now used rather as a group-name than as the specific designation of a mineral. Hence the typical pyrites is often distinguished as "iron pyrites," while other members of the group are known as "copper pyrites," "cobalt pyrites," "arsenical pyrites," &c. When, however, the term "pyrites" is used without any qualifying prefix it invariably denotes the original iron pyrites, a mineral which is often known to miners as "mundic," and to mineralogists as "pyrite," the final letter of the original word being omitted to bring the spelling into harmony with that of the names of many other minerals.

Iron pyrites, though containing nearly half its weight of iron, is of no importance as an ore of that metal; but the mineral is extensively worked for the sake of the sulphur which it contains, whence it is sometimes known as "sulphur ore." Large quantities of this ore have been worked in the vale of Avoca, in county Wicklow, Ireland. But by far the most important variety of the mineral is a "cupreous iron pyrites," which for many years past has been wrought on an enormous scale in Spain and Portugal. This ore seems to be an intimate mixture of iron pyrites with a small quantity of copper pyrites, the proportion of metallic copper being generally less than 3 per cent. Notwithstanding the poorness of the ore, the copper is profitably extracted by wet processes. There is also present a small quantity of silver (20 to 35 dwt. per ton), with a trace of gold. The deposits of this cupreous pyrites are of enormous magnitude, and occur at the junction of porphyritic rocks with clay-slate of Devonian age. The principal Spanish mines are those of Rio Tinto, Tharsis, and Calañas in the province of Huelva; whilst the most important of the Portuguese mines is that of San Domingos in the province of Alemtejo. There is ample proof that some of these pyritic deposits were worked by the ancient Romans.

The quantity of cupreous and other iron pyrites imported into Great Britain during the year 1883—principally from Spain and Portugal, but partly from Norway and elsewhere—was 601,288 tons, of the declared value of £1,356,083. But this quantity had been exceeded in several previous years, notably in 1880 and 1877. The quantity of iron pyrites raised in the United Kingdom in 1883 amounted to 27,672 tons, of the value (at the mine) of £17,467.

See Iron, vol. xiii. pp. 280, 288; Copper, vol. vi. p. 347; Marcasite, vol. xv. p. 532; and Mineralogy, vol. xvi. pp. 390, 393. For details of the Rio Tinto pyrites, see *A Treatise on Ore-Deposits*, by J. Arthur Phillips, 1884

PYRMONT. See Waldeck.

PYROMETER, an instrument for measuring high temperatures. As long ago as 1701, in a paper[1] published anonymously in the *Philosophical Transactions*, Newton gave the results of attempts to estimate the temperature of red-hot iron by noting the time it took to cool to an observed temperature, assuming what has since been called Newton's Law of Cooling. The numerical results are given in terms of the degrees of a linseed-oil thermometer constructed by Newton. Its zero was the temperature of melting ice and its second fixed point the normal temperature of the human body, denoted by 12°. About the same time Guillaume Amonton in Paris made somewhat similar attempts to determine the temperature of the red-hot end of an iron bar, using for reference a rudimentary air-thermometer—the first of its kind in which the variation of atmospheric pressure was allowed for. Since the middle of the last century the different methods and instruments suggested for measuring high temperatures have been very numerous,—in fact the variation of almost every physical property of substances which alter with change of temperature has been utilized for this purpose. Measurements of the increase of pressure produced in a quantity of gas while its volume remains constant or of the increase of volume at constant pressure, of the heat given out by a mass of metal in cooling to an observed temperature, of the expansion of a metal or graphite bar or of a mass of clay are those which have been most frequently employed; but, besides these, the change in the electrical resistance of a wire, the saturation-pressure of the steam of various liquids, the pressure of gas dissociated from various solids, the electromotive force of a thermo-electric couple, the density of the vapour of a liquid, the change of shape of a compound spiral of different metals, have been used,—even the alteration in the wave-length of a note of given pitch has been suggested as capable of being made use of for pyrometric purposes. For reasons which will be given below, the numerical results obtained by one or other of the numerous forms of the gas-thermometer have a more definitely intelligible value. The gas-thermometer method and the calorimetric method were both employed by Pouillet for the accurate measurement of high temperatures before 1836.

§ 2. The indications obtained by any of the numerous methods which have been suggested are, as a rule, expressed in terms of Centigrade or Fahrenheit degrees. This assignment of numbers presupposes not only a definition of temperature by which the size of the degree is determined but also a physical law which gives the relation between the measured interval of temperature and the standard degree. The various definitions of the standard degree that might be employed will be found in the article Heat, secs. 12, 24, 25, 30, 31, 32; and in sec. 35 of the same article the definition of the absolute thermodynamic scale of temperatures is given In the same article (sec. 38) it is shown that the "absolute temperature" of a liquid in thermal equilibrium with its own vapour under a pressure p may be obtained from the formula

$$t = t_0 \epsilon^{\int_{p_0}^{p} \frac{(1-\sigma)dp}{J\rho\kappa}},$$

where ρ is the density of the vapour, $\rho\sigma$ that of the liquid, κ the latent heat per unit-mass of the vapour corresponding to the saturation-pressure p. The dynamical equivalent of heat is represented by J. We have therefore the complete theory of what may soon become a practical method of expressing temperatures in the thermodynamic scale. Sir W. Thomson, in the article mentioned (secs. 39-45), has described arrangements for measuring the pressure of the saturated vapours of various liquids which will give that measurement in a thoroughly satisfactory manner up to, at any rate, some 600° C. For the higher temperatures mercury is the liquid employed. There are, however, some experimental data still wanting before the formula quoted above can be applied to the numerical calculation of the temperature. These are (1) the density ρ of the saturated vapour corresponding to the series of pressures, and (2) the corresponding latent heat κ of vaporization. These constants have not yet been actually observed. Instruments such as those figured in the article cited can, however, be employed with convenience and accuracy as continuous intrinsic thermoscopes, whose indications can supply a numerical measure of temperature after an empirical graduation. When used thus they possess the enormous advantage that the pressure of the saturated vapour at a definite temperature is perfectly definite, so that a single observation of the pressure is all that is necessary to determine the temperature, and the instrument can be easily arranged, so that this observation is practically a very simple one. The pressure of mercury vapour has already been determined by Regnault for temperatures up to 550°. A thermoscopic method of pyrometry which is very similar to the above was suggested by Lamy.[2] He proposed to measure the pressure of carbonic-acid gas dissociated from calcium carbonate. There is experimental evidence to show that the pressure of the dissociated gas is definite at a definite temperature. The recombination of the dissociated gas with the solid is, however, a slow process, and the method has been pronounced by Weinhold[3] to be practically unsatisfactory.

§ 3. *Gas Pyrometry. Measurement of High Temperatures by the Expansion of Air and other Gases and Vapours.*—Temperatures may be expressed in the absolute thermodynamic scale by the method of the gas-thermometer, which is available for practical purposes even at very high temperatures. It has been shown[4] that the indications of a nitrogen or hydrogen gas-thermometer, whether it is arranged to show the increase of pressure at constant volume or the increase of volume at constant pressure, give for the temperature numerical results which are practically identical with the corresponding numbers on the absolute scale. It follows, therefore, that any two gas-thermometers, if similarly graduated, would give identical indications for the same temperature, no matter whether or not they are filled with the same kind of gas and whether or not the quantities of the gases are such that the pressure in the two thermometers is the same at any one temperature. This important property of gas-thermometers has been experimentally verified by Regnault[1] by direct comparison up to 350° C. of instruments filled with different gases and at different pressures. For these reasons the readings of a properly arranged gas-thermometer have justly come to be regarded as furnishing the standard of temperature, at any rate outside the limits of the freezing and boiling points, and indeed may now be regarded as the temperature standard for scientific purposes throughout the whole range. The Kew standards are calibrated mercury-in-glass thermometers whose fixed points are repeatedly redetermined. Such instruments will not agree exactly with the gas-thermometer except at the freezing-point and boiling-point. Comparisons have been made between various mercury-thermometers and air-thermometers by Regnault[2] and many others. The results obtained by different observers are not entirely concordant; but it is needless here to discuss them, for, whatever may be the divergence between the mercury and air thermometers in the freezing-point and boiling-point, the method of measuring higher temperatures by continuing the scale of a mercury-thermometer beyond those limits is altogether untrustworthy in consequence of the very wide divergence between different mercury-thermometers at the same temperature, amounting sometimes to 10° or more[3] at a temperature of 300°. The air-thermometer readings must therefore be regarded as the standard at any rate for temperatures beyond the boiling-point.

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[1] "Scala Graduum Caloris," in *Phil. Trans.*, xxii. p. 824.

[2] *Comptes Rendus*, lxix. p. 347.

[3] "Pyrometrische Versuche," *Pogg. Ann.*, cxlix. p. 186.

[4] See Heat, secs. 46-67.

The general principle employed in the use of the gas-thermometer is as follows. Let p_0 be the pressure of a mass of gas at 0° C., p_{100} the pressure of the same mass of gas at 100° C., the volume being the same, p_t the observed pressure of the same mass of gas at some unknown temperature t, the volume still remaining the same, then

$$\frac{p_t - p_0}{p_{100} - p_0} = \frac{t}{100} \text{..............} (1).$$

We require, therefore, three observations of the pressure, two[4] to graduate the instrument and the third to measure the temperature. If the thermometer has been filled with gas of a perfectly definite kind—*e.g.*, properly dried and purified air, nitrogen, or hydrogen—and the containing vessel has been previously thoroughly dried, the value of p_{100} may be obtained from tables, since $p_{100} = p_0(1 + 100a)$, where a is the tabulated coefficient of expansion of the gas at constant volume. It is practically impossible to keep the volume of the gas constant in consequence of the expansion of the envelope. A correction must be applied on this account, the value of which is derived from independent observations of the expansion of the material of the envelope. If the pressure of the gas be maintained constant, and the volumes v_t, v_{100}, v_0 be observed for the three temperatures t°, 100°, 0°, we have—

$$\frac{v_t - v_0}{v_{100} - v_0} = \frac{t}{100} \text{..............} (2).$$

In like manner $v_{100} - v_0$ may be taken from a table of the coefficients of expansion of gases. The different methods which have been suggested for the employment of this property of gases to measure high temperatures are very numerous. We give details of a few of them.

(1) *The Constant-Pressure Method.*—The following is a very simple and practical plan of employing the method for obtaining a reading of the temperature. A glass or porcelain bulb, provided with a fine neck, is very carefully dried and filled with perfectly dry air; it is then exposed to the source of the heat whose temperature is to be investigated in such a manner that the point of the neck just projects from the furnace. When the equilibrium of temperature is reached, the neck is hermetically sealed by a blowpipe or oxy-hydrogen flame, and the bulb is withdrawn and allowed to cool, and weighed. The neck is then immersed in water or mercury and the point broken off. In consequence of the previous expansion of the air the pressure in the interior is much less than the atmospheric pressure, and the liquid consequently enters the bulb. When so much has entered that the pressure is the same inside and out (the difficulty of the comparative opacity of the porcelain is not insurmountable), the end is closed by a small piece of wax, and the bulb removed and weighed, with the liquid it contains. The bulb is then completely filled with the liquid, and weighed a third time. The difference between the third and first weighings gives a value v_t of formula (2), which only requires correction for the expansion of the envelope, while the difference between the second and first weighings gives a value of the volume from which v_0 and v_{100} can be calculated, using the known co-efficient of expansion of air, and thus all the requisite data for the determination of t are obtained. This method was used by Regnault[5] to determine the coefficient of expansion of air, and has since been described as "a new pyrometer."

In the process just described the volume of the residual gas is measured; its pressure, after cooling, may be measured instead, by an arrangement which was suggested by Regnault. The bulb is provided with a long fine neck, to the end of which a tap is fitted and so arranged that it can be easily connected with a manometer. The bulb is exposed to the high temperature, the tap being left open, and when the final temperature is reached the tap is closed and the bulb allowed to cool; it is then connected with the manometer, and, if the tap is a three-way tap, drilled as shown in fig. 1, it is easy to expel all the air from the bulb side of the manometer, between the mercury surface and the tap. The residual pressure is then measured by the manometer. A correction is required for the expansion of the bulb and for the part of the connecting tube not exposed to the high temperature. Instead of measuring the volume of the residual gas in the manner thus described, Deville and Troost[6] have pumped the hot air out of the porcelain bulb by means of a Sprengel pump, and measured the volume of air delivered by the pump. On this plan a series of observations can be made at the same temperature, a three-way tube with suitable taps serving to put the bulb alternately in connexion with a vessel to supply dry air and with the pump. Crafts and Meier[7] have obtained results by sweeping out the air with a current of hydrochloric-acid gas, which was separated from the air it carried by being passed through water.

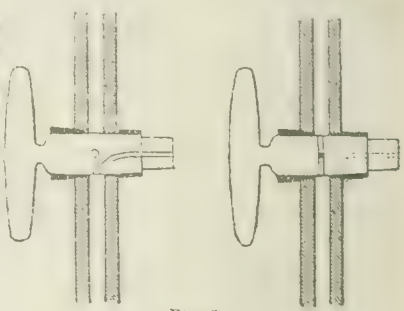

Fig. 1.

An instrument for observing the continuous variation of volume of a gas at constant pressure is figured and described by Sir W. Thomson in HEAT (sec. 65). Arrangements have also been suggested by which the density[8] of the gas at the high temperature can be directly measured. Regnault[9] has described a hydrogen pyrometer based on this principle suitable for measuring the temperature of a porcelain furnace. A wrought-iron tube of known capacity is permanently fixed in the furnace; it is filled with pure dry hydrogen by passing a current of the gas through it for some time. The current of gas is then stopped, and after the gas has attained the temperature of the furnace it is swept out by a current of *dry* air and passed over red-hot copper oxide. The water thus formed is collected in sulphuric acid tubes and its amount determined by their increase in weight, and from this observation the density of the hydrogen in the wrought-iron tube is calculated. An arrangement of taps makes the observation a very easy one when the apparatus is once set up. The formula (2) requires in this case to be slightly modified. Thus let d_t, d_{100}, d_0 be the densities of the hydrogen at the temperatures $t°$, 100°, and 0° respectively, then for the same mass of gas m we have—

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[1] "De la Mesure des Températures," *Mém. de l'Inst.*, xxi. p. 168.

[2] *Mém. de l'Inst.*, xxi. p. 191.

[3] See HEAT, sec. 26.

[4] The two known temperatures at which the pressure is measured need not necessarily be 0° and 100°, though these are often the most convenient. The formula requires only slight modification to make it applicable when any two other known temperatures are adopted.

[5] *Mém. de l'Inst.*, xxi.

[6] *Comptes Rendus.* xc. 727, 773.

[7] *C. R.*, xc. 606.

[8] Throughout this article the term "density" is used whenever the mass of a unit of volume of a substance is referred to.

[9] *Ann. de Chim.*, [3], lxiii. p. 39.

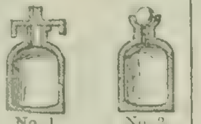
$$v_t d_t = v_{100} d_{100} = v_0 d_0 = m.$$

The formula therefore becomes—

$$\frac{d_0 - d_t}{d_0 - d_{100}} \cdot \frac{d_{100}}{d_t} = \frac{t}{100} \quad \ldots\ldots\ldots\ldots\ldots(3).$$

(2) The formula shows how the temperature of air in any experiment may be determined when its density at that temperature is observed. It is sometimes more convenient to determine instead the density of some vapour which at ordinary temperatures would be a solid or a liquid, and to deduce from that observation the density of air at the corresponding temperature. Thus, suppose that the density δ_t (expressed in grammes per cc.) of the vapour of any given liquid or solid is observed, and that independent observations show that the specific gravity of the vapour, referred to air at the same temperature and pressure, is σ, then we have $d_t = \delta_t/\sigma$, and, since d_0 and d_{100} can be taken from tables, all the necessary quantities in equation (3) are obtained. It will be noticed that the value of σ, the specific gravity of the vapour, is to be derived from independent observations. Apart from direct experimental evidence in any particular case, there is the generally accepted theory, based on the law of Avogadro, that the specific gravity of a gas or vapour referred to hydrogen at the same temperature and pressure is represented by half the number expressing the molecular weight of the substance of which the vapour is composed. For elements, with few exceptions (of which mercury is one), the ratio of the atomic weights gives the specific gravity referred to hydrogen at the same temperature and pressure. At any rate, if there are sufficient data for us to regard σ as known, we may evidently deduce the value of d_t, and thus by formula (3) the temperature, from an observation of δ_t.

Mercury Vapour.—Regnault[1] suggested the direct observation of the density of mercury vapour for the purpose of determining the temperature. The process is as follows. A quantity of mercury is placed in a wrought-iron flask provided with a perforated lid as shown in fig. 2, No. 1. The flask is then exposed to the temperature to be measured, and when thermal equilibrium is attained the small lid is slid along so that the neck is closed. The flask is then taken out and allowed to cool. The mercury is collected and weighed; the volume of the flask is determined and corrected for the expansion of the iron; and these two observations determine the density of mercury (in grammes per cc.) at the temperature in question. The specific gravity[2] of mercury vapour referred to air at the same temperature and pressure is known to be 6·92. A porcelain flask with a ball stopper, shown in fig. 2, No. 2, may be used instead of the iron flask.


No. 1. No. 2.
Fig. 2.

Iodine Vapour. Deville and Troost's Pyrometer.—Some of the best-known determinations of very high boiling-points have been made by Deville and Troost,[3] who employed iodine in a manner similar to that in which Regnault employed mercury. Some iodine was contained in a porcelain flask of about 300 cc. capacity, with a fine neck, which just protruded from the source of heat and was loosely closed by means of a stopper; when the temperature was reached and the iodine completely volatilized, the stopper was fused on to the nozzle by means of an oxy-hydrogen blowpipe. The mass of the iodine remaining in the flask was determined by weighing, after it had cooled; the volume of the flask had been previously determined; thus the density of the iodine vapour could be found. A correction of the volume of the flask was necessary in consequence of the expansion of the Bayeux porcelain of which it was composed. This was obtained from independent observations of the linear elongation of a rod of porcelain for temperatures up to 1500°; their results gave a coefficient of cubical expansion of 0·0000108 between 0° and the boiling-point of cadmium (856°), 0·0000108 between 0° and the melting-point of silver (1000°), from 0·000016 to 0·000017 between 1000° and 1400°, reaching ·000020 towards 1500°. The specific gravity of iodine vapour was taken to be 8·716, referred to air at the same temperature and pressure; this assumption was justified by additional observations with air and by using the number in a determination of the density of steam at the boiling-point of mercury.

(3) *The Manometric Gas-thermometer.*—In the constant-pressure methods of measuring temperature which have just been described one experiment gives only a single observation of the temperature. The continuous variation of temperature can be better observed by the constant-volume method. This method as used for temperatures up to that at which glass softens (about 550° C.) was thoroughly investigated by Regnault,[4] whose normal instrument is discussed under HEAT, sec. 24. The difference of pressure between the gas contained in the bulb and the atmosphere is measured by an open mercury-manometer. The barometric pressure must also be observed in order to obtain the value [illegible] of formula (1). Various forms have been given to the manometric apparatus in order that the mercury may be brought at each observation to the fiducial mark in the limb in connexion with the bulb. Balfour Stewart's[5] has a screw adjustment. An instrument described by Codazza[6] is provided with an air-compression manometer, and thus the necessity of a separate observation of the barometric height is dispensed with. Various other suggestions have been made for securing the same object.

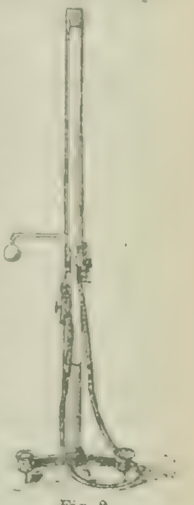


Fig. 3

The most convenient form of the instrument for general use is Jolly's (described in Poggendorff's *Jubelband*, p. 82, 1874), and represented in fig. 3. The two vertical tubes of the manometer are connected by an india-rubber tube properly strengthened by a cotton covering, and they can be made to slide vertically up and down a wooden pillar which supports them; they are provided with clamps for fixing them in any position and a tangent screw for fine adjustment. The connexion between the bulb and the manometer is made by means of the convenient three-way tap described above. The scale of the instrument is engraved on the back of a strip of plane mirror before silvering, and the divisions are carried sufficiently far across the scale for the reflexions of the two surfaces of the mercury to be visible behind the scale. Parallax can thus be avoided and an accurate reading obtained without the necessity of using a kathetometer. In order to allow for the expansion of the glass of the reservoir a weight-thermometer bulb is supplied with the instrument, made from another specimen of the same kind of glass, and the relative expansion of the mercury and the glass can thus be determined by the observer himself. The volume of the air-bulb and that of the capillary tube and the small portion of the manometer tube above the small beak of glass, the point of which serves as the fiducial mark, are determined by the instrument-makers. The formula of reduction is—

$$t = \frac{H - H_0}{\alpha H_0 - 3\beta H}\left(1 + \frac{v'}{v} \cdot \frac{H}{H_0} \cdot \frac{1}{1 + \alpha t'}\right),$$

where H is the pressure at the high temperature t, H_0 the pressure at the temperature of the air t', v'/v the ratio of the volume of the connecting tube, &c., to the volume of the bulb, α the coefficient of expansion of the air, and 3β the coefficient of cubical expansion of the glass. A similar instrument with a bulb which will resist higher temperatures may be used beyond the softening-point of glass. Pouillet in his classical research on high temperatures[7] used a platinum bulb and connecting tube. He employed the constant-pressure method and measured in the manometer tube the variation of volume. Regnault[8] mentions a platinum air-pyrometer and gives instructions for drawing the platinum connecting tube; but no results of measurements obtained with it are given. E. Becquerel[9] published an account of results obtained with a platinum reservoir air-thermometer, which were objected to by Deville and Troost on the ground that platinum becomes porous at high temperatures, and their objection is supported by an experiment described by them in the *Répertoire de Chimie Appliquée*, 1863, p. 237, and *Fortschritte der Physik*, 186[illegible], p. [illegible]. Weinhold[10] used a Jolly's thermometer fitted with a porcelain bulb and connecting tube, and Deville and Troost are of opinion that porcelain forms the only suitable material for gas-thermometer bulbs for very high temperatures.[11] For use at high temperatures the gas-thermometer should be filled with gas at a low pressure, so that when heated there may be no great difference of pressure between the interior and the external air. It is perhaps unnecessary here to insist upon the necessity for the complete desiccation of the interior of the bulb and of the gas employed.

(4) The last modification of the gas-thermometer to which it is necessary to call attention is that designed and used by Berthelot,[12] intended for reading high temperatures rapidly to an accuracy of within two or three degrees. It consists of a small cylindrical bulb

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[1] *Ann. de Chimie*, [3], lxiii. p. [illegible].

[2] Mean of results of Von Meyer, Dumas, Mitscherlich, and Bineau.

[3] *Ann. de Chimie*, [4], lviii. p. 257.

[4] *Mém. de l'Inst.* [illegible]

[5] [illegible]

[6] [illegible] p. 215.

[7] [illegible]

[8] [illegible]

[9] [illegible]

[10] [illegible]

[11] See Deville and Troost on glass and other envelopes for high-temperature instruments, [illegible] p. [illegible]

[12] *Ann. de Chimie*, [illegible] p. 144.

of glass or silver of 4 cc. capacity connected with a vertical stem of thermometer tubing of 0·2 mm. diameter. This stem terminates in an open vessel of mercury, and thus the pressure of the gas can be measured. Berthelot's instrument is graduated by reference to four fixed points, namely, the freezing-point and boiling-point of water, and the boiling-points of mercury and sulphur. In order that the mercury index may move easily in the tube, extreme care must be taken in drying the tube, and only perfectly pure mercury can be used.

§ 4. The results obtained by any of the air-pyrometric methods just described may be employed to express directly the temperature of the pyrometer in numbers agreeing closely with the thermodynamic scale. The other instruments to which we now turn our attention can only be regarded as intrinsic thermoscopes, which, in order to give intelligible numerical results, must be graduated by direct comparison with an air-thermometer. Some of them may indeed be used by extrapolation to give a numerical measure of temperatures outside the practical range of the air-thermometer, employing for that purpose a formula verified for temperatures within the range. A case in point is the determination of the temperature of fusion of platinum by the calorimetric method described below. These intrinsic thermoscopes are frequently much more convenient in practice than any of the modifications of the air-pyrometer.

§ 5. *Discontinuous Intrinsic Thermoscopes.*—The best example of the measurement of temperature by a discontinuous intrinsic thermoscope is that suggested by Prinsep.[1] He formed a series of definite percentage alloys of silver and gold and of gold and platinum. The melting-points of these alloys give a series of fixed temperatures lying between the melting-points of silver and gold and of gold and platinum respectively. An observation is taken by exposing in the furnace, upon a small cupel, a set of small flattened specimens of the alloys, not necessarily larger than pin heads, and noticing which of them are fused.

The temperatures of fusion of these alloys have been determined by Erhard and Shertel[2]; their results are given in the following table, taken from Landolt and Börnstein's *Physikalisch-chemische Tabellen.*

Table I.—The Fusing-Points of Prinsep's Alloys.

1. SILVER AND GOLD.

Per cent. of silver.	Per cent. of gold.	Fusing-point.[3]	Per cent. of silver.	Per cent. of gold.	Fusing-point.
100	..	954°	40	60	1020°
80	20	975°	20	80	1045°
60	40	995°	..	00	1075°

2. GOLD AND PLATINUM.

Per cent. of gold.	Per cent. of platinum.	Fusing-point.[3]	Per cent. of gold.	Per cent. of platinum.	Fusing-point.
100	..	1075°	45	55	1420°
95	5	1100°	40	60	1460°
90	10	1130°	35	65	1495°
85	15	1160°	30	70	1535°
80	20	1190°	25	75	1570°
75	25	1220°	20	80	1610°
70	30	1255°	15	85	1650°
65	35	1285°	10	90	1690°
60	40	1320°	5	95	1730°
55	45	1350°	..	100	1775°
50	50	1385°			

It is said, however, that some difficulty is met with in the use of Prinsep's alloys in consequence of the property possessed by silver of taking up oxygen when melted and ejecting it on solidifying and of molecular changes in the alloys which make it unadvisable to use the same specimen more than once. A similar method has recently been employed by Carnelley and Carleton Williams,[4] in which metallic salts with high fusing-points were employed instead of alloys, the fusing-points being initially determined by a calorimetric method. These methods recall an old empirical method sometimes employed in porcelain manufacture for estimating the temperature of a furnace. Certain "pyrometrical beads" or "trials"—*i.e.*, small hoops or gallipots of clay—indicated the temperature by their tint much in the same way as the proper temperature is indicated by the colour of steel in tempering.

§ 6. *The Calorimetric Method.*—This is a very convenient method and is often practically employed for measuring the temperature of furnaces. The observation consists in determining the amount of heat given out by a mass of platinum, copper, or wrought-iron on cooling in water from the high temperature. The theory is simple. Let m be the capacity for heat of the calorimeter and of the water contained in it, M the mass of metal, T the temperature required, t the initial temperature of the water in the calorimeter, θ the final temperature of the water after the introduction of the metal, and κ the *mean* specific heat of the metal between the temperatures θ and T. Then

$$T-\theta=\frac{m(\theta-t)}{M\,.\,\kappa}.$$

The value of κ, the mean specific heat of the metal between the temperatures occurring in the experiment, must be determined by precisely similar calorimetric experiments, in which the high temperature T is determined by the application of one of the air-pyrometer methods. The following table (II.) gives the best-known determinations of the mean specific heat of platinum for different ranges of temperature.

Table II.—Mean Specific Heat of Platinum.

Pouillet,[5] by platinum reservoir air thermometer.		Weinhold,[6] by porcelain reservoir air-thermometer.		Violle,[7] by porcelain reservoir air-thermometer.	
Range of temp.	Mean spec. heat.	Range of temp.	Mean spec. heat.	Range of temp.	Mean spec. heat.
0°–100°	0·03350	10°·2 – 99°·1	0·03287	0°–100°	0·0323
,, 200°	0·03392	16°·49–238°·5	0·03270		
,, 300°	0·03434	16°·9 –246°·4	0·03520		
,, 400°	0·03476	17°·2 –256°·8	0·03411		
,, 500°	0·03518	23°·5 –476°	0·03188		
,, 600°	0·03560	24°·6 –478°	0·03230		
,, 700°	0·03602	25°·4 –507°	0·03253	0°–784°	0·0365
,, 800°	0·03644	20°·7 –705°	0·03333		
,, 900°	0·03686	23°·6 –766°	0·03381		
,, 1000°	0·03728	22°·3 –934°	0·03396	0°–1000°	0·0377
,, 1100°	0·03770	17°·3 –952°	0·03333	0°–1177°	0·0388

Violle's results give, if $c_0{}^t$ be the mean specific heat between 0° and $t°$, $c_0{}^t=0·0317+·000006t$. Assuming this formula to hold beyond the verified limits, he obtains by calorimetric observations 1779° C. as the temperature of the melting-point of platinum. The true specific heat of wrought-iron at temperature t is according to Weinhold (*l.c.*) given by the formula $c_t=c_0+\alpha t+\beta t^2$, where $c_0=0·105907$, $\alpha=0·00006538$, $\beta=0·000000066477$, and the total heat obtained from unit-mass of wrought-iron cooling from $t_2°$ to $t_1°$ is therefore $\int_{t_1}^{t_2}(c_0+\alpha t+\beta t^2)dt$. The specific heat of copper does not appear to have been accurately determined for high temperatures. The determinations by Bède, quoted by Landolt and Börnstein (*op. cit.*, p. 178) are—

15°–100°	mean	specific heat	0·09331;
16°–172°	,,	,,	0·09483;
17°–247°	,,	,,	0·09680.

There are two obvious sources of error of considerable amount in the use of the calorimeter for pyrometrical purposes, viz., (1) the liability of the metal to lose heat during its passage from the furnace to the calorimeter, and (2) the evaporation of water from the calorimeter. With the small mass of platinum generally used, the former source of error is likely to be very important, for the temperature of a mass of 50 grammes of mercury at 100° C. may fall a full degree in being carried to a calorimeter 3 feet away. It does not appear that any estimates of the amount of loss which may be so produced in calorimetric determinations have been published; but in order to reduce the loss Salleron[8] suggests the employment of a platinum or copper carrier in which to heat the mass of metal, and J. C. Hoadly[9] uses a graphite crucible for that purpose. The second source of loss is more easily disposed of. Weinhold (*l.c.*) uses a calorimeter closed by a lid and quite filled with water. This is provided with a broad tube passing nearly to the bottom of the calorimeter, and the latter is tilted while the platinum mass is being introduced; whereas Violle[10] gets over the same difficulty by the use of a calorimeter provided with a platinum "éprouvette," so that the heat is imparted more slowly to the water. In a calorimetric pyrometer for technical purposes, made by Messrs Siemens

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[1] *Phil. Trans.*, 1828, p. 79.

[2] *Jahrb. für das Berg- und Hutten-Wesen in Sachsen*, 1879.

[3] Determinations of temperature by a porcelain air-thermometer. Errors in general less than 20°.

[4] See *Chem. Soc. Jour* 1876, i. 489; 1877, i. 365; 1878.

[5] *C. R.*, iii. p. 786 (1836).

[6] *Pogg. Ann.*, cxlix.

[7] *Phil. Mag.*, [5], iv. p. 318.

[8] *Chem. News*, xxvii. 77.

[9] *Jour. of Franklin Inst.*, xciv. p. 252.

[10] *Phil. Mag.*, [5], iv. p. 318.

Brothers, the mass of metal employed is a copper cylinder. For a sketch and description of the instrument, see IRON, vol. xiii. p. 304 (fig. 21).

§ 7. *Continuous Intrinsic Thermoscopes.*—The other pyrometric methods to which we have space to refer are those which depend on the continuous variation of some property of a body with variation of temperature. Each instrument of this kind requires graduation by direct or indirect comparison with an air-thermometer. The methods may be grouped under three heads,—(1) the expansion of a rod of metal or earthenware; (2) the variation of electrical resistance of a wire: (3) the electromotive force of a thermoelectric junction.

(1) *Expansion of Metals and Earthenware.*—The necessity for the measurement of high temperatures has been most felt perhaps in pottery manufacture, and in consequence many attempts have been made by potters to establish a system of pyrometry based on the permanent contraction which clay undergoes when exposed to a high temperature. The action of Wedgwood's pyrometer described in the *Phil. Trans.*, 1782, 1784, and 1786, depends on this property of clay. The linear contraction of a clay cylinder was measured by means of a metal groove with plane sides inclined to each other at a small angle, and the temperature was estimated numerically by comparing the contraction with that produced by a known difference of temperature. The results were not very satisfactory, since the clay would contract the same amount by long-continued heating at a lower temperature as by a short exposure to a higher one. Wedgwood's estimate of the melting-point of cast iron was 20,577° Fahr.

The measurement of temperature by the expansion of a metal rod has been very frequently attempted. The first instrument to which the name of "pyrometer" was given was of this kind, and was devised by Muschenbroek, and others were devised in the early part of the century by Des Aguliers, Ellicot, Graham, Smeaton, Ferguson, Brogniart, Laplace, and Lavoisier, and later by Pouillet. We may say here that the only acccurate methods of measuring the extremely minute elongations of metal rods are those in which the expansion is referred by some optical arrangement to a scale kept quite uninfluenced by the source of heat which causes the expansion. In this respect Pouillet's method of employing the expansion of a rod is superior to those previously employed.

The relative expansion of a metal in an earthenware socket was employed by Daniell in his well-known pyrometer. The relative expansion was indicated by an index of porcelain which was pushed forward when the bar expanded and left behind when it contracted, so that after the apparatus had cooled the expansion could be measured at leisure by the scale provided; due allowance was made for the expansion of the index itself. Quite recently the expansion of graphite has been employed for pyrometry by Steinle and Harting.[1] As the result of his experience, however, Weinhold[2] states that it is not possible to obtain trustworthy measurements of temperature from an instrument depending on the relative expansion of solid bodies.

An ingenious application of the relative expansion of gold, silver, and platinum was introduced by Bréguet. Very narrow strips of the three metals are fastened together to form a compound ribbon-spiral, and to the end of the spiral is attached a needle, which, as the temperature changes, moves over a graduated circle. The instrument, of course, requires empirical graduation. A modification of it is sometimes used to measure the temperature of the hot blast of an iron furnace.

(2) *Variation of Electrical Resistance.*—A pyrometric method founded on the variation of the electrical resistance of a platinum wire has been practically carried out by Siemens, and was described by him in the Bakerian lecture (*Proc. Roy. Soc.*, 1871). "Assuming a dynamical law, according to which the electrical resistance increases according to the velocity with which the atoms are moved by heat, a parabolic ratio of increase of resistance with increase of temperature follows, and in adding to this the coefficients (representing linear expansion and an ultimate minimum resistance) the resistance r for any temperature is expressed by the general formula $r = \alpha T^{\frac{1}{2}} + \beta T + \gamma$, which is found to agree very closely both with the experimental data at low temperatures supplied by Dr Matthiessen and with the experimental results varying up to 1000° C." The details of the experimental verification are not given in the abstract of the lecture, nor are the numerical values of the constants for platinum. But Weinhold gives the information, obtained by letter from the lecturer, that T is the absolute temperature, and the numerical values of the constants—$\alpha = 0{\cdot}039369$, $\beta = 0{\cdot}00216407$, $\gamma = -0{\cdot}24127$

The experimental arrangement for practical purposes of the instrument as supplied by Messrs Siemens Brothers is exceedingly convenient. It is shown in fig. 4. P is the coil of platinum-wire wound on a cylinder of fireclay, and connected by stout platinum wires X, $\bar{X}$, C with three binding screws at the end of a stout iron tube 6 feet long, and thereby with an arrangement for comparing its resistance with that of a standard coil X, by means of differential voltameters V, V'. A current from six Leclanché cells is divided into two parts, one going through the standard coil X, the voltameter V, and an additional platinum wire, also marked X, joining the other branch again at the end of the platinum coil, while the other branch includes the voltameter V', the connecting wire $\bar{X}$, and the coil P. The wire C is common to both circuits. The amount of gas generated in the voltameters is inversely proportional to the resistances of the respective branch circuits. Thus, if V and V' be the volumes of gas in the two voltameters respectively,

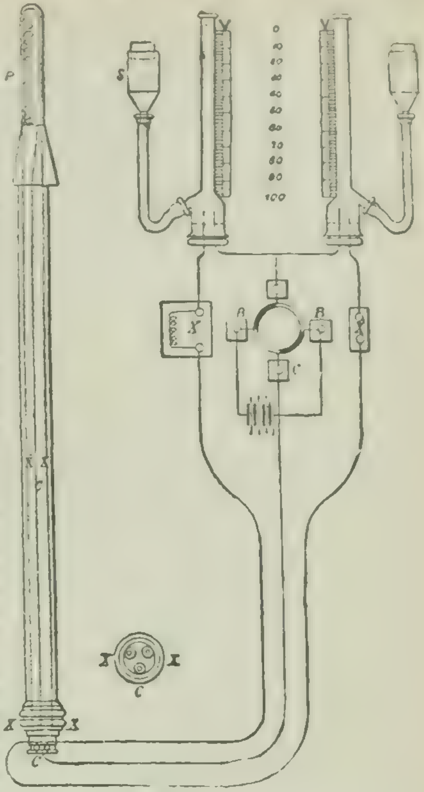

Fig. 4.

$$\frac{V}{V'} = \frac{\text{Resistance of } P \text{ and its connexions}}{\text{Resistance of } X \text{ and its connexions}}.$$

The leading wires from the screws of the iron tube to the commutator BBC are bound together in one cable, so that they have the same resistance; thus the observed variation in the ratio of the resistances may be regarded as entirely due to the variation in the resistance of P. The height of the liquids in the two voltameters can be adjusted by the short glass tubes S, S' sliding vertically on the wooden support to which the voltameters are attached. They are connected by means of india-rubber tubing with the voltameters. The commutator BBC is used to reverse the direction of the current every ten seconds during the observation, which lasts long enough to give a sufficient supply of gas in the voltameter tubes. By this artifice the error due to variation in the polarization of the electrodes is avoided.

The voltametric arrangement for comparing the resistances simplifies very greatly the apparatus required. In a laboratory the resistances may be, of course, more accurately compared by means of resistance-coils and a galvanometer. For technical purposes the temperatures up to 1400° are reduced from the observations by means of a very convenient slide rule. For temperatures beyond 1400° the calculation has to be gone through. The experimental data upon which the verification of the formula and the determination of the constants rest are not very numerous. Besides the measurements of Siemens referred to above, there is an experimental comparison by Weinhold of the results obtained from the instrument and those of an air-thermometer. For these observations the iron cover of the coil was removed. The results up to 500°, which in each case are the mean of from five to ten observations, show an agreement within 9°; those between 500° and 1000°, comprising each one observation at each of six temperatures, three of them between 500° and about 553° and three between 900° and 1000°, show differences of about +26° at the lower limit and −53° at the upper. The arrangement for comparing the resistances was found to be satisfactory and sufficiently sensitive. Specimens of this instrument were also submitted to experiment by a committee of the British Association (*Report*, 1874), but their attention was confined to the resolution of the question whether the platinum coil gave the same resistance after being repeatedly heated and cooled. It was found that this was not the case unless the coil was carefully protected by a platinum sheath.

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[1] See Beckert, *Zeitschr. f. anal. Chem.*, xxi. p. 248, 1882.

[2] *Pogg. Ann.*, cxlix. p. 206.

(3) *Thermo-electric Methods.*—The measurement of high temperatures by means of a thermo-electric junction has been attempted many times. A platinum-iron element was employed by Rosetti to measure the temperature of flames.[1] E. Becquerel[2] used a platinum-palladium element. The best-known results on the variation of the electro-motive force with temperature are those of Tait,[3] in the *Edin. Phil. Trans.*, xxvii.; but full details of the measurement of temperature in his experiments are not given. It would appear, however, from Regnault's observations,[4] and from the well-known effect of slight differences in the physical state or composition of the metals used, that it is in every case necessary for the observer with a thermo-junction to conduct his own comparison with an air-thermometer or other standard method.

§ 8. The application of the variation in the wave-length of sound to the measurement of the density of air and consequent determination of the temperature has been suggested by Cagnard de Latour, Damon-Ferrand, Mayer, and Chautard. The method is liable to difficulties which need not be detailed here, but which are obviously sufficient to cause the experiments to be regarded rather as scientific curiosities than as pyrometric measurements.

§ 9. Hitherto we have confined our attention to the question whether any instrument described is capable of giving trustworthy indications of the temperature of the instrument itself; in order to be satisfied as to whether they fulfil their object, we have still to consider whether they can be easily made to take up the temperature of the body or enclosure under investigation. This is a very difficult question, and it seems doubtful whether with such an instrument as Siemens's electrical pyrometer, of which the coil is contained in a massive sheath of iron connected to about 6 feet of stout iron tube, thermal equilibrium between the coil and the enclosure is possible. We have not space to discuss the matter, but it seems not unlikely that the differences which still exist between the results of different observers may be due to the method of exposure of the pyrometer. In connexion with this the researches of Regnault[5] with reference to the determination of the boiling-point of mercury and sulphur are very important. He observed that his thermometers, when exposed directly to the steam, indicated too high a temperature, and that it was therefore necessary for the socket enclosing the thermometer to dip into the liquid to such an extent that the surface of the liquid was above the level of the top of the thermometer bulb. Whether or not this may account for some of the differences between the results obtained for the boiling-point of zinc by Deville and Troost and by E. Becquerel and Violle it is difficult to say.

The following table (III.) will show the divergence among the best of the high-temperature measurements.

Table III.—Determinations of the Boiling-Point of Zinc.

Pressure.	Temp.	Method.	Observer.	Reference.
759·54 mm.	1030°	Iodine vapour pyrometer	Deville and Troost, 1859	§ 3, (2)
761·2 ,,	1040°	,, ,,	,, ,,	,,
	932°	Platinum reservoir air-thermometer	E. Becquerel, 1863	§ 3, (3)
	891°	Porcelain reservoir air-thermometer	,, ,,	
718·9 ,,	1035°	Porcelain reservoir air-thermometer	Weinhold, 1873	§ 3, (3)
	929°-954°	Air-thermometer ..	Deville and Troost, 1880	§ 3, (1)
	916°-925°	Hydrogen-thermometer	,, ,,	,,
760 ,,	930°	Porcelain reservoir air-thermometer	Violle, 1882........	§ 3, (3)

§ 10. Perhaps the most important modern attempts at the development of pyrometry are those connected with the identification of the law connecting the temperature of a body with the amount and nature of the energy which it radiates. On such attempts depends the possibility of measuring the temperature of a hot body by means of the light it emits. This is evidently a most desirable object, since, if that were possible, one of the great difficulties of pyrometry—the bringing of the measuring instrument to the temperature of the body under investigation—would immediately disappear. At present, however, there is no general agreement among scientific men as to the form the relation takes. We cannot here do more than refer to the "Report on Spectrum Analysis," in the British Association's *Reports* for 1881 and 1884, for references to the literature of the subject. See RADIATION. (W. N. S.)

PYROTECHNY is the art of producing pleasing scenic effects by means of fire. It is not held to include the manufacture of inflammable and explosive substances for other purposes. The use of fireworks for purposes of display is not a modern invention, for it appears to have existed in China in very ancient times; but the secret of constructing them remained unknown in Europe till about the 13th century, when the knowledge of GUNPOWDER (*q.v.*) crept in from the East. In modern times the art has been gradually improved by the work of specialists, who have had the advantage of being guided by scientific knowledge. The value of such knowledge to the pyrotechnist is extremely great; for he must be governed by the principles of chemistry in the selection of his materials, and his various contrivances for turning them to the best account are subject to the laws of mechanics. As in all such cases, however, science is useless without the aid of practical experience and acquired manual dexterity.

Many substances have a strong tendency to combine with oxygen, and will do so, in certain circumstances, so energetically as to render the products of the combination (which may be solid matter or gas) intensely hot and luminous. This is the general cause of the phenomenon known as fire. Its special character depends chiefly on the nature of the substances burned and on the manner in which the oxygen is supplied to them. As is well known, our atmosphere contains oxygen gas diluted with about four times its volume of nitrogen; and it is this oxygen which supports the combustion of our coal and candles. But it is not often that the pyrotechnist depends wholly upon atmospheric oxygen for his purposes; for the phenomena of combustion in it are too familiar, and too little capable of variation, to strike with wonder. Two cases, however, where he does so may be instanced, viz., the burning of magnesium powder and of lycopodium, both of which are used for the imitation of lightning in theatres. Nor does the pyrotechnist resort much to the use of pure oxygen, although very brilliant effects may be produced by burning various substances in glass jars filled with the gas. Indeed, the art could never have existed in anything like its present form had not certain solid substances become known which, containing oxygen in combination with other elements, are capable of being made to evolve large volumes of it at the moment it is required. The best examples of these solid *oxidizing agents* are nitrate of potash (nitre or saltpetre) and chlorate of potash; and these are of the first importance in the manufacture of fireworks. If a portion of one of these salts be thoroughly powdered and mixed with the correct quantity of some suitable combustible body, also reduced to powder, the resulting mixture is capable of burning with more or less energy without any aid from atmospheric oxygen, since each small piece of fuel is in close juxtaposition to an available and sufficient store of the gas. All that is required is that the liberation of the oxygen from the solid particles which contain it shall be started by the application of heat from without, and the action then goes on unaided. This, then, is the fundamental fact of pyrotechny,—that, with proper attention to the chemical nature of the substances employed, solid mixtures (*compositions* or *fuses*) may be prepared which contain within themselves all that is essential for the production of fire.

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[1] *Ann. de Chim.*, 1878.

[2] *Ann. de Chim.*, lxviii. p. 49.

[3] See ELECTRICITY.

[4] *Mém. de l'Inst.*, xxi. p. 241.

[5] *Mém. de l'Inst.* xxvi. p. 513.

If nitre and chlorate of potash, with other salts of nitric and chloric acids and a few similar compounds, be grouped together as oxidizing agents, most of the other materials used in making firework compositions may be classed as *oxidizable substances.* Every composition must contain at least one sample of each class: usually there are present more than one oxidizable substance, and very often more than one oxidizing agent. In all cases the proportions by weight which the ingredients of a mixture bear to one another is a matter of much importance, for it greatly affects the manner and rate of combustion. The most important oxidizable substances employed are charcoal and sulphur. These two, it is well known, when properly mixed in certain proportions with the oxidizing agent nitre, constitute gunpowder; and gunpowder plays an important part in the construction of most fireworks. It is sometimes employed alone, when a strong explosion is required; but more commonly it is mixed with one or more of its own ingredients and with other matters. In addition to charcoal and sulphur, the following oxidizable substances are more or less employed:—many compounds of carbon, such as sugar, starch, resins, &c.; certain metallic compounds of sulphur, such as the sulphides of arsenic and antimony; a few of the metals themselves, such as iron, zinc, magnesium, antimony, copper. Of these metals iron (cast-iron and steel) is more used than any of the others. They are all employed in the form of powder or small filings. They do not contribute much to the burning power of the composition; but when it is ignited they become intensely heated and are discharged into the air, where they oxidize more or less completely and cause brilliant sparks and scintillations.

Sand, sulphate of potash, calomel, and some other substances, which neither combine with oxygen nor supply it, are sometimes employed as ingredients of the compositions in order to influence the character of the fire. This may be modified in many ways. Thus the rate of combustion may be altered so as to give anything from an instantaneous explosion to a slow fire lasting many minutes. The flame may be clear, smoky, or charged with glowing sparks. But the most important characteristic of a fire—one to which great attention is paid by pyrotechnists—is its *colour*, which may be varied through the different shades and combinations of yellow, red, green, and blue. These colours are imparted to the flame by the presence in it of the heated vapours of certain metals, of which the following are the most important:—sodium, which gives a yellow colour; calcium, red; strontium, crimson; barium, green; copper, green or blue, according to circumstances. Suitable salts of these metals are much used as ingredients of fire mixtures; and they are decomposed and volatilized during the process of combustion. Very often the chlorates and nitrates are employed, as they serve the double purpose of supplying oxygen and of imparting colour to the flame.

The number of fire mixtures actually employed is very great; for the requirements of each variety of firework, and of almost each size of each variety, are different. Moreover, every pyrotechnist has his own taste in the matter of compositions. They are capable, however, of being classified according to the nature of the work to which they are suited. Thus there are rocket-fuses, gerbe-fuses, squib-fuses, star-compositions, &c.; and, in addition, there are a few which are essential in the construction of most fireworks, whatever the main composition may be. Such are the *starting-powder*, which first catches the fire, the *bursting-powder*, which causes the final explosion, and the *quick-match* (cotton-wick, dried after being saturated with a paste of gunpowder and starch), employed for connecting parts of the more complicated works and carrying the fire from one to another. Of the general nature of fuses an idea may be had from the following two examples, which are selected at hazard from among the numerous recipes for making, respectively, tourbillion fire and green stars:—

Tourbillion.		
Meal gunpowder	24	parts.
Nitre	10	,,
Sulphur	7	,,
Charcoal	4	,,
Steel filings	8	,,

Green Stars.		
Chlorate of potash	16	parts.
Nitrate of baryta	48	,,
Sulphur	12	,,
Charcoal	1	,,
Shellac	5	,,
Calomel	8	,,
Sulphide of copper	2	,,

Although the making of compositions is of the first importance, it is not the only operation with which the pyrotechnist has to do; for the construction of the *cases* in which they are to be packed, and the actual processes of packing and finishing, require much care and dexterity. These cases are made of paper or pasteboard, and are generally of a cylindrical shape. In size they vary greatly, according to the effect which it is desired to produce. The relations of length to thickness, of internal to external diameter, and of these to the size of the openings for discharge, are matters of extreme importance, and must always be attended to with almost mathematical exactness and considered in connexion with the nature of the composition which is to be used.

There is one very important property of fireworks that is due more to the mechanical structure of the cases and the manner in which they are filled than to the precise chemical character of the composition, *i.e.*, their power of *motion.* Some are so constructed that the piece is kept at rest and the only motion possible is that of the flame and sparks which escape during combustion from the mouth of the case. Others, also fixed, contain, alternately with layers of some more ordinary composition, balls or blocks of a special mixture cemented by some kind of varnish; and these *stars*, as they are called, shot into the air, one by one, like bullets from a gun, blaze and burst there with striking effect. But in many instances motion is imparted to the firework as a whole,—to the case as well as to its contents. This motion, various as it is in detail, is almost entirely one of two kinds,—*rotatory* motion round a fixed point, which may be the centre of gravity of a single piece or that of a whole system of pieces, and *free ascending* motion through the air. In all cases the cause of motion is the same, viz., that large quantities of gaseous matter are formed by the combustion, that these can escape only at certain apertures, and that a backward pressure is necessarily exerted at the point opposite to them. When a large gun is discharged, it recoils a few feet. Movable fireworks may be regarded as very light guns loaded with heavy charges; and in them the recoil is therefore so much greater as to be the most noticeable feature of the discharge; and it only requires proper contrivances to make the piece fly through the air like a sky-rocket or revolve round a central axis like a Catherine wheel. Beauty of motion is hardly less important in pyrotechny than brilliancy of fire and variety of colour.

The following is a brief description of some of the forms of firework most employed:—

Fixed Fires. *Theatre fires* consist of a slow composition which may be heaped in a conical pile on a tile or a flagstone and lit at the apex. They require no cases. Usually the fire is coloured,—green, red, or blue; and beautiful effects are obtained by illuminating buildings with it. It is also used on the stage; but, in that case, the composition must be such as to give no suffocating or poisonous fumes. *Bengal lights* are very similar, but are piled in saucers, covered with gummed paper, and lit by means of pieces of match. *Marroons* are small boxes wrapped round several times with lind cord and filled with a strong composition which explodes with a loud report. They are generally used in *batteries*, or in combination with some other form of firework. *Squibs* are straight cylindrical cases about 6 inches long, firmly closed at one end, tightly packed with a strong composition, and capped with touch-paper. Usually a little bursting-powder is put in before the ordinary composition, so that the fire is finished by an explosion. The character of the fire is, of course, susceptible of great variation in colour, &c. *Crackers* are characterized by the cases being doubled backwards and forwards several times, the folds being pressed close and secured by twine. One end is primed; and when this is lit the cracker burns with a hissing noise, and a loud report occurs every time the fire reaches a bend. If the cracker is placed on the ground, it will give a jump at each report; so that it cannot quite fairly be classed among the fixed fireworks. *Roman candles* are straight cylindrical cases filled with layers of composition and *stars* alternately. These stars are simply balls of some special composition, usually containing metallic filings, made up with gum and spirits of wine, cut to the required size and shape, dusted with gunpowder, and dried They are discharged like blazing bullets several feet into the air, and produce a beautiful effect, which may be enhanced by packing stars of differently coloured fire in one case. *Gerbes* are choked cases, not unlike Roman candles, but often of much larger size. Their fire spreads like a sheaf of wheat. They may be packed with variously coloured stars, which will rise 30 feet or more. *Lances* are small straight cases charged with compositions like those used for making stars. They are mostly used in complex devices, for which purpose they are fixed with wires on suitable wooden frames. They are connected by *leaders, i.e.*, by quick-match enclosed in paper tubes, so that they can be regulated to take fire all at the same time, singly, or in detachments, as may be desired. The devices constructed in this way are often of an extremely elaborate character; and they include all the varieties of *lettered designs*, of *fixed suns, fountains, palm-trees, waterfalls, mosaic work, Highland tartan*, &c.

Rotating Fireworks.—*Pin* or *Catherine wheels* are long paper cases filled with a composition by means of a funnel and packing-wire and afterwards wound round a disk of wood. This is fixed by a pin, sometimes vertically and sometimes horizontally; and the outer primed end of the spiral is lit. As the fire escapes the recoil causes the wheel to revolve in an opposite direction and often with considerable velocity. *Pastiles* are very similar in principle and construction. Instead of the case being wound in a spiral and made to revolve round its own centre point, it may be used as the engine to drive a wheel or other form of framework round in a circle. Many varied effects are thus produced, of which the *fire-wheel* is the simplest. Straight cases, filled with some fire-composition, are attached to the end of the spokes of a wheel or other mechanism capable of being rotated. They are all pointed in the same direction at an angle to the spokes, and they are connected together by leaders, so that each, as it burns out, fires the one next it. The pieces may be so chosen that brilliant effects of changing colour are produced; or various fire-wheels of different colours may be combined, revolving in different planes and different directions—some fast and some slowly. *Bisecting wheels, plural wheels, caprice wheels, spiral wheels*, are all more or less complicated forms; and it is possible to produce, by mechanism of this nature, a model in fire of the solar system.

Ascending Fireworks.—*Tourbillions* are fireworks so constructed as to ascend in the air and rotate at the same time, forming beautiful spiral curves of fire. The straight cylindrical case is closed at the centre and at the two ends with plugs of plaster of Paris, the composition occupying the intermediate parts. The fire finds vent by six holes pierced in the case. Two of these are placed close to the ends, but at opposite sides, so that one end discharges to the right and the other to the left; and it is this which imparts the rotatory motion. The other holes are placed along the middle line of what is the under-surface of the case when it is laid horizontally on the ground; and these, discharging downwards, impart an upward motion to the whole. A cross piece of wood balances the tourbillion; and the quick-match and touch-paper are so arranged that combustion begins at the two ends simultaneously and does not reach the holes of ascension till after the rotation is fairly begun. The *sky-rocket* is generally considered the most beautiful of all fireworks; and it certainly is the one that requires most skill and science in its construction. It consists essentially of two parts,—the body and the head. The body is a straight cylinder of strong pasted paper and is choked at the lower end, so as to present only a narrow opening for the escape of the fire. The composition does not fill up the case entirely, for a central hollow conical bore extends from the choked mouth up the body for three quarters of its length. This is an essential feature of the rocket. It allows of nearly the whole composition being fired at once; the result of which is that an enormous quantity of heated gases collects in the hollow bore and the gases, forcing their way downwards through the narrow opening, urge the rocket up through the air. The top of the case is closed by a plaster-of-Paris plug. A hole passes through this and is filled with a fuse, which serves to communicate the fire to the head after the body is burned out. This head, which is made separately and fastened on after the body is packed, consists of a short cylindrical paper chamber with a conical top. It serves the double purpose of cutting a way through the air and of holding the *garniture* of stars, sparks, crackers, serpents, gold and silver rain, &c., which are scattered by bursting fire as soon as the rocket reaches the highest point of its path. A great variety of beautiful effects may be obtained by the exercise of ingenuity in the choice and construction of this garniture Many of the best results have been obtained by unpublished methods which must be regarded as the secrets of the trade. The *stick* of the sky-rocket serves the purpose of guiding and balancing it in its flight; and its size must be accurately adapted to the dimensions of the case. In *winged* rockets the stick is replaced by cardboard wings, which act like the feathers of an arrow. A *girandole* is the simultaneous discharge of a large number of rockets (often from one hundred to two hundred), which either spread like a peacock's tail or pierce the sky in all directions with rushing lines of fire. This is usually the final feat of a great pyrotechnic display.

For a description of rockets used in war, see AMMUNITION

See Chertier, *Sur les Feux d'Artifice* (Paris, 1841; 2d ed. 1854); Mortimer, *Manual of Pyrotechny* (London, 1856); Tessier, *Chimie pyrotechnique, ou Traité pratique des Feux Colorés* (Paris, 1858); Richardson and Watts, *Chemical Technology*, s.v. "Pyrotechny" (London, 1863-67); Thomas Kentish, *The Pyrotechnist's Treasury* (London, 1878); Websky, *Luftfeuerwerkkunst* (Leipsic 1878). (O. M.)

PYRRHO. See SCEPTICISM.

PYRRHUS. The name of Pyrrhus, king of Epirus, owes its chief fame in history to the fact that with his invasion of Italy in the early part of the 3d century B.C. Greece and Rome for the first time came definitely into contact. Born about the year 318, and claiming descent from Pyrrhus, the son of Achilles, connected also with the royal family of Macedonia through Olympias, the mother of Alexander the Great, he became when a mere stripling king of the wild mountain tribes of Epirus, and learned how to fight battles in the school of Demetrius Poliorcetes (the Besieger) and of his father Antigonus. He fought by their side in his seventeenth year at the memorable battle of Ipsus in Phrygia, in which they were decisively defeated by the combined armies of Seleucus and Lysimachus. Soon afterwards he was sent to the court of Ptolemy of Egypt at Alexandria as a pledge for the faithful carrying out of a treaty of alliance between Ptolemy and Demetrius, as his sister Deidamia was the wife of the latter. Through Ptolemy, whose step-daughter Antigone he married, he was enabled to establish himself firmly on the throne of Epirus, and he became a formidable opponent to Demetrius, who was now king of Macedonia and the leading man in the Greek world. He won a victory over one of Demetrius's generals in Ætolia, invaded Macedonia, and forced Demetrius to conclude a truce with him. For a brief space of about seven months he had possession of a large part of Macedonia, Demetrius finding it convenient to make this surrender on condition that Pyrrhus did not meddle with the affairs of the Peloponnesus. But in 286 he was defeated by Lysimachus at Edessa, driven out of Macedonia, and compelled to fall back on his little kingdom of Epirus. In 280 came the great opportunity of his life, the embassy from the famous Greek city Tarentum in southern Italy with a request for aid against Rome, whose hostility the Tarentines had recklessly provoked. Pyrrhus had a trusted friend and adviser in Cineas of Thessaly, a persuasive speaker and a clever diplomatist, and he at once sent him over with 3000 men to Tarentum with a view to prepare matters. He himself soon followed, after a disastrous passage across the Adriatic, with a miscellaneous force, furnished him partly by the assistance of Ptolemy, of about 25,000 men, with some elephants, his best troops being some Macedonian infantry and Thessalian cavalry. He had counted on an army of Italian mercenaries, but the Tarentines and the Italian Greeks generally shrank from anything like serious effort and resented his calling upon them for men and money. Rome meantime raised a special war contribution, called on her subjects and allies for their full contingent of troops, and posted strong garrisons in all towns of doubtful fidelity. She was now quite the dominant power in Italy, but her position was critical, as in the north she had had trouble with the Etruscans and Gauls, while in the south the Lucanians and Bruttians were making common cause with Tarentum and the Greek cities. In fact there was the possibility of a most formidable coalition of the Italian peoples both in the north and in the south against Rome, and so Pyrrhus had a good deal on which to build his hopes of success. For the first time in history Greeks and Romans met in battle at Heraclea near the shores of the Gulf of Tarentum, and the cavalry and elephants of Pyrrhus secured for him a complete victory, though at so heavy a loss as to convince him of the great uncertainty of final success. Although he now had the Samnites as well as the Lucanians and Bruttians and all the Greek cities of southern Italy with him, he found every city closed against him as he advanced on Rome through Latium, and his dexterous minister Cineas utterly failed to negotiate a peace, the old blind Appius Claudius declaring in the senate that Rome never negotiated with a foreign enemy on Italian ground. In the second year of the war, 279, Pyrrhus again defeated a Roman army at Asculum (Ascoli) in Apulia, but he was no nearer decisive success, as Rome still had armies in the field and her Italian confederation was not broken up. For a while he quitted Italy for Sicily with the view of making himself the head of the Sicilian Greeks and driving the Carthaginians out of the island. In his military operations he was on the whole successful, and Rome and Carthage in face of the common danger concluded an offensive and defensive alliance against him. He passed three years in Sicily, but through want of political tact he gave offence to the Greek cities, which he treated rather too much in the fashion of a despot, not paying any respect to their local constitutions or sufficiently humouring their republican tastes and love of independence. He thus lost a good opportunity of uniting both the Italian and Sicilian Greeks against Rome. On his return to Italy in 276 he had neither men nor money adequately supplied him, as Tarentum and the other Greek cities had no confidence in him. It is said that he was thoroughly disheartened, and was haunted by mysterious dreams and forebodings which followed on an act which he imagined had involved him in the guilt of sacrilege. He made indeed one more effort, and engaged a Roman army at Beneventum in the Samnite country, but his arrangements for the battle miscarried, and he was defeated with the loss of his camp and the greater part of his army. He had made a fair trial of the strength of Rome and had been utterly baffled. Nothing remained but to go back to his allies at Tarentum. He left a garrison in the city and returned the following year to his home in Epirus after a six years' absence. The brief remainder of his life was passed in camps and battles, without, however, any glorious result. He won a victory over Antigonus Gonatas, king of Macedonia, on Macedonian ground. In 273 he was invited into the Peloponnesus to settle at the sword's point a dispute about the royal succession at Sparta. He besieged the city, but was repulsed with great loss. Next he went to Argos at the invitation of a political faction, and here in the confusion of a fight by night in the streets he met his death in his forty-sixth year from the hand of a woman, who hurled a ponderous roof-tile upon his head just at the moment, it is said, when he was striking a blow at her son.

Pyrrhus was no doubt a brilliant and dashing soldier, but he was aptly compared "to a gambler who made many good throws with the dice, but could not make the proper use of the game." There was something chivalrous about him which seems to have made him a general favourite. After his death Macedonia had for a time at least nothing to fear, and the liberty of Greece was quite at the mercy of that power.

For Pyrrhus, English readers will do well to consult Thirlwall, *Greece*, vols. vii., viii.; Mommsen, *History of Rome*, ii. 7; Niebuhr, *Lectures on Roman History*, lects. l., li. Plutarch's *Life of Pyrrhus* is the fullest of our original sources of information, and there is frequent mention of him in Polybius.

PYTHAGORAS AND PYTHAGOREANS. Pythagoras is one of those figures which have so impressed the imagination of succeeding times that their historical lineaments are difficult to discern through the mythical haze that envelops them. Animated, as it would appear, not merely by the philosophic thirst for knowledge but also by the enthusiasm of an ethico-religious reformer, he became, centuries after his death, the ideal hero or saint of those who grafted a mystical religious asceticism on the doctrines of Plato. Writings were forged in his name. Lives of him were written which gather up in his person all the traits of the philosophic wise man, and surround him besides with the nimbus of the prophet and wonder-worker. He is described by his Neoplatonic biographers as the favourite and even the son of Apollo, from whom he received his doctrines by the mouth of the Delphic priestess. We read that he had a golden thigh, which he displayed to the assembled Greeks at Olympia, and that on another occasion he was seen in Crotona and Metapontum at one and the same time. He is said to have tamed wild beasts by a word and to have foretold the future, while many stories turn upon the knowledge he was reported to retain of his personality and deeds in former states of existence. Thus, as Zeller truly remarks, the information respecting Pythagoreanism and its founder grows fuller and fuller the farther removed in time it is from its subject. The authentic details of Pythagoras's career, on the other hand, are meagre enough and merely approximate in character. He was a native of Samos, and the first part of his life may therefore be said to belong to that Ionian seaboard which had already witnessed the first development of philosophic thought in Greece. The exact year of his birth has been variously placed between 586 and 569 B.C., but 582 may be taken as the most probable date. Some of the accounts make him the pupil of Anaximander; but such an assertion lies so ready to hand in the circumstances of time and place that we cannot build with any assurance upon the suggested connexion with the Ionic school. It is probable, however, that Pythagoras was aware of their speculations, seeing that he left behind him in Ionia the reputation of a learned and universally informed man. "Of all men Pythagoras, the son of Mnesarchus, was the most assiduous inquirer," says Heraclitus, and then proceeds in his contemptuous fashion to brand his predecessor's wisdom as only eclectically compiled information or polymathy (πολυμαθία). This accumulated wisdom, as well as most of the tenets of the Pythagorean school, was attributed in antiquity to the extensive travels of Pythagoras, which brought him in contact (so it was said) not only with the Egyptians, the Phœnicians, the Chaldæans, the Jews, and the Arabians, but also with the Druids of Gaul, the Persian Magi, and the Brahmans. But these tales are told of too many of the early philosophers to be received implicitly; they represent rather the tendency of a later age to connect the beginnings of Greek speculation with the hoary religions and priesthoods of the East. There is no intrinsic improbability, however, in the statement that Pythagoras visited Egypt and other countries of the Mediterranean, for travel was then one of the few ways of gathering knowledge. Some of the accounts represent Pythagoras as deriving much of his mathematical knowledge from an Egyptian source. Herodotus traces the doctrine of metempsychosis to Egypt, as well as the practice of burying the dead exclusively in linen garments, but he does not mention any visit of Pythagoras to that country. There is thus little more than conjecture to fill out the first half of the philosopher's life. The historically important part of his career begins with his emigration to Crotona, one of the Dorian colonies in the south of Italy. Nothing is known with certainty of the reasons that led to this step, which he appears to have taken about the year 529; perhaps the ethical temper which can be traced in the Pythagorean school attracted the founder towards the sterner Dorian character. At Crotona Pythagoras speedily became the centre of a widespread and influential organization, which seems to have resembled a religious brotherhood or an association for the moral reformation of society much more than a philosophic school. Pythagoras appears, indeed, in all the accounts more as a moral reformer than as a speculative thinker or scientific teacher; and it is noteworthy that the only one of the doctrines of the school which is definitely traceable to Pythagoras himself is the ethico-mystical doctrine of transmigration. The aim of the brotherhood was the moral education and purification of the community; and it seems to have been largely based upon a revival of the Dorian ideal of abstinence and hardihood along with certain other traits of a more definitely religious character, which were probably due to the influence of the mysteries. But many details of life and ritual, such as abstinence from animal food and from beans, celibacy, and even community of goods, have been fathered by the organized asceticism of a later period upon the original followers of Pythagoras. Ethics, according to the Greek and especially according to the Dorian conception, being inseparably bound up with the general health of the state, we are not surprised to find the Pythagoreans represented as a political league; nor is it wonderful that their following was among the aristocracy, and that they formed the staunchest supporters of the old Dorian constitutions. It is unfair, however, to speak of the league as primarily a political organization, wide though its political ramifications must latterly have become. Its entanglement with politics was in the end fatal to its existence. The authorities differ hopelessly in chronology, but according to the balance of evidence the first reaction against the Pythagoreans took place in the lifetime of Pythagoras himself after the victory gained by Crotona over Sybaris in the year 510. Dissensions seem to have arisen about the allotment of the conquered territory, and an adverse party was formed in Crotona under the leadership of Cylon. This was probably the cause of Pythagoras's withdrawal to Metapontum, which an almost unanimous tradition assigns as the place of his death in the end of the 6th or the beginning of the 5th century. The league appears to have continued powerful in Magna Græcia till the middle of the 5th century, when it was violently trampled out by the successful democrats. The meeting-houses of the Pythagoreans were everywhere sacked and burned; mention is made in particular of "the house of Milo" in Crotona, where fifty or sixty of the leading Pythagoreans were surprised and slain. The persecution to which the brotherhood was subjected throughout Magna Græcia was the immediate cause of the spread of the Pythagorean philosophy in Greece proper. Philolaus, who resided at Thebes in the end of the 5th century (cf. Plato, *Phædo*, 61D), was the author of the first written exposition of the system. Lysis, the instructor of Epaminondas, was another of these refugees. This Theban Pythagoreanism was not without an important influence upon Plato, and Philolaus had also disciples in the stricter sense. But as a philosophic school Pythagoreanism became extinct in Greece about the middle of the 4th century. In Italy—where, after a temporary suppression, it attained a new importance in the person of Archytas, ruler of Tarentum—the school finally disappeared about the same time.

Pythagorean Philosophy.

The central thought of the Pythagorean philosophy is the idea of number, the recognition of the numerical and mathematical relations of things. In the naive speculation of an early age the abstract consideration of these relations was tantamount to asserting their essential existence as the causes of phenomena. Hence the Pythagorean thought crystallized into the formula that all things are number, or that number is the essence of everything. "The Pythagoreans seem," says Aristotle, "to have looked upon number as the principle and, so to speak, the matter of which existences consist"; and again, "they supposed the elements of numbers to be the elements of existence, and pronounced the whole heaven to be harmony and number." "Number," says Philolaus, "is great and perfect and omnipotent, and the principle and guide of divine and human life." Fantastical as such a proposition sounds, we may still recognize the underlying truth that prompted it if we reflect that it is number or definite mathematical relation that separates one thing from another and so in a sense makes them things. Without number and the limitation which number brings there would be only chaos and the illimitable, a thought abhorrent to the Greek mind. Number, then, is the principle of order, the principle by which a cosmos or ordered world subsists. So we may perhaps render the thought that is crudely and sensuously expressed in the utterances of the school. They found the chief illustrations, or rather grounds, of their position in the regular movements of the heavenly bodies and in the harmony of musical sounds, the dependence of which on regular mathematical intervals they were apparently the first to discover. The famous theory of the harmony of the spheres combines both ideas: the seven planets are the seven golden chords of the heavenly heptachord.

Immediately connected with their central doctrine is the theory of opposites held by the Pythagoreans. Numbers are divided into odd and even, and from the combination of odd and even the numbers themselves (and therefore all things) seem to result. The odd number was identified with the limited, the even with the unlimited, because even numbers may be perpetually halved, whereas the odd numbers (at least the earlier ones), being without factors, seem to stand in solid singleness. All things, accordingly, were derived by the Pythagoreans from the combination of the limited and the unlimited; and it is in harmony with the Greek spirit that the place of honour is accorded to the odd or the limited. Following out the same thought, they developed a list of ten fundamental oppositions, which roughly resembles the tables of categories framed by later philosophers:—(1) limited and unlimited; (2) odd and even; (3) one and many; (4) right and left; (5) masculine and feminine; (6) rest and motion; (7) straight and crooked; (8) light and darkness; (9) good and evil; (10) square and oblong. The arbitrariness of the list and the mingling of mathematical, physical, and ethical contrasts are characteristic of the infancy of speculation. The union of opposites in which consists the existence of things is harmony; hence the expression already quoted that the whole heaven or the whole universe is harmony. But it is to be noted that interpretations of Pythagoreanism which represent the whole system as founded on the opposition of unity and duality, and suppose this to have been explicitly identified with the opposition of form and matter, of divine activity and passive material, must be unhesitatingly rejected as betraying on the surface their post-Platonic origin. Still more is this the case when in Neoplatonic fashion they go on to derive this original opposition from the supreme Unity or God. The further speculations of the Pythagoreans on the subject of number rest mainly on analogies, which often become capricious and tend to lose themselves at last in a barren symbolism. The decade, as the basis of the numerical system, appeared to them to comprehend all other numbers in itself, and to it are applied, therefore, the epithets quoted above of number in general. Similar language is held of the number "four," because it is the first square number and is also the potential decade ($1+2+3+4=10$); Pythagoras is celebrated as the discoverer of the holy *τετρακτύς*, "the fountain and root of ever-living nature." "Seven" is called *παρθένος* and *Ἀθήνη*, because within the decade it has neither factors nor product. "Five," on the other hand, signifies marriage, because it is the union of the first masculine with the first feminine number ($3+2$, unity being considered as a number apart). The thought already becomes more fanciful when "one" is identified with reason, because it is unchangeable; "two" with opinion, because it is unlimited and indeterminate; "four" with justice, because it is the first square number, the product of equals. More legitimate is their application of number to geometry, according to which "one" was identified with the point, "two" with the line, "three" with the surface, and "four" with the cube. In the history of music the Pythagorean school is also of considerable importance from the development which the theory of the octave owes to its members; according to some accounts the discovery of the harmonic system is due to Pythagoras himself.

As already mentioned, the movements of the heavenly bodies formed for the Pythagoreans an illustration on a grand scale of the truth of their theory. Their cosmological system is also interesting on account of peculiarities which mark it out from the current conceptions of antiquity and bring it curiously near to the modern theory. Conceiving the universe, like many early thinkers, as a sphere, they placed in the heart of it the central fire, to which they gave the name of Hestia, the hearth or altar of the universe, the citadel or throne of Zeus. Around this move the ten heavenly bodies—farthest off the heaven of the fixed stars, then the five planets known to antiquity, then the sun, the moon, the earth, and lastly the counter-earth (ἀντίχθων), which revolves between the earth and the central fire and thus completes the sacred decade. Revolving along with the earth, the last-mentioned body is always interposed as a shield between us and the direct rays of the central fire. Our light and heat come to us indirectly by way of reflexion from the sun. When the earth is on the same side of the central fire as the sun, we have day; when it is on the other side, night. This attribution of the changes of day and night to the earth's own motion led up directly to the true theory, as soon as the machinery of the central fire and the counter-earth was dispensed with. The counter-earth became the western hemisphere, and the earth revolved on its own axis instead of round an imaginary centre. But, as appears from the above, the Pythagorean astronomy is also remarkable as having attributed a planetary motion to the earth instead of making our globe the centre of the universe. Long afterwards, when the church condemned the theory of Copernicus, the indictment that lay against it was its heathen and "Pythagorean" character.

The doctrine which the memory of mankind associates most closely with Pythagoras's name is that of the transmigration of souls—METEMPSYCHOSIS (*q.v.*). Though evidently of great importance for Pythagoras himself, it does not stand in any very obvious connexion with his philosophy proper. He seems to have adopted the idea from the Orphic Mysteries. The bodily life of the soul, according to this doctrine, is an imprisonment suffered for sins committed in a former state of existence. At death the soul reaps what it has sown in the present life. The reward of the best is to enter the cosmos, or the higher and purer regions of the universe, while the direst crimes receive their punishment in Tartarus. But the general lot is to live afresh in a series of human or animal forms, the nature of the bodily prison being determined in each case by the deeds done in the life just ended. This is the same doctrine of retribution and purificatory wandering which meets us in Plato's mythical descriptions of a future life. They are borrowed by him in their substance from the Pythagoreans or from a common source in the Mysteries. In accordance with this religious view of life as a stage of probation were the ethical precepts of the school, inculcating reverence towards the gods and to parents, justice, gentleness, temperance, purity of life, prayer, regular self-examination, and the observance of various ritual requirements.

Connecting its ethics in this way with religion and the idea of a future life, the Pythagorean societies had in them from the beginning a germ of asceticism and contemplative mysticism which it was left for a later age fully to develop. The Pythagorean life was destined to survive the peculiar doctrines of the Pythagorean philosophy and to be grafted on later philosophic ideas. The asceticism which characterized it appears in the 4th century B.C. in close connexion with the Orphic Mysteries; and the "Pythagoreans" of that time are frequently the butts of the New Athenian Comedy. In the Alexandrian period the Pythagorean tradition struck deeper roots; in Alexandria and elsewhere schools of men arose calling themselves Pythagoreans, but more accurately distinguished by modern criticism as Neopythagoreans, seeing that their philosophical doctrines are evidently derived in varying proportions from Plato, Aristotle and the Stoics. In general it may be said that they develop the mystic side of the Platonic doctrine, and only so far as this is connected with the similar speculations of Pythagoras can they claim to be followers of the latter. Hence men like Plutarch, who personally prefer to call themselves Platonists, may also be considered as within the scope of this Pythagorean revival. The link that really connects these Neopythagoreans with the Samian philosopher and distinguishes them from the other schools of their time is their ascetic ideal of life and their preoccupation with religion. In religious speculation they paved the way for the Neoplatonic conception of God as immeasurably transcending the world; and in their thirst for prophecies, oracles, and signs they gave expression to the prevalent longing for a supernatural revelation of the divine nature and will. The asceticism of the Jewish sect of the Essenes seems, as Zeller contends, to be due to a strong infusion of Neopythagorean elements. At a still later period Neopythagoreanism set up Pythagoras and Apollonius of Tyana not only as ideals of the philosophic life but also as prophets and wonder-workers in immediate communication with another world, and in the details of their "lives" it is easy to read the desire to emulate the narrative of the Gospels. The *Life* of Apollonius by Philostratus, which is for the most part an historical romance, belongs to the 3d Christian century.

Zeller's discussion of Pythagoreanism, in his *Philosophie d. Griechen*, book I, is very full; he also deals at considerable length in the last volume of the work with the Neopythagoreans, considered as the precursors of Neoplatonism and the probable origin of the Essenes. The numerous monographs dealing with special parts of the subject are there examined and sifted. (A. SE.)

Pythagorean Geometry.

As the introduction of geometry into Greece is by common consent attributed to Thales, so all are agreed that to Pythagoras is due the honour of having raised mathematics to the rank of a science. We know that the early Pythagoreans published nothing, and that, moreover, they referred all their discoveries back to their master. (See PHILOLAUS.) Hence it is not possible to separate his work from that of his early disciples, and we must therefore treat the geometry of the early Pythagorean school as a whole. We know that Pythagoras made numbers the basis of his philosophical system, as well physical as metaphysical, and that he united the study of geometry with that of arithmetic.

The following statements have been handed down to us. (*a*) Aristotle (*Met.*, i. 5, 985) says "the Pythagoreans first applied themselves to mathematics, a science which they improved; and penetrated with it, they fancied that the principles of mathematics were the principles of all things." (*b*) Eudemus informs us that "Pythagoras changed geometry into the form of a liberal science, regarding its principles in a purely abstract manner, and investigated its theorems from the immaterial and intellectual point of view (ἀΰλως καὶ νοερῶς)."[1] (*c*) Diogenes Laertius (viii. 11) relates that "it was Pythagoras who carried geometry to perfection, after Mœris[2] had first found out the principles of the elements of that science, as Anticlides tells us in the second book of his *History of Alexander*; and the part of the science to which Pythagoras applied himself above all others was arithmetic." (*d*) According to Aristoxenus, the musician, Pythagoras seems to have esteemed arithmetic above everything, and to have advanced it by diverting it from the service of commerce and by likening all things to numbers.[3] (*e*) Diogenes Laertius (viii. 13) reports on the same authority that Pythagoras was the first person who introduced measures and weights among the Greeks. (*f*) He discovered the numerical relations of the musical scale (Diog. Laert., viii. 11). (*g*) Proclus[4] says that "the word 'mathematics' originated with the Pythagoreans." (*h*) We learn also from the same authority[5] that the Pythagoreans made a fourfold division of mathematical science, attributing one of its parts to the "how many" (τὸ πόσον) and the other to the "how much" (τὸ πηλίκον); and they assigned to each of these parts a twofold division. They said that discrete quantity or the "how many" is either absolute or relative, and that continued quantity or the "how much" is either stable or in motion. Hence they laid down that arithmetic contemplates that discrete quantity which subsists by itself, but music that which is related to another; and that geometry considers continued quantity so far as it is immovable, but that astronomy (ἡ σφαιρική) contemplates continued quantity so far as it is of a self-motive nature. (*i*) Diogenes Laertius (viii. 25) states, on the authority of Favorinus, that Pythagoras "employed definitions in the mathematical subjects to which he applied himself."

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[1] Proclus Diadochus, *In primum Euclidis Elementorum librum Commentarii*, ed. Friedlein, p. 65.

[2] Mœris was a king of Egypt who, Herodotus tells us, lived [illegible] years before his visit to that country.

[3] Aristox., *Fragm.*, ap. Stob., *Eclog. Phys.*, i. 2, 6.

[4] Procl., op. cit., p. [illegible].

[5] *Op. cit.*, p. 35.

The following notices of the geometrical work of Pythagoras and the early Pythagoreans are also preserved. (1) The Pythagoreans define a point as "unity having position" (Procl., *op. cit.*, p. 95). (2) They considered a point as analogous to the monad, a line to the duad, a superficies to the triad, and a body to the tetrad (*ib.*, p. 97). (3) They showed that the plane around a point is completely filled by six equilateral triangles, four squares, or three regular hexagons (*ib.*, p. 305). (4) Eudemus ascribes to them the discovery of the theorem that the interior angles of a triangle are equal to two right angles, and gives their proof, which was substantially the same as that in Euclid I. 32[1] (*ib.*, p. 379). (5) Proclus informs us in his commentary on Euclid I. 44 that Eudemus says that the problems concerning the application of areas—where the term "application" is not to be taken in its restricted sense (παραβολή), in which it is used in this proposition, but also in its wider signification, embracing ὑπερβολή and ἔλλειψις, in which it is used in Book VI. Props. 28, 29—are old, and inventions of the Pythagoreans[2] (*ib.*, p. 419). (6) This is confirmed by Plutarch,[3] who says, after Apollodorus, that Pythagoras sacrificed an ox on finding the geometrical diagram, either the one relating to the hypotenuse, namely, that the square on it is equal to the sum of the squares on the sides, or that relating to the problem concerning the application of an area.[4] (7) Plutarch[5] also ascribes to Pythagoras the solution of the problem, To construct a figure equal to one and similar to another given figure. (8) Eudemus states that Pythagoras discovered the construction of the regular solids (Procl., *op. cit.*, p. 65). (9) Hippasus, the Pythagorean, is said to have perished in the sea on account of his impiety, inasmuch as he boasted that he first divulged the knowledge of the sphere with the twelve pentagons (the inscribed ordinate dodecahedron): Hippasus assumed the glory of the discovery to himself, whereas everything belonged to Him—"for thus they designate Pythagoras, and do not call him by name."[6] (10) The triple interwoven triangle or pentagram—star-shaped regular pentagon—was used as a symbol or sign of recognition by the Pythagoreans and was called by them "health" (ὑγιεία).[7] (11) The discovery of the law of the three squares (Euclid I. 47), commonly called the "theorem of Pythagoras," is attributed to him by many authorities, of whom the oldest is Vitruvius.[8] (12) One of the methods of finding right-angled triangles whose sides can be expressed in numbers (Pythagorean triangles)—that setting out from the odd numbers—is referred to Pythagoras by Heron of Alexandria and Proclus.[9] (13) The discovery of irrational quantities is ascribed to Pythagoras by Eudemus (Procl., *op. cit.*, p. 65). (14) The three proportions—arithmetical, geometrical, and harmonical—were known to Pythagoras.[10] (15) Iamblichus[11] says, "Formerly, in the time of Pythagoras and the mathematicians under him, there were three means only—the arithmetical, the geometrical, and the third in order which was known by the name sub-contrary (ὑπεναντία), but which Archytas and Hippasus designated the harmonical, since it appeared to include the ratios concerning harmony and melody." (16) The so-called most perfect or musical proportion, *e.g.*, 6 : 8 : : 9 : 12, which comprehends in it all the former ratios, according to Iamblichus,[12] is said to be an invention of the Babylonians and to have been first brought into Greece by Pythagoras. (17) Arithmetical progressions were treated by the Pythagoreans, and it appears from a passage in Lucian that Pythagoras himself had considered the special case of *triangular* numbers: Pythagoras asks some one, "How do you count?" he replies, "One, two, three, four." Pythagoras, interrupting, says, "Do you see? what you take to be four, that is ten and a perfect triangle and our oath."[13] (18) The odd numbers were called by the Pythagoreans "gnomons,"[14] and were regarded as generating, in-

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[1] We learn, however, from a fragment of Geminus, which has been handed down by Eutocius in his commentary on the *Conics* of Apollonius (Apoll., *Conica*, ed. Halleius, p. 9), that the ancient geometers observed two right angles in each species of triangle, in the equilateral first, then in the isosceles, and lastly in the scalene, whereas later writers proved the theorem generally thus—"The three internal angles of every triangle are equal to two right angles."

[2] The words of Proclus are interesting. "According to Eudemus the inventions respecting the *application*, *excess*, and *defect* of areas are ancient, and are due to the Pythagoreans. Moderns, borrowing these names, transferred them to the so-called conic lines, the parabola, the hyperbola, the ellipse, as the older school, in their nomenclature concerning the description of areas *in plano* on a finite right line, regarded the terms thus:—An area is said to be *applied* (παραβάλλειν) to a given right line when an area equal in content to some given one is described thereon; but when the base of the area is greater than the given line, then the area is said to be in *excess* (ὑπερβάλλειν); but when the base is less, so that some part of the given line lies without the described area, then the area is said to be in *defect* (ἐλλείπειν). Euclid uses in this way in his sixth book the terms *excess* and *defect*. . . . The term *application* (παραβάλλειν), which we owe to the Pythagoreans, has this signification."

[3] *Non posse suaviter vivi sec. Epicurum*, c. xi.

[4] Εἴτε πρόβλημα περὶ τοῦ χωρίου τῆς παραβολῆς. Some authors, rendering the last five words "concerning the area of the parabola," have ascribed to Pythagoras the quadrature of the parabola, which was one of the great discoveries of Archimedes.

[5] *Symp.* viii., Quæst. 2, c. 4.

[6] Iamblichus, *De Vit. Pyth.*, c. 18, s. 88

[7] Lucian, *Pro Lapsu in Salut.*, s. 5; also schol. on Aristoph., *Nub.*, 611. That the Pythagoreans used such symbols we learn from Iamblichus (*De Vit. Pyth.*, c. 33, ss. 237 and 238). This figure is referred to Pythagoras himself, and in the Middle Ages was called *Pythagoræ figura*; even so late as Paracelsus it was regarded by him as a symbol of health. It is said to have obtained its special name from the letters υ, γ, ι. θ (=ει), α having been written at its prominent vertices.

[8] *De Arch.*, ix., Præf., 5, 6, 7. Amongst other authorities are Diogenes Laertius (viii. 11), Proclus (*op. cit.*, p. 426), and Plutarch (*ut sup.*, 6). Plutarch, however, attributes to the Egyptians the knowledge of this theorem in the particular case where the sides are 3, 4, and 5 (*De Is. et Osir.*, c. 56).

[9] Heron Alex., *Geom. et Stereom. Rel.*, ed. F. Hultsch, pp. 56, 146; Procl., *op. cit.*, p. 428. The method of Pythagoras is as follows:—he took an odd number as the lesser side; then, having squared this number and diminished the square by unity, he took half the remainder as the greater side, and by adding unity to this number he obtained the hypotenuse, *e.g.*, 3, 4, 5; 5, 12, 13.

[10] Nicom. Ger., *Introd. Ar.*, c. xxii.

[11] *In Nicomachi Arithmeticam*, ed. S. Tennulius, p. 141.

[12] *Op. cit.*, p. 168. As an example of this proportion Nicomachus and, after him, Iamblichus give the numbers 6, 8, 9, 12, the harmonical and arithmetical means between two numbers forming a geometric proportion with the numbers themselves $\left(a : \frac{2ab}{a+b} : : \frac{a+b}{2} : b\right)$. Iamblichus further relates (*l.c.*) that many Pythagoreans made use of this proportion, as Aristæus of Crotona, Timæus of Locri, Philolaus and Archytas of Tarentum, and many others, and after them Plato in his *Timæus* (see Nicom., *Inst. Arithm.*, ed. Ast, p. 153, and *Animadversiones*, pp. 327-329; and Iambl., *op. cit.*, p. 172 *sq.*).

[13] Βίων πρᾶσις, 4, vol. i. p. 317, ed. C. Jacobitz.

[14] Γνώμων means that by which anything is known, or "criterion"; its oldest concrete signification seems to be the carpenter's square (*norma*) by which a right angle is known. Hence it came to denote a perpendicular, of which, indeed, it was the archaic name (Proclus, *op. cit.*, p. 283). Gnomon is also an instrument for measuring altitudes, by means of which the meridian can be found; it denotes, further, the index or style of a sun-dial, the shadow of which points out the hours. In geometry it means the square or rectangle about the diagonal of a square or rectangle, together with the two complements, on account of the resemblance of the figure to a carpenter's square; and then, more generally, the similar figure with regard to any parallelogram, as defined by Euclid II. Def. 2. Again, in a still more general signification, it means the figure which, being added to any figure, preserves the original form. See Heron, *Definitiones* (59). When

asmuch as by the addition of successive gnomons—consisting each of an odd number of unit squares—to the original square unit or monad the square form was preserved. (19) In like manner, if the simplest oblong (ἑτερόμηκες), consisting of two unit squares or monads in juxtaposition, be taken and four unit squares be placed about it after the manner of a gnomon, and then in like manner six, eight . . . unit squares be placed in succession, the oblong form will be preserved. (20) Another of his doctrines was, that of all solid figures the sphere was the most beautiful, and of all plane figures the circle.[1] (21) According to Iamblichus the Pythagoreans are said to have found the quadrature of the circle.[2]

On examining the purely geometrical work of Pythagoras and his early disciples, as given in the preceding extracts, we observe that it is much concerned with the geometry of areas, and we are indeed struck with its Egyptian character. This appears in the theorem (3) concerning the filling up a plane with regular figures—for floors or walls covered with tiles of various colours were common in Egypt; in the construction of the regular solids (8), for some of them are found in Egyptian architecture; in the problems concerning the application of areas (5); and lastly, in the theorem of Pythagoras (11), coupled with his rule for the construction of right-angled triangles in numbers (12). We learn from Plutarch that the Egyptians were acquainted with the geometrical fact that a triangle whose sides contain three, four, and five parts is right-angled, and that the square of the greatest side is equal to the squares of the sides containing the right angle. It is probable too that this theorem was known to them in the simple case where the right-angled triangle is isosceles, inasmuch as it would be at once suggested by the contemplation of a floor covered with square tiles—the square on the diagonal and the sum of the squares on the sides contain each four of the right-angled triangles into which one of the squares is divided by its diagonal. It is easy now to see how the problem to construct a square which shall be equal to the sum of two squares could, in some cases, be solved numerically. From the observation of a chequered board it would be perceived that the element in the successive formation of squares is the gnomon or carpenter's square. Each gnomon consists of an odd number of squares, and the successive gnomons correspond to the successive odd numbers, and include, therefore, all odd squares. Suppose, now, two squares are given, one consisting of sixteen and the other of nine unit squares, and that it is proposed to form from them another square. It is evident that the square consisting of nine unit squares can take the form of the fourth gnomon, which, being placed round the former square, will generate a new square containing twenty-five unit squares. Similarly it may have been observed that the twelfth gnomon, consisting of twenty-five unit squares, could be transformed into a square each of whose sides contains five units, and thus it may have been seen conversely that the latter square, by taking the gnomonic or generating form with respect to the square on twelve units as base, would produce the square of thirteen units, and so on. This method required only to be generalized in order to enable Pythagoras to arrive at his rule for finding right-angled triangles whose sides can be expressed in numbers, which, we are told, sets out from the odd numbers. The nth square together with the nth gnomon forms the $(n+1)$th square; if the nth gnomon contains m^2 unit squares, m being an *odd* number, we have $2n+1=m^2$. $\therefore n=\frac{m^2-1}{2}$, which gives the rule of Pythagoras.

The general proof of Euclid I. 47 is attributed to Pythagoras, but we have the express statement of Proclus (*op. cit.*, p. 426) that this theorem was not proved in the first instance as it is in the *Elements*. The following simple and natural way of arriving at the theorem is suggested by Bretschneider after Camerer.[3] A square can be dissected into the sum of two squares and two equal rectangles, as in Euclid II. 4; these two rectangles can, by drawing their diagonals, be decomposed into four equal right-angled triangles, the sum of the sides of each being equal to the side of the square; again, these four right-angled triangles can be placed so that a vertex of each shall be in one of the corners of the square in such a way that a greater and less side are in continuation. The original square is thus dissected into the four triangles as before and the figure within, which is the square on the hypotenuse. This square, therefore, must be equal to the sum of the squares on the sides of the right-angled triangle.

It is well known that the Pythagoreans were much occupied with the construction of regular polygons and solids, which in their cosmology played an essential part as the fundamental forms of the elements of the universe. We can trace the origin of these mathematical speculations in the theorem (3) that "the plane around a point is completely filled by six equilateral triangles, four squares, or three regular hexagons." Plato also makes the Pythagorean Timæus explain—"Each straight-lined figure consists of triangles, but all triangles can be dissected into rectangular ones which are either isosceles or scalene. Among the latter the most beautiful is that out of the doubling of which an equilateral arises, or in which the square of the greater perpendicular is three times that of the smaller, or in which the smaller perpendicular is half the hypotenuse. But two or four right-angled isosceles triangles, properly put together, form the square; two or six of the most beautiful scalene right-angled triangles form the equilateral triangle; and out of these two figures arise the solids which correspond with the four elements of the real world, the tetrahedron, octahedron, icosahedron, and the cube"[4] (*Timæus*, 53, 54, 55). The construction of the regular solids is distinctly ascribed to Pythagoras himself by Eudemus (8). Of these five solids three—the tetrahedron, the cube, and the octahedron—were known to the Egyptians and are to be found in their architecture. Let us now examine what is required for the construction of the other two solids—the icosahedron and the dodecahedron. In the formation of the tetrahedron three, and in that of the octahedron four, equal equilateral triangles had been placed with a common vertex and adjacent sides coincident; and it was known that if six such triangles were placed round a common vertex with their adjacent sides coincident, they would lie in a plane, and that, therefore, no solid could be formed in that manner from them. It remained, then, to try whether five such equilateral triangles could be placed at a common vertex in like manner; on trial it would be found that they could be so placed, and that their bases would form a regular pentagon. The existence of a regular pentagon would thus become known. It was also known from the formation of the cube that three squares could be placed in a similar way with a common vertex; and that, further, if three equal and regular hexagons were placed round a point as common vertex with adjacent sides coincident, they would form a plane. It remained in this case too only to try whether three equal regular pentagons could be placed with a common vertex and in a similar way; this on trial would be found possible and would lead to the construction of the regular dodecahedron, which was the regular solid last arrived at.

We see that the construction of the regular pentagon is required for the formation of each of these two regular solids, and that, therefore, it must have been a discovery of Pythagoras. If we examine now what knowledge of geometry was required for the solution of this problem, we shall see that it depends on Euclid IV. 10, which is reduced to Euclid II. 11, which problem is reduced to the following: To produce a given straight line so that the rectangle under the whole line thus produced and the produced part shall be equal to the square on the given line, or, in the language of the ancients, To apply to a given straight line a rectangle which shall be equal to a given area—in this case the square on the given line—and which shall be *excessive* by a square. Now it is to be observed that the problem is solved in this manner by Euclid (VI. 30, 1st method), and that we know on the authority of Eudemus that the problems concerning the *application* of areas and their *excess* and *defect* are old, and inventions of the Pythagoreans (5). Hence the statements of Iamblichus concerning Hippasus (9)—that he divulged the sphere with the twelve pentagons—and of Lucian and the scholiast on Aristophanes (10)—that the pentagram was used as a symbol of recognition amongst the Pythagoreans—become of greater importance.

Further, the discovery of irrational magnitudes is ascribed to Pythagoras by Eudemus (13), and this discovery has been ever regarded as one of the greatest of antiquity. It is commonly assumed that Pythagoras was led to this theory from the consideration of the isosceles right-angled triangle. It seems to the present writer, however, more probable that the discovery of incommensurable magnitudes was rather owing to the problem: To cut a line in extreme and mean ratio. From the solution of this problem it follows at once that, if on the greater segment of a line so cut a part be taken equal to the less, the greater segment, regarded as a new line, will be cut in a similar manner; and this process can be continued without end. On the other hand, if a similar method be adopted in the case of any two lines which can be represented numerically, the process would end. Hence would aris

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gnomons are added successively in this manner to a square monad, the first gnomon may be regarded as that consisting of three square monads, and is indeed the constituent of a simple Greek fret; the second of five square monads, &c.; hence we have the gnomonic numbers.

[1] Diog. Laert., *De Vit. Pyth.*, viii. 19.

[2] Simplicius, *In Aristotelis Physicorum libros quattuor priores Commentaria*, ed. H. Diels, p. 60.

[3] See Bretsch., *Die Geom. vor Euklides*, p. 82; Camerer, *Euclidis Elem.*, vol. i. p. 444, and the references given there.

[4] The dodecahedron was assigned to the fifth element, *quinta pars, æther*, or, as some think, to the universe. (See PHILOLAUS.)

the distinction between commensurable and incommensurable quantities. A reference to Euclid X. 2 will show that the method above is the one used to prove that two magnitudes are incommensurable; and in Euclid X. 3 it will be seen that the greatest common measure of two commensurable magnitudes is found by this process of continued subtraction. It seems probable that Pythagoras, to whom is attributed one of the rules for representing the sides of right-angled triangles in numbers, tried to find the sides of an isosceles right-angled triangle numerically, and that, failing in the attempt, he suspected that the hypotenuse and a side had no common measure. He may have demonstrated the incommensurability of the side of a square and its diagonal. The nature of the old proof—which consisted of a *reductio ad absurdum*, showing that, if the diagonal be commensurable with the side, it would follow that the same number would be odd and even[1]—makes it more probable, however, that this was accomplished by his successors. The existence of the irrational as well as that of the regular dodecahedron appears to have been regarded by the school as one of their chief discoveries, and to have been preserved as a secret; it is remarkable, too, that a story similar to that told by Iamblichus of Hippasus is narrated of the person who first published the idea of the irrational, namely, that he suffered shipwreck, &c.[2]

Eudemus ascribes the problems concerning the application of figures to the Pythagoreans. The simplest cases of the problems, Euclid VI. 28, 29—those, namely, in which the given parallelogram is a square—correspond to the problem: To cut a given straight line internally or externally so that the rectangle under the segments shall be equal to a given rectilineal figure. The solution of this problem—in which the solution of a quadratic equation is implicitly contained—depends on the problem, Euclid II. 14, and the theorems, Euclid II. 5 and 6, together with the theorem of Pythagoras. It is probable that the finding of a mean proportional between two given lines, or the construction of a square which shall be equal to a given rectangle, is due to Pythagoras himself. The solution of the more general problem, Euclid VI. 25, is also attributed to him by Plutarch (7). The solution of this problem depends on that of the particular case and on the application of areas; it requires, moreover, a knowledge of the theorems: Similar rectilineal figures are to each other as the squares on their homologous sides (Euclid VI. 20); and, If three lines are in geometrical proportion, the first is to the third as the square on the first is to the square on the second. Now Hippocrates of Chios, about 440 B.C., who was instructed in geometry by the Pythagoreans, possessed this knowledge. We are justified, therefore, in ascribing the solution of the general problem, if not (with Plutarch) to Pythagoras, at least to his early successors.

The theorem that similar polygons are to each other in the duplicate ratio of their homologous sides involves a first sketch, at least, of the doctrine of proportion and the similarity of figures.[3] That we owe the foundation and development of the doctrine of proportion to Pythagoras and his school is confirmed by the testimony of Nicomachus (14) and Iamblichus (15 and 16). From these passages it appears that the early Pythagoreans were acquainted, not only with the arithmetical and geometrical means between two magnitudes, but also with their harmonical mean, which was then called "subcontrary." The Pythagoreans were much occupied with the representation of numbers by geometrical figures. These speculations originated with Pythagoras, who was acquainted with the summation of the natural numbers, the odd numbers, and the even numbers, all of which are capable of geometrical representation. See the passage in Lucian (17) and the rule for finding Pythagorean triangles (12) and the observations thereon *supra*. On the other hand, there is no evidence to support the statement of Montucla that Pythagoras laid the foundation of the doctrine of *isoperimetry*, by proving that of all figures having the same perimeter the circle is the greatest, and that of all solids having the same surface the sphere is the greatest. We must also deny to Pythagoras and his school a knowledge of the conic sections, and in particular of the quadrature of the parabola, attributed to him by some authors; and we have noticed the misconception which gave rise to this erroneous inference.

Let us now see what conclusions can be drawn from the foregoing examination of the mathematical work of Pythagoras and his school, and thus form an estimate of the state of geometry about 480 B.C. First, as to *matter*. It forms the bulk of the first two books of Euclid, and includes a sketch of the doctrine of proportion—which was probably limited to commensurable magnitudes—together with some of the contents of the sixth book. It contains too the discovery of the irrational (ἄλογον) and the construction of the regular solids, the latter requiring the description of certain regular polygons—the foundation, in fact, of the fourth book of Euclid. Secondly, as to *form*. The Pythagoreans first severed geometry from the needs of practical life, and treated it as a liberal science, giving definitions and introducing the manner of proof which has ever since been in use. Further, they distinguished between *discrete* and *continuous* quantities, and regarded geometry as a branch of mathematics, of which they made the fourfold division that lasted to the Middle Ages—the *quadrivium* (fourfold way to knowledge) of Boetius and the scholastic philosophy. And it may be observed that the name of "mathematics," as well as that of "philosophy," is ascribed to them. Thirdly, as to *method*. One chief characteristic of the mathematical work of Pythagoras was the combination of arithmetic with geometry. The notions of an equation and a proportion—which are common to both, and contain the first germ of algebra—were introduced among the Greeks by Thales. These notions, especially the latter, were elaborated by Pythagoras and his school, so that they reached the rank of a true scientific method in their theory of proportion.[4] To Pythagoras, then, is due the honour of having supplied a method which is common to all branches of mathematics, and in this respect he is fully comparable to Descartes, to whom we owe the decisive combination of algebra with geometry.

See C. A. Bretschneider, *Die Geometrie u. die Geometer vor Euklides* (Leipsic, 1870); H. Hankel, *Zur Geschichte der Mathematik* (Leipsic, 1874); F. Hoefer, *Histoire des Mathématiques* (Paris, 1874); G. J. Allman, "Greek Geometry from Thales to Euclid," in *Hermathena*, Nos. v., vii., and x. (Dublin, 1877, 1881, and 1884); M. Cantor, *Vorlesungen uber Geschichte der Mathematik* (Leipsic, 1880). The recently published *Short History of Greek Mathematics* by James Gow (Cambridge, 1884) will be found a convenient compilation. (G. J. A.)

PYTHEAS of Massilia was a celebrated Greek navigator and geographer, to whom the Greeks appear to have been indebted for the earliest information they possessed, of at all a definite character, concerning the western regions of Europe, and especially the British Islands. The period at which he lived cannot be accurately determined; but it is certain that he wrote, not only before Eratosthenes, who relied much upon his authority, but before Dicæarchus, who was a pupil of Aristotle, and died about 285 B.C. Hence he may probably be regarded as about contemporary with Alexander the Great. His work is now wholly lost, and appears to have been consulted in the original by comparatively few ancient writers, most of the statements cited from it being confined to detached points, which may easily have been derived at second or even third hand. We are hence left almost wholly in the dark as to the form and character of the work itself, but the various titles under which it is cited by later writers point rather to a geographical treatise, in which he had embodied the results of his observations, than to a continuous narrative of his voyage like that of a modern navigator.

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[1] For this proof, see Euclid X. 117; see also Aristot., *Analyt. Pr.*, i. c. 23 and c. 44.

[2] Knoche, *Untersuchungen über die neu aufgefundenen Scholien des Proklus Diadochus zu Euclid's Elementen*, pp. 20 and 23, Herford, 1865.

[3] It is agreed on all hands that these two theories were treated at length by Pythagoras and his school. It is almost certain, however, that the theorems arrived at were proved for commensurable magnitudes only, and were assumed to hold good for all. The Pythagoreans themselves seem to have been aware that their proofs were not rigorous, and were open to serious objection: in this we may have the explanation of the secrecy which was attached by them to the idea of the incommensurable and to the pentagram which involved, and indeed represented, that idea. Now it is remarkable that the doctrine of proportion is *twice* treated in the *Elements* of Euclid—first, in a general manner, so as to include incommensurables, in Book V., which tradition ascribes to Eudoxus, and then arithmetically in Book VII., which, as Hankel has supposed, contains the treatment of the subject by the older Pythagoreans.

[4] Proportion was not regarded by the ancients merely as a branch of arithmetic. We learn from Proclus that "Eratosthenes looked on proportion as the bond of mathematics" (*op. cit.*, p. 43). We are also told in an anonymous scholium on the *Elements* of Euclid, which Knoche attributes to Proclus, that the fifth book, which treats of proportion, is common to geometry, arithmetic, music, and, in a word, to all mathematical science. And Kepler, who lived near enough to the ancients to reflect the spirit of their methods, says that one part of geometry is concerned with the comparison of figures and quantities, whence proportion arises. He also adds that arithmetic and geometry afford mutual aid to each other, and that they cannot be separated

Some modern writers have supposed Pytheas to have been sent out at the public expense, in command of an expedition organized by the republic of Massilia; but there is no ancient authority for this, and the statement of Polybius, who had unquestionably seen the original work, is express, that he had undertaken the voyage in a private capacity and with limited means. All that we know concerning the voyage of Pytheas (apart from such detached notices as those already referred to) is contained in a brief passage of Polybius, cited by Strabo, in which he tells us that Pytheas, according to his own statement, had not only visited Britain but had personally explored a large part of it, and stated its circumference at more than 40,000 stadia (4000 geographical miles). To this he added the account of Thule (which he placed six days' voyage to the north of Britain) and the adjoining regions, in which there was no longer any distinction between the air and earth and sea, but a kind of mixture of all three, forming a substance resembling the gelatinous mollusc known as the *Pulmo marinus*, which rendered all navigation and progress in any other mode alike impossible. This substance he had himself seen, but the other statements he derived from hearsay. Returning from thence he visited the whole of the coasts of Europe bordering on the ocean as far as the Tanais (Polyb. ap. Strab., ii. p. 104). This last sentence has led some modern writers to suppose that he made two different voyages; but this is highly improbable, and the expressions of Polybius certainly imply that his explorations in both directions, first towards the north and afterwards towards the east, formed part of one and the same voyage.

The circumstance that the countries visited, and to a certain extent explored, by Pytheas were not only previously unknown to the Greeks—except perhaps by vague hearsay accounts received through the Phœnicians—but were not visited by any subsequent authority during a period of more than two centuries led some of the later Greek geographers altogether to disregard his statements, and even to treat the whole story of his voyage as a fiction. Eratosthenes, indeed, who wrote about a century after his time, was disposed to attach great value to his authority, though doubting some of his statements; but Polybius, about half a century later, involved the whole in one sweeping condemnation, treating the work of Pytheas as a mere tissue of fables, like that of Euhemerus concerning Panchæa; and even Strabo, in whose time the western regions of Europe were comparatively well known, adopted to a great extent the same view with Polybius.

In modern times a more critical examination has arrived at a more favourable judgment, and, though Gossellin in his *Recherches sur la Géographie des Anciens* (vol. iv. pp. 168-180) and Sir G. C. Lewis in his *History of Ancient Astronomy* (pp. 466-481) revived the sceptical view, the tendency of modern critics has been rather to exaggerate than to depreciate the value of what was really added by Pytheas to geographical knowledge. The fact is that our information concerning him is so imperfect, and the scanty notices preserved to us from his work at once so meagre and discordant, that it is very difficult to arrive at anything like a sound conclusion. It may, however, be considered as fairly established that Pytheas really made a voyage round the western coasts of Europe, proceeding from Gades, the great Phœnician emporium, and probably the farthest point familiar to the Greeks, round Spain and Gaul to the British Islands, and that he followed the eastern coast of Britain for a considerable distance to the north, obtaining information as to its farther extension in that direction which led him greatly to exaggerate its size. At the same time he heard vaguely of the existence of a large island to the north of it—probably derived from the fact of the groups of the Orkneys and Shetlands being really found in that position—to which he gave the name of Thule. No ancient writer (except a late astronomer, who merely refers to it in a passing notice and obviously at second hand) asserts that Pytheas had himself visited Thule; his account of the Sluggish Sea beyond it was, as stated by Polybius himself in the passage already cited, derived merely from hearsay.

But the most important statement made by Pytheas in regard to this unknown land of Thule, and which has given rise to most controversy in modern times, was that connected with the astronomical phenomena affecting the duration of day and night in these remote arctic regions. Unfortunately the reports transmitted to us at second hand in our existing authorities differ so widely that it is almost impossible to determine what Pytheas himself really stated. It is, however, probable that the version given in one passage by Pliny (*H.N.*, iv. 16, 104) correctly represents his authority. According to this he reported as a fact that at the summer solstice the days were twenty-four hours in length, and conversely at the winter solstice the nights were of equal duration. Of course this would be strictly true had Thule really been situated under the arctic circle, which Pytheas evidently considered it to be, and his skill as an astronomer would thus lead him to accept readily as a fact what he knew (as a voyager proceeded onwards towards the north) must be true at some point. But this statement certainly affords no evidence that he had himself actually visited the mysterious land to which it refers. (See THULE.)

Still more difficult is it to determine the extent and character of Pytheas's explorations towards the east. The statement of Polybius that he proceeded along the whole of the northern coasts of Europe as far as the Tanais is evidently based upon the supposition that this would be a simple and direct course along the coast of Germany and Scythia,—Polybius himself, in common with the other Greek geographers till a much later period, being wholly ignorant of the vast projection of the Cimbric peninsula, and the long circumnavigation that it involved,—of all which no trace is found in the extant notices of Pytheas. Notwithstanding this, some modern writers have supposed him to have entered the Baltic and penetrated as far as the mouth of the Vistula, which he erroneously supposed to be the Tanais. The only foundation for this highly improbable assumption is to be found in the fact that in a passage cited by Pliny (*H.N.*, xxxvii. 2, 35) Pytheas is represented as stating that amber was brought from an island called Abalus, distant a day's voyage from the land of the Guttones, a German nation who dwelt on an estuary of the ocean called Mentonomus, 6000 stadia in extent. It was a production thrown up by the waves of the sea, and was used by the inhabitants to burn instead of wood. It is not improbable that the "estuary" here mentioned really refers to the Baltic, the existence of which as a separate sea was unknown to all ancient geographers; but the obscure manner in which it is indicated, as well as the inaccuracy of the statements concerning the place from whence the amber was actually derived, both point to the sort of hearsay accounts which Pytheas might readily have picked up on the shores of the German Ocean, without proceeding farther than the mouth of the Elbe, which is supposed by Ukert to have been the limit of his voyage in this direction. It must be observed also that amber is found on the western coasts of Germany, as well as in the Baltic, though not in equal abundance.

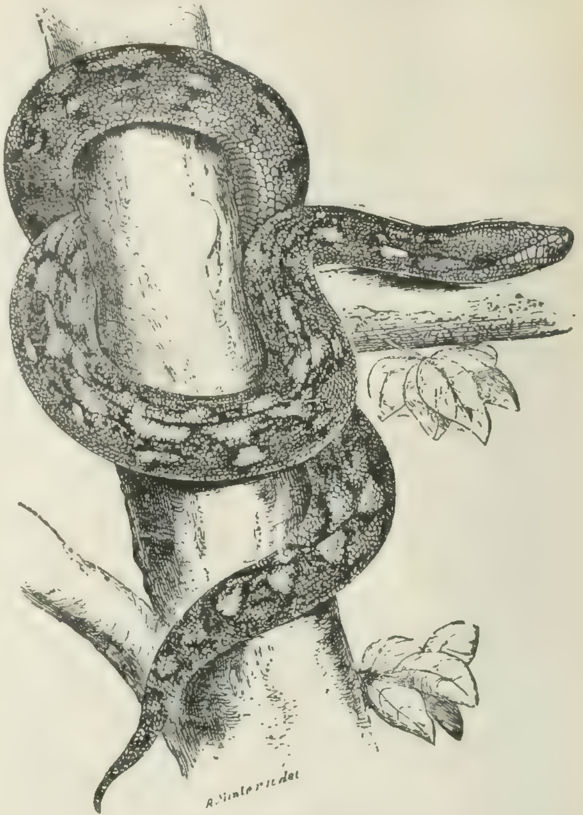
It is a very singular fact that no mention is found in any ancient writer, in connexion with the voyage of Pytheas, of the Cassiterides or Tin Islands, the exploration of which might naturally have been supposed to have been one of the chief objects of his voyage. It is indeed not impossible that the statements on this subject preserved to us from Timæus, who wrote less than a century after him, were derived from Pytheas, though there is no proof of this. The trade with those islands was probably at this period exclusively in the hands of the Phœnicians, but we know that at a later time a considerable portion of the supply was carried overland through Gaul to Massilia. Whether the voyage of Pytheas had any effect in contributing to bring about the diversion of this lucrative trade we have unfortunately no information.

Whatever uncertainty still hangs around all that has been transmitted to us concerning the actual explorations of Pytheas. it is certain that he had one merit which distinguished him from almost all his contemporaries: he was a good astronomer, and was one of the first who made observations for the determination of latitudes, among others that of his native place Massilia, which he fixed with remarkable accuracy, so that his result, which was within a few miles of the truth, was adopted by Ptolemy, and became the basis of his map of the Western Mediterranean. Pytheas was also the first among the Greeks who arrived at any correct notion of the tides, and not only indicated their connexion with the moon but pointed out their periodical fluctuations in accordance with the phases of that luminary. Other observations concerning the manners and customs of the inhabitants of these remote regions are ascribed to him that are undoubtedly correct and tend strongly to prove that he had himself really visited them. Among these are the gradual disappearance of various kinds of grain as one advanced towards the north; the use of fermented liquors made from corn and honey; and the habit of threshing out their corn in large covered barns, instead of on open threshing-floors as in Greece and Italy, on account of the want of sun and abundance of rain.

The fragments of Pytheas have been collected by Arvedson (Upsala, 1824) and by Fuhr (*De Pythea Massiliensi*, Darmstadt, 1835). Of the numerous treatises and dissertations on the subject see for those of earlier date Ukert's "Bemerkungen uber Pytheas" (in vol. i. of his *Geog. d. Griechen u. Römer*, pp. 298-309), which contains an excellent summary of all that is known concerning the author and his work. The question has been also discussed by Sir G. C. Lewis, in his *Historical Survey of the Astronomy of the Ancients* (pp. 466-480, London, 1862), by Mr Bunbury, in his *History of Ancient Geography* (vol. i. chap. xv. sect. 2), and by Mr Elton, in his *Origins of English History* (London, 1882). A very elaborate but prolix and somewhat confused investigation of the whole subject will be found in Müllenhoff's *Deutsche Alterthumskunde* (vol. i. pp. 211-497, Berlin, 1870). (E. H. B.)

PYTHON, a genus of gigantic snakes inhabiting the tropical parts of Africa and Asia, and known in some parts of the British possessions by the name of "rock-snakes." On account of their general appearance, beautifully-marked skin, large size, and similarity of habits they are frequently confounded with the true boas of the New World and misnamed "boa-constrictors." They differ from them, however, by having a double row of scutes under the tail, pits in the shields round the margins of the upper and lower jaws, and teeth in the intermaxillary bone.

Africa is inhabited by three species (*Python sebæ*, *P. regius*, and *P. natalensis*), and Asia by two (*Python molurus* and *P. reticulatus*), the former of these two species being found on the continent of India and in Ceylon, the latter in the large islands of the Archipelago and in the Malayan Peninsula. In Australasia and New Guinea similar snakes occur, but they are of much smaller size and differ in essential structural characters from the rock-snakes. These latter are among the largest of living reptiles; although their dimensions and strength have been much exaggerated, specimens of 18 and 20 feet have been brought to Europe, and reliable statements of the occurrence of individuals which measured 30 feet are on record. Snakes of this size will easily overpower and kill one of the small species of deer or antelopes which abound in their native haunts, a sheep, or a good-sized dog; but the width of their mouth would not permit them to swallow an animal larger than a half-grown sheep. The way in which they seize and kill their prey does not differ from that observed in numerous other non-venomous snakes: after having seized their victim, they smother it by constriction, throwing several coils of the body over and round it. In swallowing they always commence with the head; and, as they prey exclusively on mammals and birds, the hairs and feathers offer a considerable impediment to the passage through the narrow but distensible throat. The process of deglutition is therefore slow, although facilitated by the great quantity of saliva discharged over the body of the victim. During the time of digestion the snake is very lazy, and unwilling to move and to defend itself when attacked. At other times these animals are fierce enough, although always harmless to man if left unmolested. In captivity they seem to become used to those who attend upon them, but their apparent tameness is due rather to the depressing influence of a colder climate than to a change of their naturally excitable temper. Rock-snakes are mostly arboreal, and prefer localities in the vicinity of water to which animals resort for the purpose of drinking. They move, climb, and swim with equal facility. It has now been well established by observations on specimens in a state of nature as well as in captivity that the female rock-snake incubates her eggs for about two months, at the end of which period the young are hatched, and probably remain under the protection of the mother for a few weeks longer. The snake collects the eggs into a conical heap, round which she coils herself, entirely covering them so that her head rests in the centre on the top of the cone. In this position the animal remains without food throughout the whole period of incubation, and an increase of the temperature between the coils of the snake has been observed in every case.



Python reticulatus (India).

PYX. See MINT, vol. xvi. p. 483.

Q

Q was written in Greek with the straight stroke vertical, ϙ, as in the Phœnician alphabet from which it was borrowed, and was called koppa, the equivalent of the Hebrew koph. It is found sparingly on some old inscriptions of Rhodes, of some of the Ægean islands, of Corinth and of Syracuse, and most frequently in the Chalcidian colonies of Sicily and Italy. But it was soon supplanted by kappa, and survived only in numeration as the representative of the number 90. It went to Rome with the Chalcidian alphabet of Cumæ, and was written at first with the vertical line; but the stroke soon became slant, so that the symbol got the form it still retains (Q).

There is a slight but real distinction of sound between the so-called palatal and velar *k*. The first is the ordinary *k*, for which the back of the tongue is raised against the back part of the hard palate. The second is produced by raising the tongue against the soft palate or *velum palati*, that is, rather farther back in the mouth. This sound has a tendency to be accompanied by a slight rounding of the lips; this causes an equally slight *w* sound after the *k*. It is probable that the velar *k* with this parasitic *w* was in use for a time in Greece, and that it was represented by the koppa; the symbol would otherwise have been totally unnecessary; also the koppa is generally followed by *u* or *o*, which, on this view, is natural. We know that in Greece *kw* must have been an intermediate sound between *k* and *p* in words where *k* was labialized, such as ἕπομαι from root *sak* (see under K). But this intermediate sound was not retained in the language: either the *w* was dropped and the sound reverted to *k*, or *p* was produced by the assimilating force of the *w*; therefore all need for a symbol koppa vanished. But in Latin the middle step remained, as in *sequor*; therefore the symbol was needed. But the parasitic sound became a complete *w*; and to denote this *v* was regularly written after the *q*. Therefore even in Latin the symbol was really otiose, for *kv* would have been quite sufficient, and did actually suffice for the Umbrian and Oscan, which never possessed the *q*. In old inscriptions we find *q* alone when the following vowel is *u*, as in *Mirqurios*, *pequnia*. In later times, when *o* passed by weakening into *u*, a preceding *qu* was written *c*; thus *quom* became *cum*, to avoid the double *u* of *quum*. The *qu* of the Latin naturally passed on into the Romanic languages. It passed into the Teutonic languages in borrowed words, such as *quart*, but made its way into Teutonic words also; thus, in English, *cwén*, *cwellan* are now spelt *queen*, *quell*.

QUADRILATERAL, a military term applied to any combination of four fortresses mutually supporting each other, but especially to that of the four fortified towns of Mantua, Peschiera, Verona, and Legnago, the two former of which are situated on the Mincio and the two latter on the Adige. The real value of the Quadrilateral, which gave Austria such a firm hold on Lombardy, lay in the extraordinary natural strength of Mantua and in the readiness with which troops and supplies could be poured into Verona from the north.

See "The Quadrilateral," in the *Cornhill Magazine*, 1862; and Professor Malfatti, *Il Quadrilatero*, Milan, 1866.

QUADRUMANA. See MAMMALIA, vol. xv. p. 444, and APE, vol. ii. p. 148.

QUÆSTOR was the title of a Roman magistrate whose functions, at least in the later times of the republic, were mainly financial. The origin of the quæstorship is somewhat obscure, but on the whole it was probably instituted simultaneously with the consulship in 509 B.C.[1] The number of the quæstors was originally two, but this was successively increased to four (in 421 B.C.), eight (in 267 or 241 B.C.), and by Sulla (in 81 B.C.) to twenty. Cæsar raised the number to forty (in 45 B.C.), but Augustus reduced it again to twenty, which remained the regular number under the empire. When the number was raised from two to four in 421 B.C. the office was thrown open to the plebeians, and it was the first office that was so opened. It was the lowest of the great offices of state, and hence it was regularly the first sought by aspirants to a political career. Towards the close of the republic, if not earlier, the successful candidate was bound to have completed his thirtieth year before he entered on office, but Augustus lowered the age to twenty-five. Originally the quæstors seem to have been nominated by the consuls independently, but later, perhaps from the fall of the decemvirs (449 B.C.), they were elected by the people assembled in tribes (*comitia tributa*) and presided over by a consul or another of the higher magistrates. The quæstors held office for one year, but, like the consuls and prætors, they were often continued in office with the title of proquæstor. Indeed it was a regular rule that the quæstor attached to a higher magistrate should hold office as long as his superior; hence, when a consul regularly presided over the city for one year, and afterwards as proconsul governed a province for another year, his quæstor also regularly held office for two years. Before the election of the quæstors the senate decided the duties to be undertaken by them, and after election these duties were distributed amongst the new quæstors either by lot or by the choice of the higher magistrates to whom a quæstor was assigned. A peculiar burden laid on the quæstors, not so much as an official duty, but rather as a sort of fee exacted from all who entered on the political career, was the paving of the high roads, for which Claudius substituted the exhibition of gladiatorial games. Various classes of quæstors may be distinguished according to the duties they had respectively to discharge. Up to 421 B.C. there were only two quæstors, and when fresh ones were added the two original quæstors were distinguished by the appellation of urban quæstors (*quæstores urbani*), doubtless because they were bound to remain in Rome during their term of office.

1. *The Urban Quæstors.*—Originally the duties of the quæstors, like those of the consuls, were of a general and undefined nature; specialization of function had not yet arisen—the consuls were simply the superior, the quæstors simply the inferior magistrates of the republic. From a very early time, however, the quæstors possessed criminal to the exclusion of civil jurisdiction. The very name "quæstor" (from *quærere*, "to search out") means "investigator," "inquisitor." In the code of the Twelve Tables they are designated *quæstores parricidii*, "inquisitors of parricide or murder";[2] and perhaps originally this was their full title, which was afterwards abbreviated into quæstors when their functions as criminal judges fell into the background. In addition to parricide or murder we can hardly doubt that all other crimes fell within the jurisdiction of the quæstors; political crimes only seem to have been excepted. The criminal jurisdiction of the quæstors appears

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[1] Plutarch (*Popl.*, 12) states that the office was instituted by the first consul. Tacitus, on the other hand (*Ann.*, xi. 22), says that it dated from the time of the kings, but his ground is merely that they were mentioned in the *Lex Curiata* of the consul Brutus, which Tacitus assumes to have been identical with that of the kings.

[2] The etymology and original meaning of *parricidium* are doubtful. In the latter part of the word we have, of course, the same root as in *cædere*, "to kill," but whether or not the former part is from *pater*, "a father," or from the same root that we have in *perperam*, *perjurium*, is a moot point. Mommsen takes the latter view.

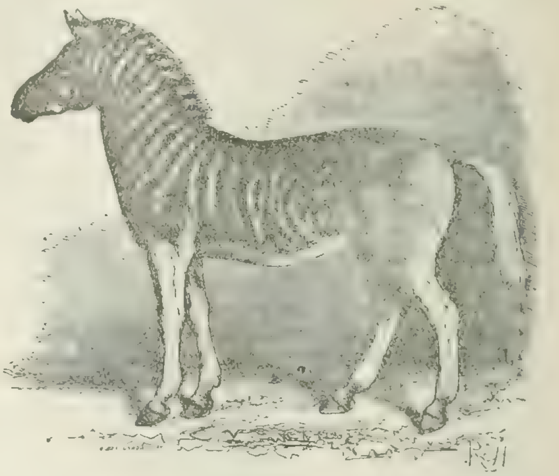
only to have terminated when towards the close of the republic trial by permanent courts (*quæstiones perpetuæ*) was extended to criminal cases.[1]

The quæstors had also charge of the public treasury (*ærarium*) in the temple of Saturn, and this was in the later times of the republic their most important function. They kept the keys of the treasury and had charge of its contents, including not only coin and bullion but also the military standards and a large number of public documents, which in later times comprised all the laws as well as the decrees of the senate. Their functions as keepers of the treasury were withdrawn from the urban quæstors by Augustus and transferred to other magistrates, but the office itself continued to exist into the 3d century, though as to the nature of the duties attached to it we have little or no information.

2. *The Military Quæstors.*—These were instituted in 421 B.C., when two new quæstors were added to the original two. They never had a distinctive appellation like that of the urban quæstors, from whom, however, they were clearly distinguished by the fact that, while the urban quæstors did not stand in a special relation of subordination to any particular magistrate, a non-urban quæstor was regularly assigned as an indispensable assistant or adjutant to every general in command, whose name or title the quæstor usually added to his own.[2] Originally they were the adjutants of the consuls only, afterwards of the provincial prætors, and still later of the proconsuls and proprætors. The dictator alone among military commanders had no quæstor, because a quæstor would have been a limitation to his powers. The governor of Sicily had two quæstors; all other governors and commanders had but one. Between the quæstor and his superior a close personal relation, analogous to that between a son and his father, existed, and was not severed when their official connexion ceased. Not till the close of the republic do cases occur of a quæstor being sent to a province invested with prætorial and even consular powers; in one case at least the quæstor so sent had a second quæstor placed under him. The duties of the military quæstor, like those of the treasury quæstor, were primarily financial. Moneys due to a provincial governor from the state treasury were often, perhaps regularly, received and disbursed by the quæstor; the magazines seem to have been under his charge; he coined money, on which not unfrequently his name appears alone. The booty taken in war was not necessarily under the control of the quæstor, but was dealt with, especially in later times, by inferior officers called *præfecti fabrum.* But, though his duties were primarily financial, the quæstor was after all the chief assistant or adjutant of his superior in command, and as such he was invested with a certain degree of military power; under the republic his military rank was superior to that of the legates, though under the empire this relation was reversed. When the general left his province before the arrival of his successor he usually committed it to the care of his quæstor, and, if he died or was incapacitated from naming his successor, the quæstor acted as his representative. Unlike the urban quæstor, the military quæstor possessed not a criminal but a civil jurisdiction corresponding to that of the ædiles at Rome.

3. *The Italian Quæstors.*—The subjugation of Italy occasioned the institution (in 267 B.C.) of four new quæstors, who appear to have been called *quæstores classici* because they were originally intended to superintend the building of the fleet (*classis*); their functions, however, are very imperfectly known. Though no doubt intended to assist the consuls, they were not subordinated (like the military quæstors) to a special consul. They were stationed at Ostia, at Cales in Campania, and in Gaul about the Padus (Po). The station of the fourth is not mentioned; perhaps it was Lilybæum in Sicily.

QUAGGA, or COUAGGA, an animal of the genus *Equus* (see HORSE, vol. xii. p. 175), nearly allied to the zebra, which formerly was met with in vast herds on the great plains of South Africa between the Cape Colony and the Vaal river, but now, in common with most of the larger wild animals of that region, becoming extremely scarce, owing to the encroachments of European civilization. In length of ears and character of tail it more resembles the horse than it does the ass, although it agrees with the latter in wanting the small bare callosity in the inner side of the hind leg, just below the hock, characteristic of the horse. The colour of the head, neck, and upper parts of the body is reddish-brown, irregularly banded and marked with dark brown stripes, stronger on the head and neck and gradually becoming fainter until lost behind the shoulder. There is a broad dark median dorsal stripe. The under surface of the body, the legs, and tail are nearly white, without stripes. The crest is very high, surmounted by a standing mane, banded alternately brown and white. Though never really domesticated, quaggas have occasionally been trained to harness. The accompanying figure is reduced from a painting made from one of a pair which were driven in Hyde Park by Mr Sheriff Parkins in the early part of the present century. The name is an imitation of the shrill barking neigh of the animal, "ouag-ga, ouag-ga," the last syllable very much prolonged. It must be remembered, however, in reading books of African travel that the same word is very commonly applied by hunters to another and more completely striped species, called by zoologists Burchell's zebra.



Quagga.

QUAIL (Old French *Quaille*, Mod. French *Caille*, Italian *Quaglia*, Low Latin *Quaquila*, Dutch *Kwakkel*, and *Kwartel*, German *Wachtel*, Danish *Vagtel*), a very well-known bird throughout almost all countries of Europe, Asia, and Africa,—in modern ornithology the *Coturnix communis* or *C. dactylisonans.* This last epithet was given from the peculiar three-syllabled call-note of the cock, which has been grotesquely rendered in several European languages, and in some parts of Great Britain the species is popularly known by the nickname of "Wet-my-lips" or "Wet-my-feet." The Quail varies somewhat in colour, and the variation is rather individual than attributable to local causes; but generally the plumage may be described as reddish-brown above, almost each feather being transversely patched with dark brown interrupted by a longitudinal stripe of light buff; the head is dark brown above, with three longitudinal streaks of ochreous-white; the sides of the breast and flanks are reddish-brown, distinctly striped with ochreous-white; the rest of the lower parts are pale buff, clouded with a darker shade, and passing into white on the belly. The cock, besides being generally brighter in tint, not unfrequently has the chin and a double throat band of reddish or blackish-brown, which marks are wanting in the hen, whose breast is usually spotted. Quails breed on the ground, as all gallinaceous birds commonly do, and lay from nine to fifteen eggs of a yellowish-white, blotched and spotted with dark brown. Though essentially migratory by nature, not a few Quails pass the winter in the northern hemisphere and even in Britain, and many more in southern Europe. In March and April they cross the Mediterranean from the south on the way to their breeding homes in large bands, but these are said to be as nothing compared with the enormous flights that emigrate from Europe towards the end of September. During both migrations immense numbers are netted for the market, since they are almost universally esteemed as delicate meat. On capture they are placed in long narrow and low cages, darkened to prevent the prisoners from fighting, and, though they are often so much crowded as to be hardly able to stir, the loss by death that ensues is but trifling. Food, usually millet or hempseed, and water are supplied in troughs hung in front, and thus these little birds are transported by tens of thousands from the shores of the Mediterranean for consumption in the most opulent and populous cities of Europe. The flesh of Quails caught in spring commonly proves dry and indifferent, but that of those taken in autumn, especially when they have been kept long enough to grow fat, as they quickly do, is excellent. In no part of the British Islands at present do Quails exist in sufficient numbers to be the especial object of sport, though there are many places in which a few, and in some seasons more than a few, yearly fall to the gun. When made to take wing, which is not always easily done, they rise with great speed, but on such occasions they seldom fly far, and no one seeing them only thus would be inclined to credit them with the power of extensive migration that they possess, though this is often overtaxed, and the birds in their transmarine voyages frequently drop exhausted into the sea or on any vessel that may be in their way. In old days they were taken in England in a net, attracted thereto by means of a Quail-call,—a simple instrument,[1] the use of which is now wholly neglected,—on which their notes are easily imitated.

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[1] It is often supposed that the *quæstores parricidii* were an old magistracy quite distinct from the ordinary quæstors. For the identification of the two, see Mommsen, *Römisches Staatsrecht*, ii., pt. 1, p. 506.

[2] Thus Cicero speaks of the *provincia consularis* of the quæstor, and we find *quæstor Cn. Pompei*, &c.

Five or six other species of the restricted genus *Coturnix* are now recognized; but the subject of the preceding remarks is generally admitted to be that intended by the author of the book of Exodus (xvi. 13) as having supplied food to the Israelites in the wilderness, though a few ornithological writers have thought that bird to have been a SAND-GROUSE (*q.v.*). In South Africa and India allied species, *C. delegorguii* and *C. coromandelica*, the latter known as the Rain-Quail, respectively occur, as well as the commoner one, which in Australia and Tasmania is wholly replaced by *C. pectoralis*, the Stubble-Quail of the colonists. In New Zealand another species, *C. novæ-zelandiæ*, was formerly very abundant in some districts, but is considered to have been nearly if not quite extirpated within the last twenty years by bush-fires. Some fifteen or perhaps more species of Quails, inhabiting the Indian and Australian Regions, have been separated, perhaps unnecessarily, to form the genera *Synœcus*, *Perdicula*, *Excalphatoria*, and so forth; but they call for no particular remark.

America has some fifty or sixty species of birds which are commonly deemed Quails, though by some authors placed in a distinct Family or Sub-family *Odontophorinæ*.[2] The best known is the Virginian Quail, or Colin, as it is frequently called—that being, according to Hernandez, its old Mexican name. It is the *Ortyx virginianus* of modern ornithology, and has a wide distribution in North America, in some parts of which it is known as the "Partridge," as well as by the nickname of "Bob-White," aptly bestowed upon it from the call-note of the cock. Many attempts have been made to introduce this bird to England (as indeed similar trials have been made in the United States with Quails from Europe); but, though it has been turned out by hundreds, and has been frequently known to breed after liberation, its numbers rapidly diminish until it wholly disappears. The beautiful tufted Quail of California, *Lophortyx californica*, has also been tried in Europe without success. All these American Quails or Colins seem to have the habit of perching on trees, which none of the Old-World forms possess.

Interesting from many points of view as is the group of Birds last mentioned, there is another which, containing a score of species (or perhaps more) often termed Quails or Button-Quails, is of still greater importance in the eyes of the systematist. This is that comprehended by the genus *Turnix*, or *Hemipodius* of some authors, the anatomical structure of which removes it far from the genera *Coturnix*, *Ortyx*, and their allies, and even from any of the normal *Gallinæ*. Prof. Huxley, as already stated (ORNITHOLOGY, vol. xviii. p. 36), would regard it as the representative of a generalized stock from which the *Charadriomorphæ* and *Alectoromorphæ*, to say nothing of other groups, have sprung. Want of space prevents our here dwelling upon these curious birds. One species, *T. sylvatica*, inhabits Barbary and southern Spain, and under the name of Andalucian Hemipode has been included (though on evidence not wholly satisfactory) among British Birds as a reputed straggler. The rest are natives of various parts of the Ethiopian, Indian, and Australian Regions. It is characteristic of the genus *Turnix* to want the hind toe; but the African *Ortyxelus* and the Australian *Pedionomus* which have been referred to its neighbourhood have four toes on each foot, and, since nothing is known of the anatomy or habits of the first and but little of those of the second,[3] their position must at present be considered doubtful. (A. N.)

QUAKERS. The Quakers, or, as they call themselves, the Society of Friends, are a body of Christians small in number but presenting several features of interest. To the student of ecclesiastical history they are curious as exhibiting a form of Christianity widely aberrant from the prevalent types, and as a body of worshippers without a creed, a liturgy, a priesthood, or a sacrament; to the student of social science they are interesting as having given to women an almost equal place with men in their church organization, and as having attempted to eliminate war, oaths, and litigation from their midst. The student of English constitutional history will observe the success with which they have, by the mere force of passive resistance, obtained from the legislature and the courts indulgence for all their scruples and a recognition of the legal validity of their customs; whilst to the student of American history the Quakers will ever be remarkable for the prominent part they played in the colonization of New Jersey and Pennsylvania.

History.—The history of Quakerism in England may conveniently be divided into four periods:—(1) from the first preaching of Fox in 1648 to the establishing of a church organization in 1666; (2) from that date to the Revolution of 1688; (3) from the Revolution to 1835; and (4) from 1835 to the present time.

1. George Fox (*q.v.*), the son of a weaver of Drayton in Leicestershire, was the founder of the Quakers. He began to preach in 1648, and in a few years gathered around him a great body of followers and a considerable number of itinerant preachers like himself, who zealously promulgated his doctrines. Amongst these Edward Burrough was one of the most remarkable. In 1655 these preachers numbered seventy-three. Fox and his fellow-preachers spoke whenever opportunity offered — sometimes in churches,

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[1] One is figured in Rowley's *Ornithological Miscellany* (ii. p. 363).

[2] They form the subject of a monograph in folio by Gould, published between 1844 and 1850.

[3] Col. Legge's observations on the habits of *Pedionomus* in the Zoological Society's *Proceedings* ([illegible], pp. [illegible]) [illegible] shew a Limicoline affinity. Garrod in the same work ([illegible]) figured the skull as that of a Turnicine, in which view Forbes acquiesced (*Ibis*, 1882, pp. 389, [illegible]); but against it Col. Legge immediately protested (*tom. cit.*, p. 610).

sometimes in barns, sometimes at market-crosses. There is some evidence to show that the arrangement of this mission, as it would now be called, rested mainly with Fox, and that the expenses of it and of the foreign missions were borne out of a common fund. Margaret Fell, the wife and afterwards the widow of Judge Fell—who subsequently married George Fox—opened her house at Swarthmore Hall, near Ulverston, to these preachers, and probably contributed largely to the common fund from which the expenses were paid. Fox's teaching was primarily a preaching of repentance; and he and his friends addressed vast congregations much as Wesley and Whitefield did at a later date. But his teaching had certain marked peculiarities—especially his insistence on the universality and sufficiency of the light of God's Spirit. He regarded the work in which he was engaged as in no wise the founding of a new sect or society, but, to use his own words, as "the appearance of the Lord's everlasting truth, and breaking forth again in His eternal power in this our day and age in England." Such teaching and such views necessarily brought Fox and his friends into direct conflict with all the religious bodies of England, and they were continually engaged in strife with the Presbyterian ministers who then filled the pulpits of English churches, with the Independents, with the Baptists, with the Episcopal Church, and with the wilder sectaries, like the Fifth Monarchy men, the Ranters, the Seekers, and the Muggletonians. This strife was conducted on both sides with a zeal and an acerbity of language not consonant with our present notions of decorum. The movement was accompanied, too, by most of those physical symptoms which usually go with vehement appeals to the conscience and the emotions of a rude multitude. The trembling amongst the listening crowd caused or confirmed the name of Quakers given to the body: men and women sometimes fell down and lay grovelling on the earth and struggling as if for life. But the Quaker preachers seem not to have encouraged these manifestations, but rather to have sought to assuage them by such reasonable means as carrying the affected to bed or administering a cordial or medicine.

Some of the early Quakers indulged in eccentricities and extravagances of no measured kind. Some travelled and preached naked or barefoot or dressed in sackcloth; others imitated the Hebrew prophets in the performance of symbolical acts of denunciation or warning; even the women in some cases distinguished themselves by the impropriety and folly of their conduct. In some cases religious excitement seems to have produced or been attended by insanity, and the aberrations of Naylor and Ibbit can only be attributed to that cause. For, though not altogether free from acts of fanaticism, the Quaker leaders discouraged and disowned the grosser acts of enthusiasm.

The activity and zeal of the early Quakers were not confined to England; they passed into Scotland and Ireland. Fox and others travelled to America and the West Indian Islands; another reached Jerusalem, and testified against the superstition of the monks; Mary Fisher, "a religious maiden," visited Smyrna, the Morea, and the court of Mohammed IV. at Adrianople; others made their way to Rome; two women suffered imprisonment from the Inquisition in Malta; two men passed into Austria and Hungary; and William Penn, George Fox, and others preached Quakerism in Holland and Germany.

As early as 1652 meetings of the followers of Fox, calling themselves at first the Children of Light, gathered together in various places in England, and were soon established in considerable numbers. The meetings at Bristol were often attended by from three to four thousand people.

2. The second period in the history of Quakerism is marked by the introduction into the body, hitherto unorganized, of an organization and a discipline principally due to the mind and energy of Fox, by a more scholarly and learned air given to the Quaker productions by the writings of William Penn and Robert Barclay, and by the part which the Quakers played in the colonization of New Jersey and of Pennsylvania. It is not wonderful that the introduction of an organization and a discipline met with great opposition amongst a people taught to believe that the inward light of each individual man was the only true guide for his conduct. The project met with some opposition at the time, and at a later period (1683), from persons of considerable reputation in the body. Wilkinson, Rogers, Story, and others raised a party against Fox as regards the management of the affairs of the society, and asserted that the meetings for discipline which had been established were useless, and that every man ought to be guided by the Spirit of God in his own mind, and not to be governed by rules of man. They drew a considerable following away with them, but the greater number adhered to their original leader.

Robert BARCLAY (*q.v.*), a Scotsman of family, who had received a polite education, principally in France, joined the Quakers about 1666, and William PENN (*q.v.*) joined the body about two years later. The Quakers had always been active controversialists, and a great body of tracts and papers was issued by them; but hitherto they had not been of much account in a literary point of view. Now the writings of Barclay, especially his celebrated *Apology for the True Christian Divinity* (1675), published by him in Latin and English, and the works of William Penn (amongst which his *No Cross no Crown* was one of the best known) gave to the Quaker literature a more logical and a more scholarly aspect.

One peculiarity of the conduct of the Friends down to the Revolution of 1688, and more or less down to the present time, must not be overlooked. They were essentially non-political. They opposed the most dogged personal and individual resistance to what they thought wrong; but they never attempted by combination or otherwise to exert political influence. "Keep out of the powers of the earth" was Fox's exhortation; and, when in 1688 a discussion was introduced into the yearly gathering of the body on the choice of parliament men, Fox strenuously opposed the introduction of politics into the meetings of his followers.

During the whole time between the rise of the Quakers and the passing of the Toleration Act they were the objects of an almost continuous persecution, which they endured with extraordinary constancy and patience. In 1656 Fox computed that there were seldom less than a thousand in prison, and it has been asserted that between 1661 and 1697 13,562 Quakers were imprisoned, 152 were transported, and 338 died in prison or of their wounds. Having come into being after the death of Charles I., the Quakers first endured persecution under the Parliament and then under Cromwell. In 1645 an ordinance of the Parliament had made the directory of the Westminster divines obligatory; and ordinances of the years 1646 and 1648 were passed for the preventing of blasphemies and heresies, which comprehended under these hard names some doctrines afterwards promulgated by the Quakers, as that the two sacraments of baptism and the Lord's supper are not commanded by the word of God, and that the use of arms for defence, be the cause ever so just, is unlawful. Furthermore these or other ordinances of the Parliament placed the decision of questions as to tithes in the hands of the justices of the peace. The instrument of government under which Cromwell assumed power as the Lord Protector had held out a promise of protection in the exercise of their religion to "such as professed faith in God by Jesus Christ" (art. 37); and the Protector himself, in a speech addressed to Parliament on the 12th September 1654, had declared liberty of conscience to be a natural right; nevertheless the Quakers found that they were still the subjects of bitter persecution. They were sometimes dealt with under the ordinances already referred to, sometimes as Sabbath-breakers because they, travelled to their meetings for worship, sometimes as disturbers of the clergy in their office because they spoke in churches, sometimes as guilty of breaches of the peace because they preached in streets or markets, sometimes for refusing to pay tithes, sometimes for refusing to take off their hats, sometimes for refusing to swear. So matters remained till the Restoration of Charles II., when the publication from Breda of his declaration for liberty of conscience again raised hopes of ease in the hearts of the Friends. But these hopes were again destined to disappointment. The laws under which the Quakers were persecuted during the revived Stuart period were (1) the common law, (2) the old legislation in ecclesiastical matters which was revived on Charles's accession, (3) the special legislation of the period, and (4) the ecclesiastical laws as administered by the ecclesiastical courts. In the first class was the general law as to breakers of the peace; in the second class may be mentioned the statute of 6 Hen. VIII. by which imprisonment was appointed as a punishment for non-payment of tithes, the statute of Elizabeth imposing the oath of supremacy, the Act of Uniformity passed in the first year of Elizabeth, the Acts of the 23rd and 29th years of the same queen which imposed fines and penalties for non-attendance of church and the statute of the 35th year of Elizabeth by which an obstinate offender in that matter was made a felon without benefit of clergy, and, lastly, the statute of 3 James I. imposing the oath of allegiance. (3) The special legislation during this period under which the Quakers suffered included (*a*) a statute 13 & 14 Car. II. c. 1, especially directed against them and punishing their refusal to take an oath, or the taking part in assemblies for worship, with fine, and a second conviction with an obligation to abjure the realm, or transportation to any of the king's plantations; (*b*) the Act of Uniformity (13 & 14 Car. II. c. 4), more stringent than that of Elizabeth; (*c*) the Five-Mile Act passed in 1665 (17 Car. II. c. 4); and, lastly, the Conventicle Act of 1670 (22 Car. II. c. 1). (4) The ecclesiastical courts, on the return of the Stuarts, were restored to their former vigour, and Quakers were continually proceeded against in them for non-payment of tithes, oblations, and other church claims, and also for non-attendance at the parish churches, and for contempt of the discipline and censures of the church. Many of their body were accordingly excommunicated, and under the writ *de excommunicato capiendo* confined to prison.

The passing of the Conventicle Act gave fresh vigour to the persecution of Dissenters. But, on 15th March 1671-72, King Charles II. issued his declaration for suspending the penal laws in matters ecclesiastical, and shortly afterwards by pardon under the great seal released above four hundred Quakers from prison, remitted their fines, and released such of their estates as were forfeited by præmunire. The dissatisfaction which this exercise of the royal prerogative created induced the king in the following year to recall his proclamation, and the sufferings of the Quakers revived; and, notwithstanding representations and appeals to King Charles II., the persecution continued throughout his reign. On the accession of James II., the Quakers addressed him with some hope from his known friendship for William Penn, and presented to him a list of the numbers of their members undergoing imprisonment in each county, amounting in all to fourteen hundred and sixty. King James not long afterwards directed a stay of proceedings in all matters pending in the Exchequer against Quakers on the ground of non-attendance on national worship. In 1687 came the king's celebrated declaration for liberty of conscience, and in the following year the Revolution, which put an end to all persecution of the Quakers, though they remained for many years liable to imprisonment for non-payment of tithes, and though they long laboured together with other Dissenters under various disabilities—the gradual removal of which is part of the general history of England.

The Toleration Act was by no means the only legislation of the reign of William and Mary which brought ease to the Quakers. The legislature early had regard to their refusal to take oaths; and from 1689 to a very recent date numerous enactments have respected the peculiar scruples of the Friends. This special legislation may be conveniently studied in Davis's *Digest of Legislative Enactments relating to Friends* (Bristol, 1820).

3. With the cessation of persecution in 1689 the zeal of the Quaker body abated. Foreign missions had no existence except in the occasional travels of some wandering minister. The notion that the whole Christian church would be absorbed in Quakerism, and that the Quakers were in fact the church, passed away; and in its place grew up the conception that they were "a peculiar people" to whom had been given a clearer insight into the truths of God than to the professing Christian world around them, and that this sacred deposit was to be guarded with jealous care. Hence the Quakerism of this period was mainly of a traditional kind: it dwelt with increasing emphasis on the peculiarities of dress and language which tended to shut Quakers off socially from their fellow-men; it rested much upon discipline, which developed and hardened into rigorous forms; and the correction or exclusion of its members was a larger part of the business of the body than the winning of converts either to Christianity or to Quakerism.

Excluded from political life by the constitution of the country, excluding themselves not only from the frivolous pursuits of pleasure but from music and art in general, with no high average of literary education (though they produced some men of eminence in medicine and science, as Dr Fothergill and Dr Dalton), the Quakers occupied themselves largely with trade, the business of their society, and the calls of philanthropy. In the middle and latter part of last century they founded several institutions for the more thorough education of their children, and entered upon many philanthropic labours.

During this period Quakerism was sketched from the outside by two very different men. Voltaire (*Dictionnaire Philosophique, s.vv.* "Quaker," "Toleration") has described the body, which attracted his curiosity, his sympathy, and his sneers, with all his brilliance. Clarkson (*Portraiture of Quakerism*) has given an elaborate and sympathetic account of the Quakers as he knew them when he travelled amongst them from house to house on his crusade against the slave trade.

4. It cannot be denied that the theology of Quakerism had become somewhat mystic and quietist during the long period we have just considered. About the year 1826 an American Quaker named HICKS (*q.v.*) openly denied the divinity of Christ, depreciated the value of the Scriptures, and recognized no other Saviour than the inward light. A large body of the American Quakers followed him, and still maintain a separate existence. It was this movement which led to a counter movement in England, known in the Quaker body as the Beacon controversy, from the name of a book published in 1835, advocating views more nearly akin to those known as evangelical than were held by many Quakers. A considerable discussion ensued, and a certain number of the Friends holding these more evangelical doctrines departed from the parent stock, leaving, however, behind them many influential members of the society who strove to give a more evangelical tone to the Quaker theology. Joseph John Gurney, by his various writings (some published before 1835), was the most prominent actor in this movement. This period has also been marked, especially within the last few years, by some revival of aggressive action, and Quakers have taken far more part in the teaching in Sunday schools, in the preaching of the gospel to the poor, and in the establishment of foreign missions than in the period immediately preceding. In 1847 an association was established to promote Sunday schools in the body; in 1859 a Friends' foreign mission was established; and the Quakers have now a few regular labourers in Madagascar, India, Syria, and Constantinople.

Other causes have been at work modifying the Quaker body. The repeal of the Test Act, the admission of

Quakers to parliament, the establishment of the university of London, and more recently still the opening to Dissenters of Oxford and Cambridge, have all operated on the body. It has almost entirely abandoned its peculiarities of dress and language; the cultivation of music and the other arts is no longer discouraged except by a very few; and literary and scientific tastes have been cultivated all the more because their attention was not preoccupied with the love of field sports or of dancing. In fact a number of men either Quakers or of Quaker origin and proclivities, large in proportion to the small body with which they are connected, occupy positions of influence in English society, and carry with them, not the full body of Quaker doctrine, but some leaven of Quaker habits and thoughts and feelings.

Doctrine.—It is not easy to state with certainty the doctrines of a body which has never adopted any creed, and whose views have undoubtedly undergone from time to time changes more or less definite. But the accepted writings of its members and the statements as to doctrine contained in the *Book of Christian Discipline* of the society furnish materials.

The most characteristic doctrine of Quakerism is undoubtedly this—that there is an immediate revelation of the Spirit of God to each individual soul, that this light is universal and comes both to the heathen and the Christian, and thereby the love and grace of God towards mankind are universal. It is almost needless to call attention to the direct antithesis between this doctrine of the Quakers and the various doctrines of election held by the Puritans, so that, if Quakerism be called the climax of Puritanism, it is so only as the rebound is the climax of the wave. From the doctrine of the sufficiency of the inward light proceed several other of the peculiar views of Quakers. They have denied the necessity and abstained from the practice of the sacraments of baptism and the Lord's supper. The one baptism, says Barclay (12th proposition), "is a pure and spiritual thing, to wit, the baptism of the spirit and fire . . . . . of which the baptism of John was a figure which was commanded for a time, and not to continue for ever." "The communion of the body and blood of Christ," says the same author (13th proposition), "is inward and spiritual, which is the participation of his flesh and blood by which the inward man is daily nourished in the hearts of those in whom Christ dwells, of which things the breaking of bread by Christ with his disciples was a figure."

But not merely do the Quakers dispense with the sacraments; they exist without any priesthood or regular or ordained ministry; they allow the liberty of unlicensed preaching and prayer to every member of their society in their assemblies, and those in whom the body recognizes the true gifts are publicly acknowledged as ministers. But by this act they attain to no greater power in the society than they possessed before. By the strength and power of the light of God, says Barclay in his 10th proposition, "every true minister of the gospel is ordained, prepared, and supplied in the work of the ministry; and by the leading, moving, and drawing thereof ought every evangelist and Christian pastor to be led and ordered in his labour and work of the gospel both as to the place where, the persons to whom, and as to the times when he is to minister."

The Quakers not only have no stated ministry, but they hold that no form of worship is so good as a patient waiting upon God in silence "by such as find no outward ceremony, no observations, no words, yea not the best and purest words, even the words of Scripture, able to satisfy their weary and afflicted souls." Hence, although permitting addresses from their members, they sit frequently silent both in family worship and in their meetings. Of late years, however, in some places passages from the Bible are read in their meetings for worship. Furthermore the Quakers maintain the equal right of women with men to preach and pray in their assemblies; and they cite the four daughters of Philip who prophesied, and other women who are mentioned in the New Testament as having laboured much in the Lord, as showing that their practice is in accord with that of the early church.

Refusing to acknowledge the ministry of the Established Church, and holding that they could thus best testify to "the spiritual reign and government of Christ," the Quakers refused to pay all church rates, tithes, and other ecclesiastical demands. To the year 1875 they maintained the same objection against tithe-rent charge, and then abandoned it.

The Quakers deny the lawfulness for a Christian of all war, defensive or otherwise, and have always refused, often at the expense of much suffering, to take any part in military matters; they equally deny the lawfulness for a Christian man to take any oath, even in a court of justice, and the law of England has long recognized their affirmations as giving validity to their evidence; they have denied themselves the cultivation of music, attendance at the theatres, and hunting, shooting, and field sports generally as vain amusements inconsistent with the gravity and seriousness of Christian life; they have insisted on the duty of using language not only free from that profanity which was so common until lately but stripped of all flattery and purged of all dross of heathenism; they enforced the duty of plainness of dress and of excluding from it, and from the modes of salutation and address, everything calculated to satisfy vanity.

The result of these doctrines on Quaker manners was notorious, and proved a continual source of objection to them on the part of their fellow-men, and frequently led to persecutions. They adopted the singular number in addressing a single individual, however exalted; and the "thou" and "thee" used to a magistrate or a judge was often a cause of great irritation. They refused to say "good night," "good morrow," or "good speed"; they adopted a numerical nomenclature for the months of the year and the days of the week. They refused to bow or to remove their hats, and for this they suffered much.[1] They forbore the drinking of healths, not merely as a vanity, but as "a provocation to drink more than did people good." They adopted a remarkable simplicity in their marriages and their funerals. They used also great plainness in their houses and furniture and in their dress; and, by their tenaciously adhering to forms of attire which had fallen into disuse, their dress both for men and women became antique and peculiar, and Quakers were easily recognized as such by the garments they wore. Furthermore they discarded the usual symbols of grief on the death of their relations.

One point of morality on which the Friends have long insisted deserves notice. They require their members who may have been released from their debts by bankruptcy or composition, when able to pay their debts in full, to do so notwithstanding their legal discharge.

In the great doctrines of Christianity embodied in the apostles' creed the Quakers are in accord with their fellow-Christians: they believe in the Father, Son, and Holy Spirit, in the atonement by Christ, and in sanctification by the Spirit; they receive and believe the Scriptures as proceeding from the Spirit of God. A letter addressed by George Fox and others to the governor of Barbados in 1671 (*Journal*, 1st ed., p. 358), and the "General Advices" in the Book of Discipline, may usefully be consulted on this point.

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[1] See Thomas Ellwood's *Journal* for an account of his sufferings in this matter, at once pathetic and ludicrous.

Organization and Discipline.—The duty of watching over one another for good was insisted on by the early Friends, and has been embodied in a system of discipline. Its objects embrace (*a*) exhortation and admonition to those who walk contrary to the standard of Quaker ethics, and the exclusion of obstinate or gross offenders from the body, and as incident to this the hearing of appeals from individuals or meetings considering themselves aggrieved; (*b*) the care and maintenance of the poor and provision for the Christian education of their children, for which purpose the society has established numerous boarding schools in different parts of the country; (*c*) the amicable settlement of "all differences about outward things," either by the parties in controversy or by the submission of the dispute to arbitration, and the restraint of all proceedings at law between members except by leave; (*d*) the recognition of ministers as such; (*e*) the cognizance of all steps preceding marriage according to Quaker forms; (*f*) the registration of births, deaths, and marriages; (*g*) the issuing of certificates or letters of approval granted to ministers travelling away from their homes, or to members removing from one meeting to another; and (*h*) the management of the property belonging to the society. The present organization of the Quaker church is essentially democratic—it has not and never had any president or head; and in theory every person born of Quaker parents is a Quaker and entitled to take part in all the general assemblies of the body. The members are grouped together in a series of subordinated meetings which recall to the mind the Presbyterian model. The unit is known as a "particular meeting"; next in order comes "the monthly meeting," usually embracing several particular meetings called together, as its name indicates, monthly; then "the quarterly meeting," embracing several monthly meetings; and lastly "the yearly meeting," embracing the whole of Great Britain. Representatives are sent from each inferior to each superior meeting; but all Quakers may attend and take part in any of these meetings. This system is double, each meeting of "men Friends" having its counterpart in a meeting of "women Friends"; and they usually meet at the same time, and join together in the devotional gatherings which take place before or after the meetings for discipline. The mode of conducting these meetings is noteworthy. There is no president, but only a secretary or clerk; there are no formal resolutions; and there is no voting. The clerk ascertains what he considers to be the judgment of the assembly, and records it in a minute.

The offices known to the Quaker body are—(1) that of minister; (2) of elder, whose duty it is "to encourage and help young ministers, and advise others as they in the wisdom of God see occasion"; and (3) overseers to whom is especially entrusted that duty of Christian care for and interest in one another which Quakers recognize as obligatory in all the members of a church. These officers hold from time to time meetings separate from the general assemblies of the members.

This present form both of organization and discipline has been reached only by a process of development. The quarterly or general meetings seem to have been the first union of separate congregations. In 1666 Fox established monthly meetings. In 1672 was held the first yearly meeting in London. In 1675 certain "canons and institutions" were issued to the quarterly meetings. In 1727 elders were first appointed. In 1752 overseers were added; and in 1737 the right of children of Quakers to be considered as Quakers was fully recognized. From these dates it is obvious that the last century saw a vigorous development of the disciplinary element in Quakerism; it was probably the time of greatest rigour as regards external matters and of the greatest severity in punishing so-called delinquencies. In Aberdeen the meeting entered on their minutes an elaborate description of what was and what was not to be endured in the dress of men and women; and York quarterly meeting was so disturbed at the presence of young women in long cloaks and bonnets that they were ordered to take advice before coming to York, and one monthly meeting directed that those young women who intended to go to York were to appear before their own meeting "in their clothes that they intend to have on at York."

Of late years the stringency of the Quaker discipline has been relaxed: the peculiarities of dress and language have been abandoned; marriage with an outsider has ceased to be a certain ground for exclusion from the body; and, above all, many of its members have come to "the conviction, which is not new, but old, that the virtues which can be rewarded and the vices which can be punished by external discipline are not as a rule the virtues and the vices that make or mar the soul" (Hatch, *Bampton Lectures*, 81).

The Quakers maintain that their system of church government and of discipline is in close accordance with that of the early church. That it has some great differences cannot be denied, especially when we think of baptism and the Lord's supper; that it has some important points of likeness, especially in the care of each member for the others and in the maintenance of the poor, is equally certain. The portraiture of the early Christian church recently drawn by Dr Hatch in his *Bampton Lectures* is in many respects likely to recall the lineaments of Quakerism.

Philanthropic Interests.—A genuine vein of philanthropy has always existed in the Quaker body. In nothing has this been more conspicuous than in the matter of slavery. George Fox and William Penn laboured to secure the religious teaching of slaves. As early as 1676 the assembly of Barbados passed "An Act to prevent the people called Quakers from bringing negroes to their meetings." John Woolman[1] laboured amongst the Quakers of America for the liberation of the slaves with the most winning tenderness. The Quakers were the first Christian body that purged themselves of the stain of dealing in slaves. As early as 1780 not a slave was owned by any Friend in England or America with the knowledge and consent of the society. In 1783 the first petition to the House of Commons for the abolition of the slave trade and slavery went up from the Quakers; and throughout the long agitations which ensued before that prayer was granted the society took an active and prominent part.

In 1798 Lancaster opened his first school for the education of the poor; and the cause of unsectarian religious education found in the Quakers steady support. They have taken also an active part in Sir Samuel Romilly's efforts to ameliorate the penal code; in prison reformation (1813), with which the name of Elizabeth Fry is especially connected; in the efforts to ameliorate the condition of lunatics in England (the Friends' Retreat at York, founded in 1792, having been remarkable as an early example of kindly treatment of the insane); and in many other philanthropic movements.

One thing is noteworthy in Quaker efforts for the education of the poor and philanthropy in general: whilst they have always been Christian in character, they have not to any considerable extent been used as a means of bringing proselytes within the body.

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[1] Woolman's *Journal* and *Works* are remarkable. He had a vision of a political economy to be based not on commodities but on lives, not on desire but on self-denial.

Quakerism in Scotland.—Quakerism was preached in Scotland very soon after its rise in England; but in the north and south of Scotland there existed independently of and before this preaching groups of persons who were dissatisfied with the national form of worship and met together in silence for devotion. They naturally fell into this society. In Aberdeen the Quakers took considerable hold, and were there joined by some persons of influence and position, especially Alexander Jaffray, some time provost of Aberdeen, and Colonel David Barclay of Ury and his son Robert, the author of the *Apology.* Much light has been thrown on the history of the Quakers in Aberdeenshire by the discovery in 1826 at Ury of a MS. *Diary* of Jaffray, since published with elucidations (2nd ed., London, 1836).

Ireland.—The father of Quakerism in Ireland was William Edmondson; his preachings began in 1653–54. The *History of the Quakers in Ireland* (from 1653 to 1752), by Wright and Rutty, may be consulted.

America.—The earliest appearance of Quakers in America is a remarkable one. In July 1656 two women Quakers, Mary Fisher and Ann Austin, arrived at Boston. Under the general law against heresy their books were burnt by the hangman, they were searched for signs of witchcraft, they were imprisoned for five weeks and then sent away. During the same year eight others were sent back to England.

In 1657 and 1658 laws were passed to prevent the introduction of Quakers into Massachusetts, and it was enacted that on the first conviction one ear should be cut off, on the second the remaining ear, and that on the third conviction the tongue should be bored with a hot iron. Fines were laid upon all who entertained Quakers or were present at their meetings. Thereupon the Quakers, who were perhaps not without the obstinacy of which Marcus Antoninus complained in the early Christians, rushed to Massachusetts as if invited, and the result was that the general court of the colony banished them on pain of death, and four Quakers, three men and one woman, were hanged for refusing to depart from the jurisdiction or obstinately returning within it. That the Quakers were irritating cannot be denied: some of them appear to have publicly mocked the institutions and the rulers of the colony and to have interrupted public worship; and some of their men and women too acted with fanaticism and disorder. But even such conduct furnishes but a poor apology for inflicting stripes and death on men and women. The particulars of the proceedings of Governor Endicott and the magistrates of New England as given in Besse are startling to read. On the Restoration of Charles II. a memorial was presented to him by the Quakers in England stating the persecutions which their fellow-members had undergone in New England. Even the careless Charles was moved to issue an order to the colony which effectually stopped the hanging of Quakers for their religion, though it by no means put an end to the persecution of the body in New England.

It is not wonderful that the Quakers, persecuted and oppressed at home and in New England, should turn their eyes to the unoccupied parts of America, and nourish the hope of founding amidst their woods some refuge from oppression and some likeness of a city of God upon earth. In 1671–73 George Fox had visited the American plantations from Carolina to Rhode Island and had preached alike to Indians and to settlers; and in 1674 a moiety of New Jersey was sold by Lord Berkeley to John Fenwick in trust for Edward Byllinge. Both these men were Quakers, and in 1678 Fenwick with a large company of his co-religionists crossed the Atlantic, sailed up the Delaware, and landed at a fertile spot which he called Salem. Byllinge, having become embarrassed in his circumstances, placed his interest in the State in the hands of Penn and others as trustees for his creditors, and they invited buyers, and companies of Quakers in Yorkshire and London were amongst the largest purchasers. In 1677-78 five vessels with eight hundred emigrants, chiefly Quakers, arrived in the colony (now separated from the rest of New Jersey under the name of West New Jersey), and the town of Burlington was established. In 1677 the fundamental laws of West New Jersey were published, and recognized in a most absolute form the principles of democratic equality and perfect freedom of conscience. Notwithstanding certain troubles from claims of the governor of New York and of the duke of York, the colony prospered, and in 1681 the first legislative assembly of the colony, consisting mainly of Quakers, was held. They agreed to raise an annual sum of £200 for the expenses of their commonwealth; they assigned their governor a salary of £20; they prohibited the sale of ardent spirits to the Indians, and forbade imprisonment for debt.

But beyond question the most interesting event in connexion with Quakerism in America is the foundation by William PENN (*q.v.*) of the colony of Pennsylvania, where he hoped to carry into effect the principles of his sect—to found and govern a colony without armies or military power, to reduce the Indians by justice and kindness to civilization and Christianity, to administer justice without oaths, and to extend an equal toleration to all persons professing theism. Such was "the holy experiment," as Penn called it, which he tried, and which seemed as if it was destined to put Quakerism to practical proof. In 1681 he obtained a grant of the colony from Charles II., and in the following year settled the frame of government for the State and sailed for America. Here he entered into his celebrated treaty of unity with the Indians, "le seul traité entre ces peuples et les Chrétiens qui n'est point été juré et qui n'est point été rompu." What was the result of this attempt to realize Quaker principles in a new country and on a virgin soil? The answer is in some respects indecisive. During the time that the Quaker influence was predominant, and for seventy years after the foundation of Pennsylvania, the Indians are said never to have taken the life of a white man; and once when five hundred Indians were assembled to concert a massacre they were turned from their purpose by six unarmed Friends. From England and Wales, from Scotland and Ireland, from the Low Countries and the banks of the Rhine, where Penn's missionary visit had made a deep impression, emigrants crowded to Pennsylvania; in two years Philadelphia had risen to be a town of six hundred houses, and in three years from its foundation that city had increased more than New York in fifty years; and the first century of the life of the colony exhibited in an unusual degree a scene of happiness and peace. But, on the other hand, little progress was made in winning the Indians to Christianity, and the annals of the infant State were full of petty quarrels and jealousies. Penn was a feudal sovereign, having over him a Stuart king as his lord paramount at home, and the absolute democracy which he had established as his immediate dependents beneath him. In such relations there were necessarily elements of difficulty, and soon dissensions broke out between the governor and the colonists; a popular party was headed by members of the Quaker body and opposed the founder, and the influx of members of other religious persuasions led to dissensions in the assembly. The officials of the Court of Admiralty set up claims at variance with Penn's notions; difference broke out between the province properly so-called and the territories which afterwards became the State of Delaware. Penn was engaged in protracted quarrels as to the boundaries of his State; the English crown made requisitions on the colonists for men and money to support the war in America against France. Penn was during some years suspended by the crown from his rights as governor; his son and one of the deputy governors whom he sent out disgraced themselves by their licentious conduct; the colony gradually passed away from under the influence of Quakerism; and Penn's "Civitas Dei" faded into an American republic. For many years large numbers of Quakers emigrated from England to America. The most noteworthy incidents in their history are the part which they have taken in that movement which has ended in the abolition of slavery in the United States and the interest which they have exhibited in the native Indians.

France.—The origin of the few Quaker congregations which exist in France is curious. It seems that amongst the Camisards were found a few who disapproved of the military operations by which their friends resisted the persecution of Louis XIV., who believed in a spiritual light, who met for silent worship, and in other respects were like Quakers. Certain it is that towards the end of last century a small body of persons holding these views and these practices existed at Congeniès and other villages at the foot of the Cevennes. During the war between England and France consequent on the American struggle for independence a Quaker was part owner in two luggers, which, against his protests, were employed as privateers and captured two valuable prizes; he took his share of the spoil, invested and accumulated it, and on the conclusion of peace in 1783 advertised in the *Gazette de France* for the owners of the captured ships. This advertisement came to the knowledge of the little body at Congeniès, and hence a communication was established between the French and English Quakers. Probably about the same time certain American Quakers, on the invitation of the French Government, migrated from Nantucket to Dunkirk, for the purpose of extending the fisheries. A curious episode in Quaker history is the presentation, on 10th February 1791, to the National Assembly of a petition from these two bodies of French Quakers, and the reply of the president. The petition and answer were printed by Baudoin, printer to the Assembly.

Germany and Norway.—In both these countries exist small bodies of persons who have adopted the views and practices of the Quakers. These bodies date from early in the present century.

Statistics of Quakerism.—The number of Quakers in England and Wales in 1680 was probably about 40,000, and in 1806 about 32,000. In 1883 the total number of members in England, Wales, and Scotland was returned as 15,219 (193 were in Scotland), an increase of 106 on the previous year, and the number of habitual attenders of meetings of the body, not members, was 5380, an increase of 150. In Ireland there were, in 1883, 2812 Quakers. The Quakers in America number probably (including all bodies which claim to be Friends) from 50,000 to 60,000 or upwards. Besides these there are in Norway about 200, in France from 70 to 80, in Germany from 50 to 60, and in Australia and New Zealand from 500 to 600 Quakers.

Bibliography.—The writings of the early Quakers are numerous; the most noteworthy are the *Journal* of George Fox and the *Life* of Thomas Ellwood, both autobiographies, the *Apology* of Robert Barclay, and the works of Penn and Penington. The *History of the Quakers* by William Sewel, a Dutch Quaker, was translated into English, and has gone through several editions; a *History of the Quakers* by Gough may also be consulted. The *Sufferings of the Quakers*, by Besse (London, 1753), is the chief authority as to the persecutions they endured. *The Peculiarities of the Society of Friends*, and the other writings of Joseph John Gurney, exhibit the modern Evangelical Quakerism. *The Book of Discipline* of the Society, in its successive editions from 1782 to 1883, is the only authoritative statement of the views of the Society on Christian practice and church government, and a comparison of the different editions would throw light on the changes of sentiment in the body. *The Inner Life of the Religious Societies of the Commonwealth* (London, 1876), by Robert Barclay, a descendant of the apologist, contains much curious information about the Quakers. Smith's *Descriptive Catalogue of Friends' Books* (London, 1867) gives the information which its title promises. Bancroft's *History of the Colonization of the United States* may be consulted for the American history of Quakers. The periodicals now issued by members of the Quaker body in Great Britain are *The Friend*, *The British Friend*, *Friends' Quarterly Examiner*, and *Friends' Review*. (E. F.)

QUANTAMPOH, or **KUNTAMPOH**, a town of the Gold Coast region of western Africa, situated about 80 miles north-east of Coomassie, in 7° 36′ N. lat. and 1° 4′ W. long. According to Captain Brandon Kirby, who was the first white man to reach the place, it had in 1881 a resident population of 15,000, and traders passed through it to the number of about 25,000. Formerly it was one of the great ivory-marts of this part of Africa, and it is still a centre of the cola-nut trade, the slave trade, &c.

QUARANTINE (Fr. *quarantaine*, a period of forty days) is, in the original sense of the term, a thing of the past in the United Kingdom and in several of the other states of Europe, as well as in America. Its interest is therefore largely historical, and a sketch of the history will be given at the end of this article. But, in common usage, the same word is applied to the modern substitutes for quarantine, although these are a complete departure in principle or theory from the indiscriminate system of detention of ships and men, unlading of cargo in lazarets, fumigation of susceptible articles, and the like, which used to be carried to great lengths on account of the plague and in connexion with the Levantine trade.

Substitute for Quarantine in the United Kingdom.—The modern practice is to detain or refuse "pratique" to no ship unless there be a communicable form of sickness on board, or there had been such during the voyage. It is the duty of the officers of customs to question the captain as to the existence of any catching disease among the passengers or ship's company; if there be any evidence or suspicion of communicable infection, the officers of customs report the same to the port sanitary authorities, who have power to deal with the case under the Public Health Act, and according to an order of the Local Government Board first issued in 1873. The medical officer of health proceeds at once to make an inspection, detaining the ship and all on board only until such time as the inspection can be satisfactorily made, the sick removed to hospital, and disinfectants applied. This practice was adopted with success in the case of several arrivals from Baltic and North Sea ports with cholera on board in 1873, no extension of the disease on shore ensuing, and again in 1884 in the case of a troopship arrived at Portsmouth direct from Bombay, and of at least two arrivals (at Liverpool and Cardiff) from Marseilles, with cholera on board. It is also adopted from time to time on account of small-pox cases, and of other catching importations at the discretion of the port sanitary authority.

The last importation of yellow fever into the United Kingdom was at Swansea in September 1865, by a wooden vessel with copper ore from St Jago de Cuba. There had been cases of yellow fever on board during the voyage; but at Swansea (as in many other instances) the infection spread rather from the ship's hull and the unladed cargo than from the crew or their effects, and some fifteen deaths ensued. If such a case were to occur again, it would be dealt with, like any other communicable disease, by the port sanitary authority under the Public Health Act. The yellow-fever incident of 1865 at Swansea is the last occasion on which the sanction of the Quarantine Acts has been appealed to. The privy council merely directed the board of customs to warn the parties implicated of their liability to prosecution, although no prosecution would be instituted. The Quarantine Acts are still unrepealed, but they may be said to have become practically obsolete during the past twenty years.

Quarantine or its Substitutes in other European Countries.—The principle of inspection, and of isolation of the sick, as stated above for the United Kingdom, was accepted with small reservation by the sanitary conference of Vienna in 1874, and it is now more or less consistently acted upon by all the larger European maritime states except Spain and Portugal. In times of cholera panic, quarantine of the original kind has been imposed against all arrivals from an "infected country" by ports of the Levant and Black Sea, and by several Mediterranean states besides Spain. But it is only in the ports of the Iberian Peninsula that the old quarantine traditions remain in force from year to year; and it is only for them that any special account need be given.

The principal occupation of the quarantine establishment at Lisbon all the year round is with arrivals from Brazil, where yellow fever is endemic. The lazaretto of Lisbon, which is probably the largest and in ordinary times the busiest in the world, is situated on a hill opposite the Belem Tower, 4 miles below the city. The present establishment was erected by the Portuguese Government at a cost of over £200,000. It consists of seven perfectly distinct pavilions standing radially in a semicircle with the convexity to the river. It is managed by an inspector who is under the minister of the interior. Public tenders are invited every year, or every two years, for boarding and lodging the passengers according to their classes on board ship (1st, 2d, and 3d), the contract being given to the lowest bidder. The present prices for board and lodging *per diem* are about 5s. 6d. 1st class, 3s. 2nd class, and 1s. 6d. steerage. The establishment is carried on at a loss to the Government. Quarantine is imposed, as a matter of fact, on all ships, passengers, luggage, and cargo coming from the Brazils. The term varies from five days to seven days, according as the Brazilian port is considered infected or suspected. A bill of health is issued to the captain by the Portugese consul at the port of sailing, which usually bears on it that so many deaths from yellow fever had occurred during the previous eight or ten days. If clean bills of health were issued, the quarantine would be raised; and this has happened for short periods at rare intervals. During the winter months (December, January, February), when the cold makes a development of the yellow fever virus at Lisbon improbable, if not impossible, the baggage and cargo only are subject to quarantine, the passengers being allowed to go ashore at once with their hand baggage. Throughout the rest of the year all passengers from the Brazils have to go to the lazaretto and stay there the alloted time, their effects being aired, fumigated, or disinfected. If Lisbon be the port of discharge, the cargo from an infected ship will be landed at the lazaret for purification if so directed. There is a schedule of "susceptible articles," which includes cotton, hair, hemp, letters, parcels, and other correspondence, hides, fresh meat, wool and linen, skin, feathers, and silk. These articles are fumigated with chlorine; the inside of the ship is washed with chloride of lime or other disinfectant. In the case of a mail steamer on her way to England, the passengers and effects for Lisbon are landed at the quarantine grounds, and the vessel proceeds to her destination (Liverpool or Southampton) "in quarantine," which means nothing as regards the English ports.

This rigorous routine is a concession to the popular recollection of the terrible epidemic of yellow fever in the hot summer of 1857, when there were 19,000 cases in and around Lisbon, with about 6000 deaths, a large proportion being among the well-to-do. The importation was traced to a tainted ship and cargo from Rio. For many years, no cases of yellow fever have developed among the suspected passengers landed; and in only two or three instances have there been cases among the employés of the establishment who are occupied with the baggage and merchandise. The Lisbon chamber of commerce is now in favour of a modification of the quarantine law, and of regulations in conformity with the prominent facts of experience—namely, that the fever is not started on shore through personal contact, but solely by emanations from a ship's hull, ballast, cargo, or passengers' effects, and that high-class iron steamships are not, in the nature of things, under the same suspicion as old wooden sailing vessels.

The quarantine practices of Lisbon are copied faithfully at the Azores, Madeira, and the Cape Verd Islands.

For Spain there are two chief quarantine stations or "foul lazarets," one for the Atlantic seaboard at Vigo, and another for the Mediterranean coast at Port Mahon, Minorca. Vessels arriving at Spanish ports with foul bills of health (from Havana, &c., in ordinary times, and from various ports in cholera times) must proceed to one or other of these appointed stations to perform their quarantine. A "quarantine of observation," which is usually for six or three days, and is imposed on vessels with clean bills, may be performed at any port. It is a routine maxim of the Madrid board of health that any country, such as the United Kingdom, which does not practise quarantine, is *ipso facto* suspected when a foreign epidemic is in any part of Europe to which its vessels trade; and all arrivals from its ports may be subjected to a quarantine of observation. This abstract doctrine, which can hardly be approved by responsible medical authority, was acted on for a short time as recently as 1883 and 1884, when cholera was in Egypt and in Provence.

Next to Spain and Portugal, Turkey and Greece are the countries in Europe where the old quarantine traditions have most vitality, owing doubtless to their nearness to former seats of plague in the Levant. The lazarets at the Piræus and in the Dardanelles are considerable establishments, mostly used now in times of cholera. Ships bound inwards for Turkish ports take health-guards on board in the Dardanelles. There are many other lazarets at Mediterranean, Adriatic, and Levantine ports, including Malta and Gibraltar, surviving from the days of the plague, whose machinery is furbished up from time to time when cholera breaks out.[1] For the whole of northern Europe, including the Atlantic seaboard of France, quarantine is now practically obsolete; by Holland it was never seriously practised even for the plague, and by the states bordering on the Baltic it was given up about the same time as it fell into disuse in Great Britain.[2] In Norwegian ports subsequent to 1866 there were 3126 arrivals from countries infected with cholera, on board which 25 cases of cholera were found and 29 cases of cholerine; but the malady obtained no footing on shore although quarantine was not enforced. In 1873, when cholera was prevalent in several ports of the Baltic and North Seas, there were 550 arrivals at Norwegian ports from infected countries, among which were 12 cases of cholera; but importation of the epidemic to the shore was prevented simply by inspection and isolation of the sick. In Italian ports, again, 800 vessels were quarantined in 1872, in not one of which was any case of cholera found. The immunity of the United Kingdom in 1873 and 1884, notwithstanding the arrival of ships with cholera on board, and even (in 1873) the unobserved landing of cholera cases, has been mentioned already.

Land Quarantine.—A land quarantine on a frontier is still enforced on account of cholera from time to time in southern Europe, *e.g.*, in 1884 by Italy against France at Ventimiglia and Modena and by Spain against France in the passes of the Pyrenees, and in 1885 by Portugal against Spain. The experiment occasionally succeeds. A "sanitary cordon" is the rigorous isolation (by troops) of a pestilence-stricken place from the country around. It is a survival from the times of the plague, and is of no use in cholera.

Quarantine or its Substitutes in the Western Hemisphere.—Apart from the visitations of cholera now and then, the chief occasion of quarantine on the American continent and adjacent islands is the endemic existence of yellow fever in Brazilian and West Indian harbours, particularly Havana and Rio de Janeiro (and, since 1853, in Callao and other Peruvian ports). During the yellow-fever season from April to November, the ports of the United States are on the outlook, under the quarantine laws of each State, to detain vessels with yellow fever on board arriving from Gulf ports or from the West Indies and Brazil. In like manner the ports of the River Plate would protect themselves against foul arrivals from Brazil; and some of the Mexican Gulf and West Indian harbours will even practise quarantine against each other according as the fever happens to be epidemic here or there. The practice at New York, Boston, Philadelphia, Baltimore, and other United States ports is to detain only the sick, or those who are reasonably suspected, the lazaret (usually on an island in the harbour) being practically a hospital for sailors, immigrants, and other newly-arrived persons suffering from communicable disease. In some years the cases of yellow fever arriving at New York have been numerous, and an epidemic has now and again arisen among the residents near the lazaret. Experience has shown that the ship's hull, foul ballast, and the like have been the real sources of infection, cases occurring at New York every year among the labourers on infected ships. It is only occasionally that the unlading of the cargo of a yellow-fever ship into the quarantine barges has been insisted on. The classification of ships according as they carry clean or foul bills of health has been found to be practically unworkable in the United States, a foul bill being a rare thing. The severity of the quarantine is left, accordingly, very much to the discretion of the medical officer of the port. According to the definition of the National Board of Health, quarantine is "the administration employed to determine the presence or absence of the causes of contagious or infectious diseases, and to secure the removal or destruction of such causes;" and it does not imply detention for any specified time, nor for more time than is necessary for the above purposes. Notwithstanding the creation of a National Board of Health for the Federal Union, quarantine is still an affair of the States acting independently. The detection and isolation of small-pox cases is one of the chief occupations of the quarantine officers at United States ports.

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[1] Sir William Pym, the superintendent-general of quarantine, who visited most of them officially in 1844, narrates a case at Messina which illustrates the abuses that these establishments might be put to: "it is only very lately that the board of health at Messina placed a vessel (the 'Rapid') from England under quarantine, because a report had appeared in the papers of a fever having prevailed at Glasgow, and subjected her to a charge of about 3 per cent. upon the value of her cargo for quarantine fees" (*Correspondence respecting the Quarantine Laws*, Parl. Paper, 1846, p. 16).

[2] The lazaret for all the Baltic states was on the Swedish island of Kanso at the entrance of the Cattegat opposite Gothenburg

As regards the introduction of cholera into the United States, Billings says:—"The present quarantine systems of the United States are now probably unable to prevent the introduction of this disease, as they have been heretofore. Unless the disease had actually occurred on board ship, very little precaution would be taken, and very few of our ports have the necessary facilities for properly dealing with a large passenger ship having cholera on board, in such a manner as to obtain a reasonable amount of security without causing unreasonable delay, involving unnecessary suffering and danger on the part of those not actually sick" (*Trans. Internat. Med. Congress*, London, 1881, iv. 416).

In several instances, when cholera has broken out among emigrants in a transatlantic steamship, the vessel has put into Halifax, N. S., where there are facilities for quarantining passengers; and more than once the epidemic, although of the most threatening kind, has gone no farther. New Orleans has proved itself a more likely port of entry for cholera than any of the Atlantic ports.

In the ports of South America and the West Indies the quarantine practice is variable and empirical. Sometimes an absolute cordon has been established, as in the instance of Dominica against Guadeloupe in 1865–66 during the cholera. The smaller and healthier the community the more severe is the quarantine likely to be. In the West Indies, the Bermudas, &c., the very remarkable disease of dengue (probably a modern hybrid form) is considered to be an importable infection which quarantine can keep out.

Quarantine in the Red Sea and at Suez.—Cholera having come to Europe in 1865 by a new route, by the pilgrim traffic to Mecca, the conference of Constantinople in 1866 took into consideration the question of a quarantine at the Straits of Bab-el-Mandeb. Since that time such a quarantine has been instituted for pilgrim ships at the island of Xamaran on the Arabian side of the Red Sea, some 200 miles within the straits. Since the severe outbreak of cholera at Mecca in the end of 1881, the quarantine for pilgrim ships at Xamaran has become more stringent. The slight outbreak at Mecca in 1882 is said, without good reason, to have arisen owing to three English steamships with pilgrims having evaded that quarantine. All pilgrim ships whatsoever are required to stop at Xamaran,[1] and the pilgrims from cholera-stricken countries in the East are disembarked and kept under observation in the lazarets on the island for ten or fifteen days.[2]

On the dispersal of the hajj at Mecca, another quarantine is performed by the pilgrims returning by way of Suez, who are usually only a small fraction of the whole assemblage. They are disembarked either at Wejh on the Arabian coast half way between Jeddah and Suez, or at Tor on the Sinaitic side of the Gulf of Suez, sometimes even at both places. After the epidemic at Mecca from September to December 1881, it was not until the 19th February 1882 that the last company of pilgrims was allowed to re-embark at Wejh for Suez, by the authority of an inspecting sanitary commission from Egypt. If no suspicious cases occur, the detention is for fourteen days; but a single case subjects the whole group in which it had appeared to a further term of quarantine. Pilgrims bound for Smyrna, Beyrout, or other ports in the Levant are subjected to another term of quarantine in the lazaret of the port of arrival. Those proceeding landwards to Damascus undergo a quarantine at Moses' Wells.

The usefulness of this control over the movements of the Mecca pilgrims has been much debated. Regarding the advantages of the quarantine after the breaking up of the hajj there has been a good deal of positive evidence since 1865; but the detention at Xamaran is a much more questionable affair. In a great assemblage at Mecca, such as that of 1881, there are all the conditions for the fresh breeding of a choleraic form of sickness, which shall be communicable to others. just as there have often been (in the common-sense view) the elements of its *de novo* origin under precisely similar circumstances among a multitude of Hindus at Hurdwar, or other religious places of resort in India; and the excessive pains taken to exclude hypothetical cases of the communicable disease coming from India, Java, or other endemic centre are disproportionate so long as there is no assurance that the soil of Mecca is not itself about to become a breeding-place of the poison *de novo*. On the other hand the dispersal from Mecca is obviously an occasion for sanitary precautions.

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[1] The working of the quarantine at Xamaran will be best understood from a particular instance. The steamship "Hesperia" sailed in July 1882 from Bombay for Jeddah with 498 pilgrims, who had been inspected under the Native Passengers Act. She arrived on the 26th July at Aden, where she was quarantined for ten days owing to the death of one of the firemen from cholera. Xamaran was reached on the 8th of August, and the pilgrims landed for a ten days' quarantine. Deaths having occurred among the pilgrims on shore, a second quarantine of ten days was imposed; and towards the expiry of that time the health officer again placed the ship in quarantine for ten days owing to more deaths on shore. On September 8, when the vessel was still in quarantine, it became necessary to proceed to Aden for coals, steam having been kept up continually owing to the dangerous nature of the quarantine moorings. In leaving Xamaran the ship broke her quarantine, and only escaped the threatened fire of the Turkish gunboat by her speed. She returned from Aden on the 19th September, and re-embarked her passengers for Jeddah on the 23d, two of them dying in the boats during the embarkation. The drinking-water of the quarantine camp at Xamaran was credibly stated to be in a fetid condition, causing vomiting and purging, and the food insufficient and inferior. Each pilgrim had to pay 10 rupees, and the ship 12,000 piastres of sanitary dues. After landing her passengers at Jeddah, the "Hesperia" proceeded on her voyage to Liverpool, undergoing a twenty-four hours' quarantine of observation at Suez.—*Brit. Med. Journ.*, 1882, ii. 958.

[2] The international sanitary conference of Rome 1885 has proposed a relaxation of the rule: each ship with more than [illegible] pilgrims to carry a doctor, and no ship to be detained more than 24 hours, nor the pilgrims disembarked, unless there be or has been cholera on board.

For the general traffic from the East a quarantine of observation of twenty-four hours is imposed on arrivals at Suez from time to time when cholera is formally declared to be epidemic in Bombay or other Eastern port. Under such circumstances, ships pass through the canal in quarantine, having their canal pilots either on board the ship "in quarantine," or, under an older and more cumbrous arrangement, navigating the vessel from a steam-launch. In like manner, the coaling at Port Said is done in quarantine, and the mails and passengers landed at Brindisi under the same restrictions and formalities. The question of a more searching quarantine at Suez for the general Eastern traffic has been much discussed in the French Academy of Medicine, and has been taken up more recently at Berlin; but the weight of opinion (led by M. de Lesseps) is against any such interference with the quick despatch of vessels, as at once futile and impracticable.[1] During all the years that the canal has been open, cholera has become epidemic in Europe only once owing to direct importation from the East, namely in 1884, when the vehicle was a transport returned from Saigon; and the circumstances in that case were such that a quarantine at Suez, unless it had included the ship's hull and the personal effects on board, would have made no real difference. On the other hand, transports with recognized cholera on board have on two or three previous occasions been passed through the canal with all despatch, and no harm done on shore either in the isthmus of Suez or at the port of arrival (Portsmouth, Toulon).

PRINCIPLES OF QUARANTINE.—Plague, yellow fever, and Asiatic cholera are the three great spreading diseases which have been successively the subject of quarantine restrictions.

For many years *plague* has ceased to have any practical interest in this connexion; the last occasion of alarm in the Mediterranean ports was the outbreak of 1859, at Benghazi, in Tripoli; and at the present date the sole concern is about the land quarantine along the Turko-Persian and Russo-Persian frontiers. It is for yellow fever and Asiatic cholera, therefore, that the principles of quarantine have chiefly to be discussed, the epidemiological principles being somewhat different in the two cases. But one or two remarks have to be made about the theory of preventing the introduction of other communicable diseases.

In the draft of an international bill of health which was adopted by the international sanitary congress at Washington in 1881 small-pox and typhus are scheduled along with plague, yellow fever, and cholera. Although there are few countries where *small-pox* has not obtained a footing, yet every seaport finds it advisable to prevent the free entrance of fresh cases. Thus Denmark, in 1884, took precautions against the importation of small-pox from the Thames. It is mostly in Australia, New Zealand, the Cape, and other colonies that quarantine against small-pox is rigorously carried out. Except for a limited outbreak in Sydney in 1884, that disease has been absolutely excluded from the Australasian colonies, thanks to their admirable quarantine establishments. The case is very different at the Cape, owing to the existence of a virulent native centre of variolous disease at no great distance in the interior.

As regards *typhus*, the principles of prevention are entirely different from those that apply to small-pox. When the Irish emigration by sailing ships was brisk forty years ago, typhus often came with the new arrivals to New York, Boston, Philadelphia, Quebec, and Montreal; and a similar state of things now goes on in connexion with the Italian and other European emigration to Brazil and the River Plate. Filth, overcrowding, and want are the causes of such outbreaks; and it is only where those conditions obtain on shore that the imported disease spreads. A period of detention amidst clean and wholesome surroundings after landing has much to recommend it, the best argument for such general precaution being the fact that the disease in some instances had not occurred during the voyage, but only after the emigrants had landed in the new country. Another illustration of the need of quite special rules for typhus, and of the need of freedom from dogmatic bias about pre-existing disease germs, is the remarkable outbreak at Liverpool in 1859. The epidemic was clearly traced to an Egyptian frigate with four hundred souls on board, many of them convicts in chains. The vessel arrived in the Mersey from Alexandria in an indescribable state of filth; about one hundred of the crew and others were on the sick list from diarrhœa, dysentery, and the like; but none of the cases were typhus, nor was there a single case of that disease among the ship's company from first to last. The typhus occurred in the pilot and others who went on board in the river, among the attendants at a bath to which the filthy crew were sent to be washed, and among the patients of the Southern Hospital, into which some of the Arabs and Nubians were admitted for common complaints. To make quarantine effective against typhus, it is necessary to keep in mind that the specific fever may be vicarious to a common condition of filth and general misery. It is a modified form of the same principle of vicarious infection that, in the historical retrospect, gives us the key to the much more important problem of yellow fever, a disease which is to be regarded as a special form of typhus.

Yellow fever.

Principles of Quarantine against Yellow Fever.—The first requirement in the quarantine doctrine of yellow fever is to know where the disease is endemic, that is to say, where its poison exists in such a form that it may rise in exhalations from the harbour mud, alluvial foreshores, or wharves and shipping quarters in general, or may enter the bilges of ships with the water. There is a natural reluctance on the part of seafaring communities in the western hemisphere to admit that they harbour the seeds of yellow fever; but some of the endemic foci of the disease are beyond dispute. The principal are Havana and Rio de Janeiro. But if we take the whole historical period of yellow fever into our view, from 1640 onwards, we shall find that there is hardly a single great slave port in the New World that has not been at one time or another a native seat and source of the miasmatic virus of yellow fever. Some of these have long since got rid of the poisonous exhalations, such as Philadelphia and Baltimore; others, such as Norfolk, Charleston, and Savannah, have in all probability seen the worst days of the fever, and are now practically free from the taint in their harbours and their soil; but there are other United States ports, such as New Orleans, for which the like assurance cannot as yet be given. In the West Indies the ports of the Spanish Antilles are the worst primary breeding-places of the poison at the present day; although in the 17th and 18th centuries Bridgetown (Barbados), English Harbour (Antigua), Fort Royal (Martinique), and Basse Terre (Guadeloupe) were poisonous to the crews of the stationary men-of-war to an almost incredible extent. On the mainland, Georgetown, Demerara, is in the same rank; and the Brazilian ports (particularly Rio) have been so since 1849. Besides these harbours, all of them among the principal slave-ports at one time or another, there are others, such as Vera Cruz, Tampico, Chagres, and Porto Bello, which would seem to have lurking in their soil or shore-mud the specifically noxious thing that produces yellow fever; but it is a question whether these have not got the virus at second-hand from other centres in the Gulf. Again, it is probable that the occasional outbreaks at Monte Video had been caused by material quantities of the specifically noxious filth carried thither in trading bottoms. The great epidemics in the ports of Spain in the first quarter of this century were certainly due either to reshipment of the virus from the West Indies in the bilges of merchantmen, or to an original deposition of it from contraband slave-ships making the return voyage to Europe with cargoes of produce (see an article by the writer in the *North American Review*, Oct. 1884). The rare outbreaks in Europe within the last fifty years have been due to foul arrivals from slave-ports like Havana and Rio.

Wherever the line be drawn between endemic and non-endemic ports of yellow fever, it is only the latter that can in reason seek to impose quarantine against the disease. Of such are now the ports on the Atlantic seaboard of the United States, the ports of the River Plate, and the whole European seaboard; for these the history is full of instances of true importations traceable to particular vessels, and from such instances the principles of an efficacious quarantine may be deduced. It is not a passenger steamship arriving at New York or Lisbon with a case or cases of yellow fever on board that calls for quarantine (as distinguished from isolation and care of the sick); no real epidemic can be shown to have ever arisen from purely personal importation of that kind. The great epidemics in Spain and Portugal, and the more recent and smaller outbreaks in New York and in some ports of northern

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[1] A large majority of the medical delegates to the conference of Rome (1885) voted in favour of detaining at Suez for at least five days such vessels as might be judged by an officer of the International Sanitary Commission to be suspect,—the passengers to be disembarked and isolated in groups.

Europe, have been traced to other sources than the persons of the sick. Even a ship with a fever-stricken crew is dangerous, not so much because of the fever among the crew, but on account of those lurking causes of yellow fever in the ship through which the crew themselves were infected. There is an overwhelming mass of testimony that the real risk of importing the yellow-fever virus is always in the foul bilges of wooden ships, which had been lying in one of the endemic yellow-fever harbours. The poison is sucked in through the ship's seams; it ferments or multiplies in her bilges, rises as miasmata to infect the hold or 'tween decks, sometimes clinging to cargo, and perhaps making no sign until the cargo is all out. Again, in temperate latitudes, the virus may be imported and do no harm, unless it meet with a tract of exceptionally hot weather, such as happened at Swansea in 1865. According to this principle, all iron ships, which have little or no bilge-water, and all clean ships whatsoever, are practically free from the risk of importing an epidemic of yellow fever, even although one or more of their passengers or crew may have developed the malady on the voyage, having come on board in the stage of its incubation. The only question of practical consequence in the case of iron steamships arises in connexion with the modern practice of carrying water-ballast in tanks or compartments of the ship's bottom. On the other hand a wooden ship from a yellow-fever port, especially if she have open seams and had lain long in the harbour or "careenage," is not above suspicion on arriving during hot weather, even if no cases of yellow fever had occurred on board during the voyage. Such vessels have often carried the yellow-fever poison in their bilges; in some cases they had not been suspected until it was too late, and in other cases of mysterious outbreaks they have never been suspected at all because they had no actual cases on board. The grand lesson of experience in yellow fever is that the ship's hull is infinitely more dangerous than the persons of yellow-fever patients; and a ship's hull is dangerous only because there is a material quantity of specifically poisonous filth fermenting in the recesses of the hold. All high-class iron ships, and clean ships in general, are, for common-sense purposes, above suspicion. The persons of the sick are little likely to introduce the fever; but foul linen, bedding, and clothes are a source of danger, especially if they have been in a box or bundle for some time (witness the slight outbreak at Madrid in 1878 on the unpacking of soldiers' baggage brought *via* Santander from Cuba).

Principles of Quarantine against Cholera.—The peculiar dangers of cholera diffusion arise from the vomited and purged matters which are characteristic of the common type of the malady. Under certain circumstances the discharges of the sick are infective; they are probably not infective as they come from the body; but even minute quantities of the choleraic matters, if they have fermented in the ground, or in boxes and bundles of foul linen, bedding, or clothes, may exhale a virus which is often suddenly prostrating in its action. Thus every person with cholera, or even with choleraic diarrhœa in times of epidemic, is a source whence many more may be poisoned. When the choleraic matters percolate into wells or reservoirs the poisoning may be on a great scale. Cholera with such infective properties is an exotic to the soil of Europe and probably of all countries except south-eastern Asia; and, if the infective discharges of cholera patients from the East were kept out of Western soil, no choleraic disease would be likely to become epidemic on the latter. Such exclusion has been more or less the endeavour of all Western states from the time of the first invasion through Central Asia in 1831. The only question is whether, by attempting too much, they have not lost the opportunity of controlling the spread of the disease by less drastic means. The instances where cholera has been kept out by a rigid cordon, or the strictest form of quarantine, are few: it is probable that Spain owed her immunity in 1849, when all the rest of Europe suffered, to her policy of exclusion; there was a strikingly successful instance of the same in the case of Dominica in 1865, during a frightful cholera mortality in Guadeloupe, only 22 miles distant; and it has happened more than once for Portugal to keep out the epidemic and for Sicily to protect herself for a time against the mainland of Italy But in the great majority of instances the quarantines against cholera have been "elaborate illustrations of leakiness." Island communities have the best chances of succeeding; but in the case of the British Islands the attempt has been abandoned as impracticable. The British policy of attempting a good deal less was justified by success in 1873, when the Baltic and North Sea trade went on uninterruptedly, notwithstanding the presence of cholera at various ports across the water. In 1874 the international sanitary conference of Vienna adopted an abstract resolution by a large majority approximately in favour of the British practice, though the conference of Rome in 1885 was slightly reactionary. According to this practice a case of cholera is received into the country with much the same sort of assurance as a case of typhoid fever would be. There is much reason to believe that in both cases the agency of the soil or other *tertium quid* is needed to give potency to the poison, and that the diffusion of both diseases can be limited by disposing of the discharges of the sick in such a way that they shall neither taint the soil or the water, nor ferment on unwashed linen or bedding. Wherever a filth-sodden soil receives the choleraic matters, poisonous miasmata will rise from it; and such miasmata will also arise even in houses or on board ship, or from bundles and boxes of effects, if cleanliness be thoroughly overpowered by the stress of events. In India such cholera-soils exist from year to year, or are capable of being made on occasion, as at great religious fairs; and in that respect some Indian soils are to cholera what certain of the harbours and foreshores of the western hemisphere are to yellow fever. Both diseases in their native seats are primarily caused by specific miasmata from the tainted soil. But in Europe the spreading power of cholera is infinitely greater than that of yellow fever because the choleraic matters are more copious, and more likely to ferment under all circumstances of climate, locality (coast and interior), states of weather, and differences of race. But there is still a reasonable prospect of finding a good substitute for quarantine against cholera in the fact that its power of spreading is certainly made subject to conditions. The maxim for cholera is—Take care of the conditions, and the disease will take care of itself. Cholera is what Pettenkofer calls an "exogenous" infection: the infective matter acquires its virulence, not in or upon the body, as in a case of small-pox, but outside the body, amidst filth or other sanitary neglect. The reason why cholera is more difficult to manage than typhoid fever is that it is peculiarly a disease of the poor; "poverty has always been the true quartermaster of cholera." The virus is transported (in the West at least) from place to place largely by emigrants, religious pilgrims (as in Russia), fugitives, tramps, or others hard pressed by circumstances; one of the most remarkable instances of that kind is its alleged transmission, in 1833, from Kansas across the Rocky Mountains to the Pacific by parties of Indians successively infected. The danger from the wandering poor is all the greater that they would be naturally unwilling under any circumstances to sacrifice their small belongings of clothes, bedding, and the like, which are often the real media of infection. It is not to be denied that the old-fashioned detention for a week or more in a lazaret has still something to recommend it for such poor classes of travellers; but the detention will be more likely to give vitality to any lurking virus of the disease than to extinguish it, unless the lazaret be particularly well found in all the conveniences of living.

HISTORY OF QUARANTINE.—The first lazarets in Europe were constructed for the plague; and that disease was the only one for which quarantine was practised (not to mention the earlier isolation of lepers, and the attempts to check the invasion of syphilis in northern Europe about 1490) down to the advent of yellow fever in Spain at the beginning of the 19th century, and the arrival of Asiatic cholera in 1831. Venice took the lead in measures to check the spread of plague, having appointed three guardians of the public health in the first years of the Black Death (1348). The next record of preventive measures comes from Reggio in Modena in 1374. The first lazaret was founded by Venice in 1403, on a small island adjoining the city; in 1467 Genoa followed the example of Venice; and in 1476 the old leper hospital of Marseilles was converted into a plague hospital, the great lazaret of that city, perhaps the most complete of its kind, having been founded in 1526 on the island of Pomègue.

The practice at all the Mediterranean lazarets was not different from the English procedure in the Levantine and North-African trade, to which the rest of this sketch will be confined. On the approach of cholera in 1831 some new lazarets were set up at Western ports, notably a very extensive establishment near Bordeaux, afterwards turned to another use.

The plague had disappeared from England, never to return, for more than thirty years before the practice of quarantine against it was definitely established by an Act of Parliament of Queen Anne's reign (1710). The first Act was called for, owing to an alarm lest plague should be imported from Poland and the Baltic; the second Act of 1721 was due to the disastrous prevalence of plague at Marseilles and other places in Provence; it was renewed in 1733 owing to a fresh outbreak of the malady on the Continent, and again in 1743 owing to the disastrous epidemic at Messina. In 1752 a rigorous quarantine clause was introduced into an Act regulating the Levantine trade; and various arbitrary orders were issued during the next twenty years to meet the supposed danger of infection from the Baltic. Although no plague cases ever came to England all those years, the restrictions on traffic became more and more stringent (following the movements of medical dogma), and in 1788 a very oppressive Quarantine Act was passed, with provisions affecting cargoes in particular The first year of this century marks the turning point in quarantine legislation; a parliamentary committee sat on the practice, and a more reasonable Act arose on their report. In 1805 there was another new Act, and in 1823–24 again an elaborate inquiry followed by an Act making the quarantine only at discretion of the privy council, and at the same time recognizing yellow fever "or other highly infectious disorder" as calling for quarantine measures along with plague. The steady approach of cholera in 1831 was the last occasion in

England of a thorough-going resort to quarantine restrictions. The pestilence invaded every country of Europe despite all efforts to keep it out. In England the experiment of hermetically sealing the ports was not seriously tried when cholera returned in 1849, 1853, and 1865–66. In 1847 the Privy Council ordered all arrivals with clean bills from the Black Sea and the Levant to be admitted to free pratique, provided there had been no case of plague during the voyage; and therewith the last remnant of the once formidable quarantine practice against plague may be said to have disappeared. The quarantine establishment fell gradually into disuse, and is now represented by a hulk at the Motherbank (Portsmouth), which is kept up solely for formal reasons.

For a number of years after the passing of the first Quarantine Act (1710) the protective practices were of the most haphazard and arbitrary kind. In 1721 two vessels laden with cotton goods, &c., from Cyprus, then a seat of plague, were ordered to be burned with their cargoes, the owners receiving £23,935 as indemnity. By the clause in the Levant Trade Act of 1752 vessels for the United Kingdom with a foul bill (*i.e.*, coming from a country where plague existed) had to repair to the lazaretto of Malta, Venice, Messina, Leghorn, Genoa, or Marseilles, to perform their quarantine or to have their cargoes "sufficiently opened and aired." Since 1741 Stangate Creek (on the Medway) had been made the quarantine station at home; but it would appear from the above clause that it was available only for vessels with clean bills. In 1755 lazarets in the form of floating hulks were established in England for the first time, the cleansing of cargo (particularly by exposure to dews) having been done previously on the ship's deck. There was no medical inspection employed, but the whole routine left to the officers of customs and quarantine. In 1780, when plague was in Poland, even vessels with grain from the Baltic had to lie forty days in quarantine, and unpack and air the sacks; but owing to remonstrances, which came chiefly from Edinburgh and Leith, grain was from that date declared to be a "non-susceptible article." About 1788 an order of council required every ship liable to quarantine, in case of meeting any vessel at sea, or within four leagues of the coast of Great Britain or Ireland, to hoist a yellow flag in the day time and show a light at the maintopmast head at night, under a penalty of £200. After 1800 ships from plague-countries (or with foul bills) were enabled to perform their quarantine on arrival in the Medway instead of taking a Mediterranean port on the way for that purpose; and about the same time an extensive lazaret was built on Chetney Hill near Chatham at an expense of £170,000, which was almost at once condemned owing to its marshy foundations, and the materials sold for £15,000. The use of floating hulks as lazarets continued as before. In 1800 two ships with hides from Mogador (Morocco) were ordered to be sunk with their cargoes at the Nore, the owners receiving £15,000. About this period it was merchandise that was chiefly suspected: there was a long schedule of "susceptible articles," and these were first exposed on the ship's deck for twenty-one days or less (six days for each instalment of the cargo), and then transported to the lazaret, where they were opened and aired forty days more. The whole detention of the vessel was from sixty to sixty-five days, including the time for reshipment of her cargo. Pilots had to pass fifteen days on board a "convalescent ship." The expenses may be estimated from one or two examples. In 1820 the "Asia," 763 tons, arrived in the Medway with a foul bill from Alexandria, laden with linseed; her freight was £1475 and her quarantine dues £610. The same year the "Pilato," 495 tons, making the same voyage, paid £200 quarantine dues on a freight of £1060. In 1823 the "William Parker" from Alexandria paid £188, or 5½ per cent. on the value of her cargo. In 1823 the expenses of the quarantine service (at various ports) were £26,090, and the dues paid by shipping (nearly all with clean bills) £22,000; in 1824 the figures were respectively £23,704 and £14,419. A parliamentary return moved for by Mr Forster showed the expenses of the quarantine establishments at Rochester, Portsmouth, Bristol, Milford, Liverpool, and Bo'ness for the year ending 6th January 1846 to be £15,590. A return for the United Kingdom and colonies moved for by Mr Joseph Hume in 1849 showed, among other details, that the expenses of the lazaret at Malta for ten years from 1839 to 1848 had been £53,553. Under the direction of Sir W. Pym, the superintendent-general of quarantine, the home establishments were gradually reduced from 1846 onwards, and the reports of the Board of Health (signed by Chadwick, Southwood Smith, and others) in 1849 and 1852, which argued against quarantine, although not always on sound epidemiological principles gave a further impetus in the same direction. The most recent appeal to the quarantine law (at Swansea in 1865) has been referred to above.

Literature.—The most considerable treatise on quarantine is the article (pp. 66) by Léon Colin in the *Dict. Encyl. des Sc. Med.*, 3d section, vol. i., Paris, 1874 (with a bibliography). There is also a general article by Reincke in Eulenburg's *Handbuch des Gesundheitswesen*. A quarantine committee of the Social Science Association collected in 1860–61, valuable consular returns on the practice of quarantine in all parts of the world: these were edited by Milroy and ordered to be printed (with the report and summary) as three parliamentary papers communicated to the board of trade. The third paper (6th August 1861, No. 544) contains, in an appendix, an *Historical Sketch of Quarantine Legislation and Practice in Great Britain*, by Dr Milroy, from which the above historical notes have been largely taken. See also Sherston Baker, *Law of Quarantine*, Lond., 1873. Russell's *Treatise of the Plague* (4to, London, 1791) contains "remarks on quarantines, lazarettoes, &c.," and an account of the mode of "shutting up" practised by households in Aleppo on the outbreak of plague in the town. On plague-quarantines, see also Hirsch, in the *Vierteljahrsschr für Oeffentl. Gesundheitspflege*, 1880, xii. 6. The inexpediency of quarantine in the United Kingdom is discussed by John Simon in the eighth *Report of the Medical Officer of the Privy Council* for 1865, p. 35. The fifth *Report* (new series), 1875, contains an abstract by Seaton of *Proceedings of the International Sanitary Conference at Vienna*, 1874. (C. C.)

QUARANTINE, CATTLE. The importation of foreign cattle into England was forbidden at a comparatively early period. Thus 18 Car. II. c. 2 made such importation a common nuisance. In 1869 previous legislation was consolidated by the Contagious Diseases (Animals) Act, 1869, which applied to the United Kingdom. In 1878 this Act was repealed and new provisions made by the Contagious Diseases (Animals) Act, 1878, amended by two Acts passed in 1884. By this Act the privy council is empowered to make from time to time such general or special orders as they think fit for prohibiting the landing of animals brought from a foreign country. Foreign animals can be landed only at certain ports named by the privy council, and must be slaughtered on landing, unless they are intended for exhibition or other exceptional purposes, in which case they are subject to the quarantine rules given in the fifth schedule of the Act. In the United States the importation of neat cattle is forbidden by the Act of 1883, c. 121, except as allowed by the secretary of the treasury. The appropriation Acts since 1881 have made annual grants of sums of $50,000 to enable the secretary of the treasury to cooperate with State and municipal authorities in making regulations for the establishment of cattle quarantine stations. The cattle quarantine system of Canada is said to be one of the most perfect existing. In 1876 a quarantine of eight days was established, raised to ninety days in 1879. The chief Canadian Act is 42 Vict. c. 23. The effect of the Canadian precautions has been that English orders in council have allowed Canadian cattle to be imported into the United Kingdom for breeding and exhibition purposes.

QUARANTINE, WIDOW'S, is the right of a widow to remain in the principal house belonging to her husband for forty days after his death. It is specially recognized in Magna Carta and in some of the State laws in the United States.

QUARE IMPEDIT, in English law, is a form of action by which the right of presentation to a benefice is tried. It is so called from the words of the writ formerly in use which directed the sheriff to command the person disturbing the possession to permit the plaintiff to present a fit person, or to show cause "why he hinders" the plaintiff in his right. The action is one of the few surviving real actions preserved by 3 & 4 Will. IV. c. 27. As a real action it could before the Judicature Acts have been brought only in the Court of Common Pleas. The effect of recent legislation has been to assimilate proceedings in *quare impedit* as far as possible to those in an ordinary action. It is now usually brought against a bishop to try the legality of his refusal to institute a particular clerk. The bishop must fully state upon the pleadings the grounds on which he refuses. *Quare impedit* is peculiarly the remedy of the patron; the remedy of the clerk is the proceeding called *duplex querela* in the ecclesiastical court. At common law no damages or costs were recoverable in *quare impedit*; 13 Edw. I. st. 1, c. 5, provided for damages up to two years' value of the benefice, and 4 & 5 Will. IV. c. 39 for costs. The action is not barred till the expiration of sixty years, or of three successive incumbencies adverse to the plaintiff's right, whichever period be the longer (3 & 4 Will. IV. c. 27, § 29). Where the patron of a benefice is a Roman Catholic, one of the universities presents in his place (1 Will. and Mary, sess. 1, c. 26). By 13 Anne c. 13 during the pendency of a *quare impedit* to which either of the universities is a party in right of the patron being a Roman Catholic the court has power to administer an oath for the discovery of any secret trust, and to order the *cestui que trust* to repeat and subscribe a declaration against transubstantiation.

QUARLES, Francis (1592-1644), a sacred poet of the 17th century, enjoyed considerable celebrity in his own day, and some of his works have shared in the recent revival of interest in our older literature. The work by which he is best known, his *Emblemes*, was originally published in 1635, with grotesque illustrations, engraved by Marshall, and borrowed from the *Pia Desideria* of Hermann Hugo. The poems, which are diffuse meditations upon Scriptural texts, seem, in modern phrase, to have been "written up" to the illustrations, and are quite in keeping with their quaint mixture of sublime and familiar thoughts. An edition of the *Emblems*, with new illustrations by C. H. Bennett, was published in Edinburgh in 1857, and these illustrations are reproduced in Mr Grosart's complete edition in the Chertsey Worthies Library. The incongruous oddities of Quarles's verse are more obvious than the higher qualities that recent admirers claim for him. The following stanza, in a paraphrase of Job xiv. 13, has often been referred to as the supreme example of his occasional sublimity of thought:—

> "'Tis vain to flee; till gentle Mercy show
> Her better eye, the farther off we go
> The swing of Justice deals the mightier blow."

Quarles would seem to have been a man of good family, and he boasts of his "long-lived genealogy." He was born at Romford in Essex in 1592, and, after a regular education at school, Christ's College, Cambridge, and Lincoln's Inn, had influence enough at court to get the office of cupbearer to the queen of Bohemia. He was afterwards (about 1621) appointed secretary to Ussher, the primate of Ireland, and later on, returning at an uncertain date to England, obtained (in 1639) the post of city chronologer, which had been held before him by Middleton and Ben Jonson. Upon the outbreak of the Civil War he wrote on the Royalist side, and died in 1644, in consequence, his widow suggests, of his harsh treatment by the king's enemies. Quarles's first publication, with the suggestive title of *The Feast of Wormes*, appeared in 1620, and from that date till his death he was a busy and prolific writer of verse and prose. His *Divine Poems*, collected in 1630, were published separately at intervals in the course of the preceding ten years. *Divine Fancies* followed in 1632; then the *Emblems*, which might well come under that general designation. The earlier poem of *Argalus and Parthenia* (1622) was in a different vein: the substance was imitated from Sidney's *Arcadia*, and the verse from Marlowe's *Hero and Leander*. The speeches are spun out to a most tedious length, but the poem contains more fine lines and fewer incongruous fancies than any other of the author's productions. Quarles also published many *Elegies*, in the fashion of memorial verses of which Milton's *Lycidas* was the contemporary masterpiece. His *Hieroglyphics*, in the same vein as his *Emblems*, appeared first in 1638. His principal prose work was the *Enchyridion* (1640), a collection of four "centuries" of miscellaneous aphorisms. This was followed two years later by more "observations" of the same kind "concerning princes and states." Lovers of commonplace wisdom dressed in a garb always studiously quaint and sometimes happily epigrammatic, may turn to Quarles with every prospect of enjoyment.

QUARTER SESSIONS (in full, General Quarter Sessions of the Peace) is the name given to a local court with civil and criminal jurisdiction. In England the court consists in counties of two or more justices of the peace, one of whom must be of the quorum (see Justice of the Peace), in cities and boroughs of the recorder alone. The quarter sessions are a court of record. The records in a county are nominally in the custody of the *custos rotulorum*, the highest civil officer in the county, practically in that of the clerk of the peace, who is nominated by the *custos* and removable by the quarter sessions. In a city or borough he is appointed by the council and removable by the recorder. The original jurisdiction of quarter sessions seems to have been confined to cognizance of breaches of the peace. By a series of statutes passed in the reign of Edward III. the time of the holding of the sessions was fixed, and their jurisdiction extended to the trial of felonies and trespasses. The jurisdiction now depends upon a mass of legislation reaching from 1344 to the present time. The dates at which the county sessions must meet are fixed, by 2 Geo. IV. and 1 Will. IV. c. 70, to be the first weeks after the 11th of October, the 28th of December, the 31st of March, and the 24th of June. Quarter sessions in a city or borough depend upon the Municipal Corporations Act, 1882, 45 & 46 Vict., c. 50. A grant of quarter sessions to a city or borough is made by the crown in council on petition of the town council. The main points in which borough differ from county quarter sessions are these:—(1) the recorder, a barrister of five years' standing, is sole judge in place of a body of laymen; (2) the recorder has a discretion to fix his own dates for the holding of a court, as long as he holds it once every quarter of a year; it may be held more frequently if the recorder think fit or a secretary of state so direct; (3) the recorder has no power to levy a borough rate or to grant a licence for the sale of exciseable liquors by retail. In some few boroughs the recorder is judge of the borough civil court. Quarter sessions in the counties of Middlesex, Kent, and Lancaster, as also in London and the Cinque Ports, are governed by special legislation

The jurisdiction of quarter sessions is either original or appellate.

Original Jurisdiction.—Civil.—This includes the levying of a county rate and its application, the appointment of a county licensing committee, and of public officers, such as the county treasurer, the public analyst, and the inspectors of weights and measures, the confirmation of bye-laws made by local authorities, the increase or alteration of polling places and petty sessional divisions, the regulation of police, and powers under various Acts of Parliament, such as the Highway Acts, and the Contagious Diseases (Animals) Act. The quarter sessions of the metropolitan counties have by 25 Geo. II. c. 36 the power of licensing music-halls, &c., within 20 miles of London.

Criminal.—Apart from statute, the commissions of justices of the peace provide that they shall reserve the graver felonies for trial at assizes. They are now forbidden by several Acts of Parliament to try a prisoner for treason or murder, or for any felony punishable without a previous conviction by penal servitude for life (such as burglary and rape), or for any of the offences enumerated in 5 & 6 Vict. c. 38, the most practically important of which are perjury, forgery, bigamy, abduction, concealment of birth, libel, bribery, and conspiracy. The procedure is by indictment, as at assizes, and the trial of offences by jury. In the case of incorrigible rogues and of sureties of the peace the quarter sessions exercise a quasi-criminal jurisdiction without a jury. They may also estreat recognizances entered into for appearance in a court of summary jurisdiction, but this part of their jurisdiction may be considered practically obsolete as the Summary Jurisdiction Act, 1879, gives the court of summary jurisdiction power to estreat [illegible] itself

Appellate Jurisdiction.—Civil.—The principal [illegible] jurisdiction is exercised are in appeals from [illegible] of summary jurisdiction as to the assessment of the poor-rate and the removal and settlement of paupers, and orders made under the Highway, Licensing, and Bastardy Acts.

Criminal.—An appeal lies to quarter sessions from a [illegible] of summary jurisdiction only where [illegible] given by statute. The appellate jurisdiction has been considerably increased by the Summary Jurisdiction Act, 1879 (42 & 43 Vict. c. 49), which allows an appeal [illegible] conviction or order of a court of summary jurisdiction [illegible] imprisonment without the option of a fine. The appeal may be brought in accordance with either the Act giving the appeal or the Summary Jurisdiction Act.

There is no appeal from quarter sessions on the facts, but their decision may be reviewed by the High Court of Justice by means of *certiorari*, *mandamus*, prohibition, or a case stated under 12 & 13 Vict. c. 45, § 11. A case may be stated for the opinion of the court of criminal appeal under 11 & 12 Vict. c. 78, § 1.

Ireland.—In Ireland the chairman of quarter sessions is a salaried professional lawyer, and has important civil jurisdiction corresponding very much to that of a county court judge in England. His jurisdiction depends chiefly upon 14 & 15 Vict. c. 57. The recorders of Dublin and Cork are judges of the civil bill courts in those cities.

Scotland.—In Scotland quarter sessions were established by the Act 1661, c. 338, under which justices were to meet on the first Tuesday of March, May, and August, and the last Tuesday of October to "administrate justice to the people in things that are within their jurisdiction and punish the guilty for faults and crimes done and committed in the preceding quarter." The jurisdiction of quarter sessions in Scotland is more limited than in England, much of what would be quarter-sessions work in England being done by the sheriff or the commissioners of supply. Quarter sessions have appellate jurisdiction in poaching, revenue, and licensing cases, and under the Pawnbrokers and other Acts. All appeals from proceedings under the Summary Jurisdiction Acts are taken to the High Court of Justiciary at Edinburgh or on circuit (44 & 45 Vict. c. 33). The original jurisdiction of quarter sessions is very limited, and almost entirely civil. Thus they have power to divide a county and to make rules for carrying into effect the provisions of the Small Debts Act, 6 Geo. IV. c. 48. The decision of quarter sessions may be reviewed by advocation, suspension, or appeal.

United States.—In the United States courts of quarter sessions exist in many of the States; their jurisdiction is determined by State legislation, and extends as a rule only to the less grave crimes. They are in some States constituted of professional judges.

QUARTZ, the name of a mineralogical species which includes nearly all the native forms of silica. It thus embraces a great number of distinct minerals, several of which are cut as ornamental stones or otherwise used in the arts. For a general description of the species, see MINERALOGY, vol. xvi. p. 389; and for its chief varieties, see AGATE, vol. i. p. 277; AMETHYST, vol. i. p. 736; FLINT, vol. ix. p. 325; and JASPER, vol. xiii. p. 596. The crystallography of quartz has been fully investigated by Des Cloizeaux in his classical *Mémoire sur la cristallisation et la structure intérieure du Quartz*, Paris, 1855.

QUASSIA, the generic name given by Linnæus to a small tree of Surinam in honour of the negro Quassi or Coissi, who employed the intensely bitter bark of the tree as a remedy for fever. This bark was introduced into European medicine about the middle of the last century, and was officially recognized in the *London Pharmacopœia* of 1788. In 1809 it was replaced by the bitter wood or bitter ash of Jamaica, *Picræna excelsa*, Lindl., which was found to possess similar properties and could be obtained in pieces of much larger size. Since that date this wood has continued in use in Britain under the name of quassia to the exclusion of the Surinam quassia, which, however, is still employed in France and Germany. *Picræna excelsa*, Lindl. (*Quassia excelsa*, Swartz) is a tree 50 to 60 feet in height, and resembles the common ash in appearance. It has imparipinnate leaves composed of four or five pairs of short-stalked, oblong, blunt, leathery leaflets, and inconspicuous green flowers. The fruit consists of shining drupes about the size of a pea. It is found also in Antigua and St Vincent. *Quassia amara*, L., is a shrub or small tree belonging to the same natural order as *Picræna*, viz., *Simarubaceæ*, but is readily distinguished by its large handsome red flowers arranged in terminal clusters. It is a native of Panama, Venezuela, Guiana, and northern Brazil. Jamaica quassia is imported into England in logs several feet in length and often nearly one foot in thickness, consisting of pieces of the trunk and larger branches. The thin greyish bark is usually removed. The wood is nearly white, or of a yellowish tint, but sometimes exhibits blackish markings due to the mycelium of a fungus. The wood has a pure bitter taste, and is without odour or aroma. It is usually to be met with in the form of turnings or raspings, the former being obtained in the manufacture of the "bitter cups" which are made of this wood. The medicinal properties are due to the presence of quassiin (first obtained by Winckler in 1835), which exists in the wood to the extent of $\frac{1}{10}$th per cent. It is a neutral crystalline substance, soluble in hot dilute alcohol and chloroform and in 200 parts of water. It is also readily soluble in alkalies, and is reprecipitated by acids. It is almost insoluble in ether, and forms an insoluble compound with tannin.

Quassia is used in medicine in the form of infusion and tincture as a pure bitter tonic and febrifuge, and in consequence of containing no tannin is often prescribed in combination with iron. An infusion of the wood sweetened with sugar is also used as a fly poison, and forms an effectual injection for destroying thread worms. Quassia also forms a principal ingredient of several "hop substitutes," for which use it was employed as long ago as 1791, when John Lindsay, a medical practitioner in Jamaica, wrote that the bark was exported to England "in considerable quantities for the purposes of brewers of ale and porter."

QUATERNIONS. The word quaternion properly means "a set of four." In employing such a word to denote a new mathematical method, Sir W. R. HAMILTON (*q.v.*) was probably influenced by the recollection of its Greek equivalent, the Pythagorean Tetractys, the mystic source of all things.

Quaternions (as a mathematical *method*) is an extension, or improvement, of Cartesian geometry, in which the artifices of coordinate axes, &c., are got rid of, *all* directions in space being treated on precisely the same terms. It is therefore, except in some of its degraded forms, possessed of the perfect isotropy of Euclidian space.

From the purely geometrical point of view, a quaternion may be regarded as *the quotient of two directed lines in space*—or, what comes to the same thing, as *the factor, or operator, which changes one directed line into another.* Its analytical definition cannot be given for the moment; it will appear in the course of the article.

History of the Method.—The evolution of quaternions belongs in part to each of two weighty branches of mathematical history—the interpretation of the *imaginary* (or *impossible*) quantity of common algebra, and the Cartesian application of algebra to geometry. Sir W. R. Hamilton was led to his great invention by keeping geometrical applications constantly before him while he endeavoured to give a real significance to $\sqrt{-1}$. We will therefore confine ourselves, so far as his predecessors are concerned, to attempts at interpretation which had geometrical applications in view.

One geometrical interpretation of the negative sign of algebra was early seen to be mere *reversal* of direction along a line. Thus, when an image is formed by a plane mirror, the distance of any point in it from the mirror is simply the negative of that of the corresponding point of the object. Or if motion in one direction along a line be treated as positive, motion in the opposite direction along the same line is negative. In the case of time, measured from the Christian era, this distinction is at once given by the letters A.D. or B.C., prefixed to the date. And to find the position, in time, of one event relatively to another, we have only to subtract the date of the second (taking account of its sign) from that of the first. Thus to find the interval between the battles of Marathon (490 B.C.) and Waterloo (1815 A.D.) we have

$$+1815-(-490)=2305 \text{ years.}$$

And it is obvious that the same process applies in all cases in which we deal with quantities which may be regarded as of one directed dimension only, such as distances along a line, rotations about an axis, &c. But it is essential to notice that this is by no means necessarily true of *operators*. To turn a line through a certain angle in a given plane, a certain operator is required; but when we wish to turn it through an equal negative angle we must not, in general, employ the negative of the former operator. For the negative of the operator which turns a line through a given angle in a given plane will in all cases produce the negative of the original result, which is *not* the result of the reverse operator, unless the angle involved be an odd multiple of a right angle. This is, of course, on the usual assumption that the sign of a product is changed when that of *any one* of its factors is changed, —which merely means that -1 is commutative with all other quantities.

The celebrated Wallis seems to have been the first to push this idea further. In his *Treatise of Algebra* (1685) he distinctly proposes to construct the imaginary roots of a quadratic equation by going *out of* the line on which the roots, if real, would have been constructed.

In 1804 the Abbé Buée,[1] apparently without any knowledge of Wallis's work, developed this idea so far as to make it useful in geometrical applications. He gave, in fact, the theory of what in Hamilton's system is called *Composition of Vectors in one plane*—*i.e.*, the combination, by + and −, of complanar directed lines. His constructions are based on the idea that the imaginaries $\pm\sqrt{-1}$ represent a unit line, and its reverse, *perpendicular to* the line on which the real units ± 1 are measured. In this sense the imaginary expression $a+b\sqrt{-1}$ is constructed by measuring a length a along the fundamental line (for real quantities), and from its extremity a line of length b in some direction perpendicular to the fundamental line. But he did not attack the question of the representation of products or quotients of directed lines. The step he took is really nothing more than the kinematical principle of the composition of linear velocities, but expressed in terms of the algebraic imaginary.

In 1806 (the year of *publication* of Buée's paper) Argand published a pamphlet[2] in which precisely the same ideas are developed, but to a considerably greater extent. For an interpretation is assigned to the *product* of two directed lines in one plane, when each is expressed as the sum of a real and an imaginary part. This product is interpreted as another directed line, forming the fourth term of a proportion, of which the first term is the real (positive) unit-line, and the other two are the factor-lines. Argand's work remained unnoticed until the question was again raised in *Gergonne's Annales*, 1813, by Français. This writer stated that he had found the germ of his remarks among the papers of his deceased brother, and that they had come from Legendre, who had himself received them from some one unnamed. This led to a letter from Argand, in which he stated his communications with Legendre, and gave a résumé of the contents of his pamphlet. In a further communication to the *Annales*, Argand pushed on the applications of his theory. He has given by means of it a simple proof of the existence of n roots, and no more, in every rational algebraic equation of the nth order with real coefficients. About 1828 Warren in England, and Mourey in France, independently of one another and of Argand, reinvented these modes of interpretation; and still later, in the writings of Cauchy, Gauss, and others, the properties of the expression $a+b\sqrt{-1}$ were developed into the immense and most important subject now called the *theory of complex numbers* (see NUMBERS, THEORY OF). From the more purely symbolical view it was developed by Peacock, De Morgan, &c., as *double algebra*.

Argand's method may be put, for reference, in the following form. The directed line whose length is a, and which makes an angle θ with the real (positive) unit line, is expressed by

$$a(\cos\theta + i\sin\theta),$$

where i is regarded as $+\sqrt{-1}$. The sum of two such lines (formed by adding together the real and the imaginary parts of two such expressions) can, of course, be expressed as a third directed line—the diagonal of the parallelogram of which they are conterminous sides. The product, P, of two such lines is, as we have seen, given by

$$1 : a(\cos\theta + i\sin\theta) :: a'(\cos\theta' + i\sin\theta') : \mathrm{P},$$

or

$$\mathrm{P} = aa'\{\cos(\theta+\theta') + i\sin(\theta+\theta')\}.$$

Its length is, therefore, the product of the lengths of the factors, and its inclination to the real unit is the sum of those of the factors. If we write the expressions for the two lines in the form $\mathrm{A}+\mathrm{B}i$, $\mathrm{A}'+\mathrm{B}'i$, the product is $\mathrm{AA}'-\mathrm{BB}'+i(\mathrm{AB}'+\mathrm{BA}')$; and the fact that the length of the product line is the product of those of the factors is seen in the form

$$(\mathrm{A}^2+\mathrm{B}^2)(\mathrm{A}'^2+\mathrm{B}'^2) = (\mathrm{AA}'-\mathrm{BB}')^2 + (\mathrm{AB}'+\mathrm{BA}')^2.$$

In the modern theory of complex numbers this is expressed by saying that the *Norm* of a product is equal to the product of the norms of the factors.

Argand's attempts to extend his method to space generally were fruitless. The reasons will be obvious later; but we mention them just now because they called forth from Servois (Gergonne's *Annales*, 1813) a very remarkable comment, in which was contained the only yet discovered trace of an anticipation of the method of Hamilton. Argand had been led to deny that such an expression as i^i could be expressed in the form $\mathrm{A}+\mathrm{B}i$,—although, as is well known, Euler showed that one of its values is a real quantity, the exponential function of $-\pi/2$. Servois says, with reference to the general representation of a directed line in space:—

"L'analogie semblerait exiger que le trinôme fût de la forme $p\cos\alpha + q\cos\beta + r\cos\gamma$; α, β, γ étant les angles d'une droite avec trois axes rectangulaires; et qu'on eût

$$(p\cos\alpha + q\cos\beta + r\cos\gamma)(p'\cos\alpha + q'\cos\beta + r'\cos\gamma)$$

$=\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$. Les valeurs de p, q, r, p', q', r' qui satisferaient à cette condition seraient *absurdes*; mais seraient-elles imaginaires, reductibles à la forme générale $\mathrm{A}+\mathrm{B}\sqrt{-1}$? Voilà une question d'analyse fort singulière que je soumets a vos lumières. La simple proposition que je vous en fais suffit pour vous faire voir que je ne crois point que toute fonction analytique non réelle soit vraiment reductible à la forme $\mathrm{A}+\mathrm{B}\sqrt{-1}$."

As will be seen later, the fundamental i, j, k of quaternions, with their reciprocals, furnish a set of six quantities which satisfy the conditions imposed by Servois. And it is quite certain that they cannot be represented by ordinary imaginaries.

Something far more closely analogous to quaternions than anything in Argand's work ought to have been suggested by De Moivre's theorem (1730). Instead of regarding, as Buée and Argand had done, the expression $a(\cos\theta + i\sin\theta)$ as a directed line, let us suppose it to represent the *operator* which, when applied to *any* line in the plane in which θ is measured, turns it in that plane through the angle θ, and at the same time increases its length in the ratio $a : 1$. From the new point of view we see at once, as it were, *why* it is true that

$$(\cos\theta + i\sin\theta)^m = \cos m\theta + i\sin m\theta.$$

For this equation merely states that m turnings of a line through successive equal angles, in one plane, give the same result as a single turning through m times the common angle. To make this process applicable to *any* plane in space, it is clear that we must have *a special value of* i for each such plane. In other words, a unit line, drawn in any direction whatever, must have -1 for its square. In such a system there will be no line in space specially distinguished as the *real unit line*: all will be alike imaginary, or rather alike real. We may state, in passing, that every quaternion can be represented as $a(\cos\theta + \varpi\sin\theta)$,—where a is a real number, θ a real angle, and ϖ a directed unit line whose square is -1. Hamilton took this grand step, but, as we have already said, without any help from the previous work of De Moivre. The course of his investigations is minutely described in the preface to his first great work[1] on the subject. Hamilton, like most of the many inquirers who endeavoured to give a real interpretation to the imaginary of common algebra, found that at least two kinds, orders, or ranks of quantities were necessary for the purpose. But, instead of dealing with points on a line, and then wandering out at right angles to it, as Buée and Argand had done, he chose to look on algebra as the science of *pure time*,[2] and to investigate the properties of "sets" of time-steps. In its essential nature a set is a linear function of any number of *distinct* units of the same species. Hence the simplest form of a set is a *couple*; and it was to the possible laws of combination of couples that Hamilton first directed his attention. It is obvious that the way in which the two separate time-steps are involved in the couple will determine these laws of combination. But Hamilton's special object required that these laws should be such as to lead to certain assumed results; and he therefore commenced by assuming these, and from the assumption determined how the separate time-steps must be involved in the couple. If we use Roman letters for mere numbers, capitals for instants of time, Greek letters for time-steps, and a parenthesis to denote a couple, the laws assumed by Hamilton as the basis of a system were as follows:—

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[1] *Phil. Trans.*, 1806.

[2] *Essai sur une manière de representer les Quantités Imaginaires dans les Constructions Géométriques.* A second edition was published by Hoüel (Paris, 1874). There is added an important *Appendix*, consisting of the papers from *Gergonne's Annales* which are referred to in the text above. Almost nothing can, it seems, be learned of Argand's private life, except that in all probability he was born at Geneva in 1768.

$$(B_1, B_2) - (A_1, A_2) = (B_1 - A_1, B_2 - A_2) = (\alpha, \beta);$$
$$(a, b)(\alpha, \beta) = (a\alpha - b\beta, b\alpha + a\beta).^3$$

To show how we give, by such assumptions, a real interpretation to the ordinary algebraic imaginary, take the simple case $a = 0$, $b = 1$, and the second of the above formulæ gives

$$(0, 1)(\alpha, \beta) = (-\beta, \alpha).$$

Multiply once more by the number-couple (0,1), and we have

$$\begin{aligned}(0, 1)(0, 1)(\alpha, \beta) &= (0, 1)(-\beta, \alpha) = (-\alpha, -\beta)\\ &= (-1, 0)(\alpha, \beta) = -(\alpha, \beta).\end{aligned}$$

Thus the number-couple (0,1), when twice applied to a step-couple, simply changes its sign. That we have here a perfectly *real* and intelligible interpretation of the ordinary algebraic imaginary is easily seen by an illustration, even if it be a somewhat extravagant one. Some Eastern potentate, possessed of absolute power, covets the vast possessions of his vizier and of his barber. He determines to rob them both (an operation which may be very satisfactorily expressed by -1); but, being a wag, he chooses his own way of doing it. He degrades his vizier to the office of barber, taking all his goods in the process; and makes the barber his vizier. Next day he repeats the operation. Each of the victims has been restored to his former rank, but the operator -1 has been applied to both.

Hamilton, still keeping prominently before him as his great object the invention of a method applicable to space of three dimensions, proceeded to study the properties of *triplets* of the form $x + iy + jz$, by which he proposed to represent the directed line in space whose projections on the coordinate axes are x, y, z. The composition of two such lines by the algebraic addition of their several projections agreed with the assumption of Buée and Argand for the case of coplanar lines. But, assuming the *distributive* principle, the product of two lines appeared to give the expression

$$xx' - yy' - zz' + i(yx' + xy') + j(xz' + zx') + ij(yz' + zy').$$

For the square of j, like that of i, was assumed to be negative unity. But the interpretation of ij presented a difficulty,—in fact *the main difficulty* of the whole investigation,—and it is specially interesting to see how Hamilton attacked it. He saw that he could get a hint from the simpler case, already thoroughly discussed, provided the two factor lines were in one plane through the real unit line. This requires merely that

$$y : z :: y' : z'; \text{ or } yz' - zy' = 0;$$

but then the product should be of the same form as the separate factors. Thus, in this special case, the term in ij ought to vanish. But the numerical factor appears to be $yz' + zy'$, while it is the quantity $yz' - zy'$ which really vanishes. Hence Hamilton was at first inclined to think that ij must be treated as *nil*. But he soon saw that "a less harsh supposition" would suit the simple case. For his speculations on sets had already familiarized him with the idea that multiplication might in certain cases not be commutative; so that, as the last term in the above product is made up of the two separate terms $ijyz'$ and $jizy$, the term would vanish of itself when the factor-lines are coplanar provided $ij = -ji$, for it would then assume the form $ij\,(yz' - zy')$. He had now the following expression for the product of any two directed lines

$$xx' - yy' - zz' + i(yx' + xy') + j(xz' + zx') + ij(yz' - zy').$$

But his result had to be submitted to another test, the Law of the Norms. As soon as he found, by trial, that this law was satisfied, he took the final step. "This led me," he says, "to conceive that perhaps, instead of seeking to *confine* ourselves to *triplets*, ... , we ought to regard these as only *imperfect forms of* Quaternions, ... and that thus my old conception of *sets* might receive a new and useful application." In a very short time he settled his fundamental assumptions. He had now three distinct space-units i, j, k; and the following conditions regulated their combination by multiplication:—

$$i^2 = j^2 = k^2 = -1,\ ij = -ji = k,\ jk = -kj = i,\ ki = -ik = j.^4$$

And *now* the product of two quaternions could be at once expressed as a third quaternion, thus—

$$(a + ib + jc + kd)(a' + ib' + jc' + kd') = A + iB + jC + kD,$$

where

$$\begin{aligned}A &= aa' - bb' - cc' - dd',\\ B &= ab' + ba' + cd' - dc',\\ C &= ac' + ca' + db' - bd',\\ D &= ad' + da' + bc' - cb'.\end{aligned}$$

Hamilton at once found that the Law of the Norms holds,—not being aware that Euler had long before decomposed the product of two sums of four squares into this very set of four squares. And now a directed line in space came to be represented as $ix + jy + kz$, while the product of two lines is the quaternion

$$-(xx' + yy' + zz') + i(yz' - zy') + j(zx' - xz') + k(xy' - yx').$$

To any one acquainted, even to a slight extent, with the elements of Cartesian geometry of three dimensions, a glance at the extremely suggestive constituents of this expression shows how justly Hamilton was entitled to say —"When the conception . . . . had been so far unfolded and fixed in my mind, I felt that the *new instrument for applying calculation to geometry*, for which I had so long sought, was now, at least in part, attained." The date of this memorable discovery is October 16, 1843.

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[1] *Lectures on Quaternions*, Dublin, 1853.

[2] *Theory of Conjugate Functions, or Algebraic Couples, with a Preliminary and Elementary Essay on Algebra as the Science of Pure Time*, read in 1833 and 1835, and published in *Trans. R. I. A.*, xvii. ii. (1835).

[3] Compare these with the long-subsequent ideas of Grassmann, presently to be described.

[4] It will be easy to see that, instead of the last three of these, we may write the single one $ijk = -1$.

We can devote but a few lines to the consideration of the expression above. Suppose, for simplicity, the factor-lines to be each of unit length. Then x, y, z, x', y', z' express their direction-cosines. Also, if θ be the angle between them, and x'', y'', z'' the direction-cosines of a line perpendicular to each of them, we have $xx' + yy' + zz' = \cos\theta$, $yz' - zy' = x''\sin\theta$, &c., so that the product of two unit lines is now expressed as $-\cos\theta + (ix'' + jy'' + kz'')\sin\theta$. Thus, when the factors are parallel, or $\theta = 0$, the product, which is now the square of any (unit) line, is -1. And when the two factor lines are at right angles to one another, or $\theta = \pi/2$, the product is simply $ix'' + jy'' + kz''$, the unit line perpendicular to both. Hence, and in this lies the main element of the symmetry and simplicity of the quaternion calculus, *all systems of three mutually rectangular unit lines in space have the same properties as the fundamental system* **i, j, k**. In other words, if the system (considered as rigid) be made to turn about till the *first* factor coincides with i and the second with j, the product will coincide with k. This fundamental system, therefore, becomes unnecessary; and the quaternion method, in every case, takes its reference lines solely from the problem to which it is applied. It has therefore, as it were, a unique *internal* character of its own.

Hamilton, having gone thus far, proceeded to evolve these results from a train of *a priori* or metaphysical reasoning, which is so interesting in itself, and so characteristic of the man, that we briefly sketch its nature.

Let it be supposed that the product of two directed lines is something which has quantity; *i.e.*, it may be halved, or doubled, for instance. Also let us assume (a) space to have the same properties in all directions, and make the convention (b) that to change the sign of any one factor changes the sign of a product. Then the product of two lines which have the same direction *cannot be*, even in part, *a directed quantity*. For, if the directed part have the same direction as the factors, (b) shows that it will be reversed by reversing either, and therefore will recover its original direction when both are reversed. But this would obviously be inconsistent with (a). If it be perpendicular to the factor lines, (a) shows that it must have simultaneously every such direction. Hence it *must* be a mere number.

Again, the product of two lines at right angles to one another cannot, even in part, be a number. For the reversal of either factor must, by (b), change its sign. But, if we look at the two factors in their new position by the light of (a), we see that the sign must not change. But there is nothing to prevent its being represented by a directed line if, as farther applications of (a) and (b) show we must do, we take it perpendicular to each of the factor lines. Hamilton seems never to have been quite satisfied with the apparent *heterogeneity* of a quaternion, depending as it does on a numerical and a directed part. He indulged in a great deal of speculation as to the existence of an *extra-spatial unit*, which was to furnish the *raison d'être* of the numerical part, and render the quaternion *homogeneous* as well as linear. But, for this, we must refer to his own works.

Hamilton was not the only worker at the theory of sets. The year after the first publication of the quaternion method, there appeared a work of great originality, by Grassmann,[1] in which results closely analogous to some of those of Hamilton were given. In particular two species of multiplication ("inner" and "outer") of directed lines in one plane were given. The results of these two kinds of multiplication correspond respectively to the numerical and the directed parts of Hamilton's quaternion product. But Grassmann distinctly states in his preface that he had not had leisure to extend his method to angles in space. Hamilton and Grassmann, while their earlier work had much in common, had very different objects in view. Hamilton, as we have seen, had geometrical application as his main object; when he realized the quaternion system, he felt that his object was gained, and thenceforth confined himself to the development of his method. Grassmann's object seems to have been, all along, of a much more ambitious character, viz., to discover, if possible, a system or systems in which every conceivable mode of dealing with sets should be included. That he made very great advances towards the attainment of this object all will allow; that his method, even as completed in 1862, fully attains it is not so certain. But his claims, however great they may be, can in no way conflict with those of Hamilton, whose mode of multiplying *couples* (in which the "inner" and "outer" multiplication are essentially involved) was produced in 1833, and whose quaternion system was completed and published before Grassmann had elaborated for press even the rudimentary portions of his own system, in which the veritable difficulty of the whole subject, the application to angles in space, had not even been attacked. Grassmann made in 1854 a somewhat savage onslaught on Cauchy and De St Venant, the former of whom had invented, while the latter had exemplified in application, the system of "*clefs algébriques*," which is almost precisely that of Grassmann. But it is to be observed that Grassmann, though he virtually accused Cauchy of plagiarism, does not appear to have preferred any such charge against Hamilton. He does not allude to Hamilton in the second edition of his work. But in 1877, in the *Mathematische Annalen*, xii., he gave a paper "On the Place of Quaternions in the *Ausdehnungslehre*," in which he condemns, as far as he can, the nomenclature and methods of Hamilton. There are many other systems, based on various principles, which have been given for application to geometry of directed lines, but those which deal with products of lines are all of such complexity as to be practically useless in application. Others, such as the *Barycentrische Calcul* of Möbius, and the *Méthode des Équipollences* of Bellavitis, give elegant modes of treating space problems, so long as we confine ourselves to projective geometry and matters of that order; but they are limited in their field, and therefore need not be discussed here. More general systems, having close analogies to quaternions, have been given since Hamilton's discovery was published. As instances we may take Goodwin's and O'Brien's papers in the *Cambridge Philosophical Transactions* for 1849.

Relations to other Branches of Science.—Even the above brief narrative shows how close is the connexion between quaternions and the ordinary Cartesian space-geometry. Were this all, the gain by their introduction would consist mainly in a clearer insight into the mechanism of coordinate systems, rectangular or not—a very important addition to theory, but little advance so far as practical application is concerned. But we have now to consider that, as yet, we have not taken advantage of the *perfect symmetry* of the method. When that is done, the full value of Hamilton's grand step becomes evident, and the gain is quite as extensive from the practical as from the theoretical point of view. Hamilton, in fact, remarks,[2] "I regard it as an inelegance and imperfection in this calculus, or rather in the state to which it has hitherto been unfolded, whenever it becomes, or *seems* to become, necessary to have recourse . . . . . . to the resources of ordinary algebra, for the *solution of equations in quaternions*." This refers to the use of the x, y, z coordinates,—associated, of course, with i, j, k. But when, instead of the highly artificial expression $ix + jy + kz$, to denote a finite directed line, we employ a single letter, α (Hamilton uses the Greek alphabet for this purpose), and find that we are permitted to deal with it exactly as we should have dealt with the more complex expression, the immense gain is at least in part obvious. Any quaternion may now be expressed in numerous simple forms. Thus we may regard it as the sum of a number and a line, $a + \alpha$, or as the product, $\beta\gamma$, or the quotient, $\delta\epsilon^{-1}$, of two directed lines, &c., while, in many cases, we may represent it, so far as it is required, by a single letter such as q, r, &c.

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[1] *Die Ausdehnungslehre*, Leipsic, 1844; 2d ed., "*vollständig und in strenger Form bearbeitet*," Berlin, 1862. See also the collected works of Möbius, and those of Clifford, for a general explanation of Grassmann's method.

[2] *Lectures on Quaternions*, § 513.

Perhaps to the student there is no part of elementary mathematics so repulsive as is spherical trigonometry. Also, everything relating to change of systems of axes, as for instance in the kinematics of a rigid system, where we have constantly to consider one set of rotations with regard to axes fixed in space, and another set with regard to axes fixed in the system, is a matter of troublesome complexity by the usual methods. But every quaternion formula is a proposition in spherical (sometimes degrading to plane) trigonometry, and has the full advantage of the symmetry of the method. And one of Hamilton's earliest advances in the study of his system (an advance independently made, only a few months later, by Cayley) was the interpretation of the singular operator $q(\quad)q^{-1}$, where q is a quaternion. Applied to *any* directed line, this operator at once turns it, *conically*, through a definite angle, about a definite axis. Thus rotation is now expressed in symbols at least as simply as it can be exhibited by means of a model. Had quaternions effected nothing more than this, they would still have inaugurated one of the most necessary, and apparently impracticable, of reforms.

The physical properties of a heterogeneous body (provided they vary *continuously* from point to point) are known to depend, in the neighbourhood of any one point of the body, on a quadric function of the coordinates with reference to that point. The same is true of physical quantities such as potential, temperature, &c., throughout small regions in which their variations are continuous; and also, without restriction of dimensions, of moments of inertia, &c. Hence, in addition to its geometrical applications to surfaces of the second order, the theory of quadric functions of position is of fundamental importance in physics. Here the symmetry points at once to the selection of the three principal axes as the directions for i, j, k; and it would appear at first sight as if quaternions could not simplify, though they might improve in elegance, the solution of questions of this kind. But it is not so. Even in Hamilton's earlier work it was shown that all such questions were reducible to the *solution of linear equations in quaternions*; and he proved that this, in turn, depended on the determination of a certain operator, which could be represented for purposes of calculation by a single symbol. The method is essentially the same as that developed, under the name of "matrices" by Cayley in 1858; but it has the peculiar advantage of the simplicity which is the natural consequence of entire freedom from conventional reference lines.

Sufficient has already been said to show the close connexion between quaternions and the theory of numbers. But one most important connexion with modern physics must be pointed out, as it is probably destined to be of great service in the immediate future. In the theory of surfaces, in hydrokinetics, heat-conduction, potentials, &c., we constantly meet with what is called *Laplace's operator*, viz., $\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}$. We know that this is an *invariant*; *i.e.*, it is independent of the particular directions chosen for the rectangular coordinate axes. Here, then, is a case specially adapted to the isotropy of the quaternion system; and Hamilton easily saw that the expression $i\frac{d}{dx}+j\frac{d}{dy}+k\frac{d}{dz}$ could be, like $ix+jy+kz$, effectively expressed by a single letter. He chose for this purpose ∇. And we now see that the square of ∇ is the negative of Laplace's operator; while ∇ itself, when applied to any numerical quantity conceived as having a definite value at each point of space, gives *the direction and the rate of most rapid change* of that quantity. Thus, applied to a potential, it gives the direction and magnitude of the force; to a distribution of temperature in a conducting solid, it gives (when multiplied by the conductivity) the flux of heat, &c. No better testimony to the value of the quaternion method could be desired than the constant use made of its notation by mathematicians like Clifford (in his *Kinematic*) and by physicists like Clerk-Maxwell (in his *Electricity and Magnetism*). Neither of these men professed to employ the calculus itself, but they recognized fully the extraordinary clearness of insight which is gained even by merely translating the unwieldy Cartesian expressions met with in hydrokinetics and in electrodynamics into the pregnant language of quaternions.

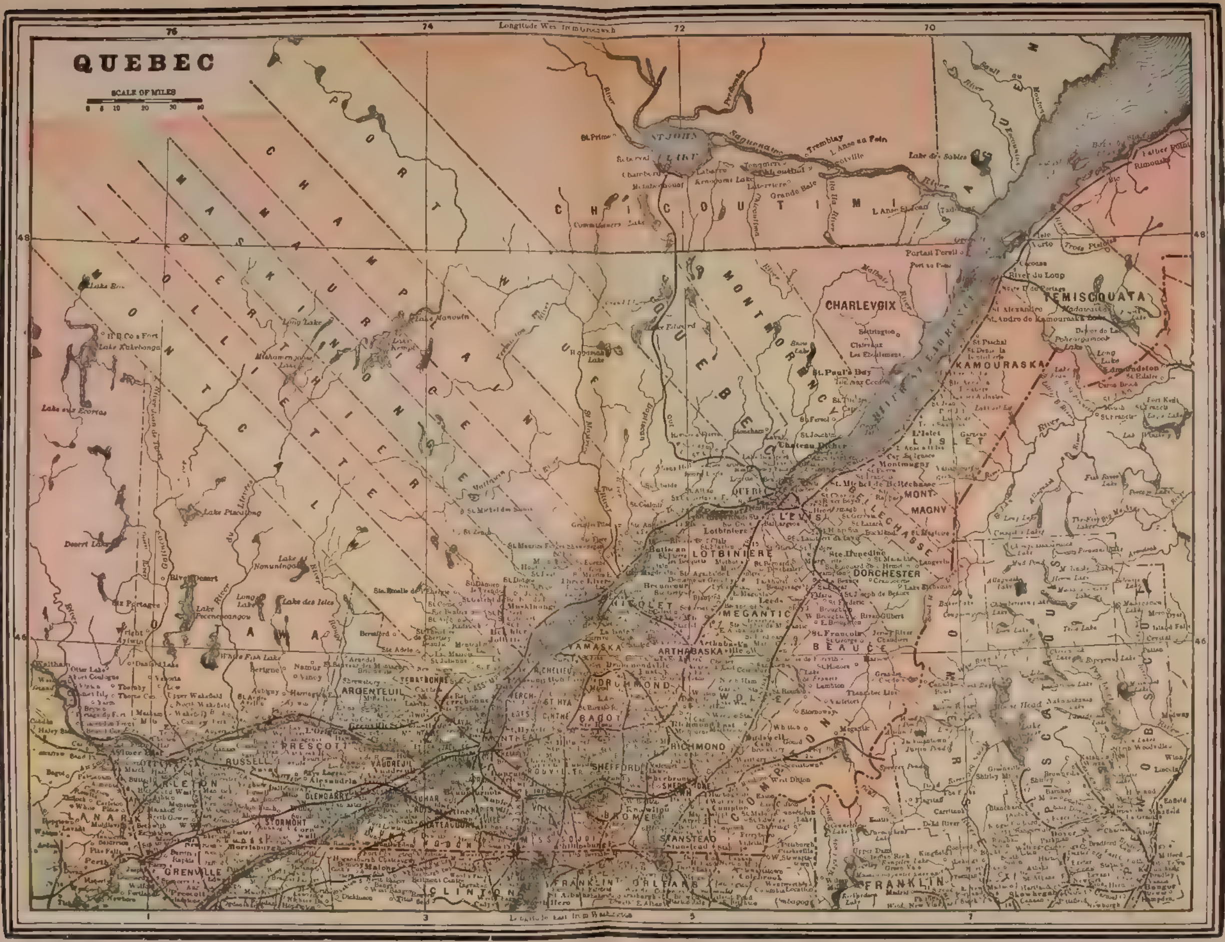
Works on the Subject.—Of course the great works on this subject are the two immense treatises by Hamilton himself. Of these the second (*Elements of Quaternions*, London, 1866) was posthumous—incomplete in one short part of the original plan only, but that a most important part, the theory and applications of ∇. These two works, along with Hamilton's other papers on quaternions (in the *Dublin Proceedings* and *Transactions*, the *Philosophical Magazine*, &c.), are storehouses of information, of which but a small portion has yet been extracted. A German translation of Hamilton's *Elements* has recently been published by Glan.

Other works on the subject, in order of date, are Allegret, *Essai sur le Calcul des Quaternions* (Paris, 1862); Tait, *An Elementary Treatise on Quaternions* (Oxford 1867, 2d ed. 1873; German translation by v. Scherff, 1880, and French by Plarr, 1882-84); Kelland and Tait, *Introduction to Quaternions* (London, 1873, 2d ed. 1882); Hoüel, *Éléments de la Théorie des Quaternions* (Paris, 1874); Unverzagt, *Theorie der Quaternionen* (Wiesbaden, 1876); Laisant, *Introduction à la Méthode des Quaternions* (Paris, 1881); Graefe, *Vorlesungen über die Theorie der Quaternionen* (Leipsic, 1884).

An excellent article on the "Principles" of the science, by Dillner, will be found in the *Mathematische Annalen*, vol. xi., 1877. And a very valuable article on the general question, *Linear Associated Algebra*, by the late Prof. Peirce, was unfortunately lithographed for private circulation only. Sylvester and others have recently published extensive contributions to the subject, including quaternions under the general class *matrix*, and have developed much farther than Hamilton lived to do the solution of equations in quaternions. Several of the works named above are little more than compilations, and some of the French ones are painfully disfigured by an attempt to introduce an improvement of Hamilton's notation; but the mere fact that so many have already appeared shows the sure progress which the method is now making. (P. G. T.)

QUATREMÈRE, Étienne Marc (1782-1857), one of the most learned of modern Orientalists, came of an eminent family of Parisian merchants. His father was a victim of the Revolution, his mother a pious woman devoted to works of charity and venerated after her death almost as a saint. The son retained much of what was best in the old spirit of the Parisian *bourgeoisie*—its industry, sobriety, and independence of character, along with a certain narrowness of view. He was sincerely religious, with strong Jansenist and Gallican tendencies, a touch of rationalism, and a great dislike of modern growths of Catholicism. His whole life was spent alone among his books, and his works always display the most extensive and accurate erudition—in which indeed, and not in criticism or original ideas, his strength lay. Employed in 1807 in the manuscript department of the imperial library, he passed to the chair of Greek in Rouen in 1809, entered the academy of inscriptions in 1815, taught Hebrew and Aramaic in the Collége de France from 1819, and finally in 1827 became professor of Persian in the School of Living Oriental Languages.

Quatremère's first work was *Recherches sur la langue et la litterature de l'Égypte* (1808), showing that the language of ancient Egypt must be sought in Coptic. His *Mém. sur les Nabatéens* (1835) has been mentioned under Nabatæans, and his translation of Makrízí's history of the Mameluke sultans in the article on that author. The valuable notes to the latter book show his erudition at the best. He published also among other works a translation of Rashíd al-Dín's *Hist. des Mongols de la Perse* (1836); *Mém. géog. et hist. sur l'Égypte* (1810); the text of Ibn Khaldún's *Prolegomena*; and a vast number of useful memoirs in the *Jour. As.* His numerous reviews in the *Jour. des Savants* should also be mentioned. Quatremère made great lexicographic collections in Oriental languages, fragments of which appear in the notes to his


QUEBEC
SCALE OF MILES
Longitude West from Greenwich
Longitude East from Washington
76
74
72
70
48
46
1
3
5
7
PONTIAC
CHAMPLAIN
MASKINONGE
BERTHIER
JOLIETTE
MONTCALM
OTTAWA
CHICOUTIMI
QUEBEC
MONTMORENCY
CHARLEVOIX
TEMISCOUATA
KAMOURASKA
L'ISLET
MONTMAGNY
BELLECHASSE
DORCHESTER
LOTBINIERE
NICOLET
MEGANTIC
ARTHABASKA
BEAUCE
YAMASKA
DRUMMOND
BAGOT
WOLFE
RICHMOND
SHEFFORD
SHERBROOKE
BROME
STANSTEAD
COMPTON
ARGENTEUIL
TERREBONNE
PRESCOTT
RUSSELL
CARLETON
LANARK
GLENGARRY
STORMONT
GRENVILLE
VAUDREUIL
CHATEAUGUAY
FRANKLIN
CLINTON
ORLEANS
SOMERSET
PISCATAQUIS
Lake St. John
Saguenay River
River St. Lawrence
Rimouski
Riviere du Loup
Levis
Quebec

various works. His MS. material for Syriac has been utilized in Payne Smith's *Thesaurus*; of the slips he collected for a projected Arabic, Persian, and Turkish lexicon some account is given in the preface to Dozy, *Supp. aux Dict. Arabes*. They are now in the Munich library.

QUEBEC, a province of Canada in British North America, lying between 52° 30′ and 45° N. lat., and between 57° 7′ and 79° 33′ 20″ W. long., and bounded on the N. by Labrador and Hudson's Bay, on the E. by Labrador and the Gulf of St Lawrence, on the S. by the Bay of Chaleurs, New Brunswick, and the States of Maine, New Hampshire, Vermont, and New York, and on the S.W. and W. by the river Ottawa and the province of Ontario. Its length, from Lake Temiscamingue to Anse au Sablon in the Straits of Belle Isle, is nearly 1000 miles on a due east and west course, and from Lake Temiscamingue to Cape Gaspé it is 700 miles; its breadth is 300 miles, and the area 188,694 square miles (120,764,651 acres). The surface of the country is exceedingly varied and picturesque, embracing several ridges of mountains and lofty hills, diversified by numerous rivers, lakes, and forests. There are many islands of great fertility and beauty, cascades and falls of considerable height, and extensive tracts of cultivable land, rendering the scenery everywhere bold and striking. Mountain ranges extend from south-west to north-east and run parallel to each other. The Notre Dame or Green Mountains, which are a continuation of the Appalachian range, extend along nearly the whole of the south side of the St Lawrence, terminating at the gulf of the same name, between the Bay of Chaleurs and Gaspé Point, where they form an elevated table-land 1500 feet high. Their chief summits are Mount Logan and Mount Murray, very nearly 4000 feet high. In the eastern townships the mountains of this range are capable of cultivation. The Laurentian range (called by Garneau the Laurentides) skirts the northern bank of the St Lawrence, forming undulating ridges of 1000 feet in elevation, and extending from Labrador to the vicinity of Quebec, where it leaves the river. Keeping nearly parallel with it until within 30 miles west of Montreal, it rounds the Ottawa for 100 miles, crosses it, and curves in the direction of Kingston. From this point the range extends north-westward to the shores of Lakes Huron and Superior. The Mealy Mountains, stretching from 75° W. lat. to Sandwich Bay, are always covered with snow, and are about 1500 feet high. There are many rocky masses connected with the mountain chains lining the St Lawrence which form precipitous cliffs, often rising to a considerable height. Some of the hills of the Laurentian range are 1300 feet high, and below the city of Quebec their altitude is 3000 feet. They enclose numberless small lakes, many of which are still unexplored.

The whole country is exceptionally well watered, and abounds in numerous large rivers, bays, and lakes. The principal river is the St Lawrence (*q.v.*), which flows through the entire length of the province. A short distance above Montreal it receives from the north-west the Ottawa, an interesting and beautiful stream over 600 miles in length, with its tributaries the Gatineau, the Lièvre, and the Rouge. The St Lawrence is navigable for ships of the line as far as Quebec, and for steamships of over 5000 tons to Montreal. Between Montreal and Lake Ontario the navigation is interrupted by rapids, the most important of which are the Cedar and Lachine Rapids, the latter about 9 miles above Montreal. The total elevation between tide water and Lake Ontario is about 230 feet. This is overcome by eight canals, varying from ¾ mile to 11½ miles in length, in the aggregate only 41 miles of canals, with locks 200 feet long between the gates, and 45 feet wide. The St Maurice, rising in Lake Oskelaneo near the Hudson's Bay Territory, and flowing into the St Lawrence at Three Rivers, is over 400 miles long. It has many tributaries, and drains an area of 21,000 square miles. Twenty-four miles above Three Rivers is the fall of Shawenegan, 150 feet high. The Batiscan river enters the St Lawrence at Batiscan. Jacques Cartier, Ste Anne, and Montmorency are all on the northern side of the St Lawrence. The Montmorency is famous for its falls—situated about 8 miles from Quebec city, 250 feet high—and the natural steps on its rocky bank, 1½ miles above the cataract. Near the falls is Haldimand House, once the residence of the duke of Kent, father of Queen Victoria. The Saguenay, sometimes called the River of Death, is one of the most remarkable bodies of water in the world.[1] It rises in Lake St John, and discharges into the St Lawrence at Tadousac, after a course of 100 miles. At its mouth the Saguenay is 2½ miles wide, and the depth exceeds 100 fathoms. The depth in other parts varies from 100 to 1000 feet. In the upper part of the river are many pretty falls and rapids. The Saguenay is navigable for large vessels as far as Chicoutimi, 98 miles from the mouth of the river. Fifteen miles south of Chicoutimi there recedes from the Saguenay Ha Ha Bay, at the head of which is the village of St Alphonse. On the south side of the St Lawrence is the Richelieu river, which drains Lake Champlain, and enters Lake St Peter at Sorel, and flows in a northerly direction for 75 miles. Champlain sailed up this river in 1609. Other important streams are the St Francis, rising in Lake Memphremagog; the Chaudière, the outlet of Lake Megantic, with its beautiful falls, 125 feet high, and situated 10 miles above Quebec; the Chateauguay, Yamaska, Etchemin, Loup, Assumption, Becancour, and North. All these rivers are navigable, and contain fish. Besides the rapids mentioned, there are situated a short distance above Rigaud on the Ottawa the Carillon Falls, a series 12 miles in length. Near Ottawa city are the Chaudière Falls, or "boiling pot," less than 40 feet in height, and extending over 6 miles. Les Chats, a series of rapids 30 miles further up the Ottawa, are striking and grand. At Calumet there is another rapid. The Falls of Ste Anne are on the north shore of the St Lawrence, 22 miles below Quebec; the Falls of St Fereol, the Long Sault, Cedars, and Lachine Rapids by no means complete the list.

The principal lakes are Lake St John, which possesses an area of 360 square miles, Lake Temiscamingue, 126 miles, St Peter, Metapedia, Kempt, Megantic, Memphremagog, Pipmuakan, the northern part of Lake Champlain, Manouan, Grand Wayagamack, Asturagamicook, Piscatonque, Kakebonga, Mijizowaja, Keepawa, Papimonagace, Edward, Matawin, St Louis, Massawipi, Pamouscachiou, Graves, Grand, St Francis, and hundreds of others of lesser note, and all stocked with fish. The chief bays along the coasts are Chaleurs (in part), with its bold and precipitous cliffs, Malbaie, Mille-Vaches, Ha Ha, &c. Quebec's principal islands are Anticosti, sterile and almost uninhabited, Bonaventure, an important fishing station to the east of Gaspé, and the Magdalen Islands, situated in the Gulf of St Lawrence, about 50 miles north of Prince Edward Island. This group is inhabited by about 3200 persons, mostly French fishermen. Other islands are the island of Montreal, St Helen's, Jesus, the island of Orleans, 22 miles long, below Quebec, Grosse Isle, Isle aux Coudres, Hare, Bic Island,—all in the St Lawrence; and the islands of Calumet and Allumette in the Ottawa river.

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[1] Bayard Taylor says it is "not properly a river. It is a tremendous chasm, like that of the Jordan Valley and the Dead Sea, cleft for 60 miles through the heart of a mountainous wilderness. Everything is hard, naked, stern, silent. Dark grey cliffs of granite gneiss rise from the pitch-black water; firs of gloomy green are rooted in their crevices and fringe their summits; loftier ranges of a dull indigo hue show themselves in the background; and over all bends a pale, cold, northern sky."

Beginning with the oldest rocks, the more northern part of the province of Quebec is based on the Laurentian system of Sir William Logan. This includes both the Laurentian proper and an overlying formation largely composed of Labrador and anorthite felspars, to which Sir William Logan gave the name Upper Laurentian, though it is now more usually known by the name Norian, applied to similar rocks in Scandinavia. This Upper Laurentian formation occupies but limited areas, one of which is near Lake St John, and another to the east of St Jerome, not far from Montreal. The Lower Laurentian of Logan, on the other hand, including the Ottawa or Trembling Mountain group and the Grenville series, extends from the Straits of Belle Isle to the Ottawa river in a continuous belt. It consists largely of gneiss and crystalline schists, and holds thick beds of limestone and beds of iron ore and veins of apatite. It is the chief seat of the iron and phosphate mining industries, and contains also the principal deposits of graphite or plumbago. It is on this formation that the remarkable forms, discovered by Dr Dawson (now Sir William), known as *Eozoon canadense*, and supposed to be the earliest form of animal life, occur.

The Laurentian formation is succeeded in the western part of the province by the Potsdam sandstone, a probable equivalent in age of the Upper Cambrian of Britain. On this rests a dolomitic limestone—the Calciferous formation,—and on this the great and richly fossiliferous limestones of the Lower Silurian (Ordovician) age known as the Chazy and Trenton groups. These limestones afford the best building-stone of the province, while the Potsdam sandstone also affords a good stone of construction. Above the Trenton is the Utica shale, a dark-coloured argillaceous deposit, rich in graptolites and trilobites, and on this is the Hudson River group, consisting largely of sandstones and calcareous beds.

To the south-west of these rocks lie Upper Silurian and Devonian beds, the latter holding fossil plants and fishes, and at the extreme south-eastern part of the province, on the Bay of Chaleurs, is the outlier of the Lower Carboniferous area of New Brunswick. It is not likely that any true coal occurs in the province, though veins of hardened bitumen are found locally in the beds next to be noticed.

From Quebec eastward along the St Lawrence occurs a great series of argillaceous and arenaceous beds, the equivalents of the Upper Cambrian and Lower Silurian of the interior districts, but deposited under different conditions, and abounding in some peculiar forms of trilobites and graptolites. In their extension to the southward they pass into the United States. Near the boundary they begin to be associated with various crystalline rocks. These were regarded by Sir William Logan as altered Silurian beds of the Quebec group; but later observers (MacFarlane, Selwyn, and Hunt) have maintained that they are, in part at least, of greater age. They contain several important economic minerals—gold, copper, and iron ores, chrysolite used as asbestos, chromic iron, and serpentine; marble and roofing slates are found in associated beds believed to be of Silurian age.

A large part of the country, more especially on the lower levels, is covered with Pleistocene deposits of the so-called Glacial age. The lower part of these beds consists of tile or boulder-clay with local and Laurentian boulders, and in some places a few marine shells of northern species. On this rests a finer blue clay, in some places rich in fossil shells, and known as the Leda clay. It affords a good material for the manufacture of bricks and tiles. Above the Leda clay are sands and gravels, often with travelled boulders, and named the Saxicava sand, from a shell found very abundantly in some portions of their lower part. These superficial deposits appear to imply submergence and driftage of thick ice-fields with local glaciers descending from the mountains. The prevalent directions of glacial striations is north-east and south-west or parallel to the course of the St Lawrence valley.

In certain alluvial deposits in the vicinity of the St Maurice river there occur workable deposits of bog iron ore, which have been worked for many years.

The climate of Quebec is variable. In winter the cold is generally steady, and the atmosphere is clear and bracing. The thermometer often registers 20° below zero. Snow lies on the ground from the end of November until the middle of April, affording good sleighing for five months of the year. The inhabitants enjoy with zest and spirit all the out-door sports common to the country, such as skating, curling, tobogganing, snow-shoeing, coasting, and sliding. In Montreal winter carnivals are held which attract from all parts of Canada and the United States thousands of spectators. Snow falls to a very great depth, and though the winds are often sharp they are not often raw or damp, nor is there any fog. The summer is warm and pleasant, and the extreme heat is indicated at 90 . The finest season of the year is the autumn, which lasts about six or eight weeks.

Vegetation develops rapidly in Quebec. Much of the country is well adapted for agricultural purposes, the soil being rich and loamy, and well suited for the growth of cereals, hay, and fruit crops, all of which ripen perfectly. Wheat, barley, oats, rye, flax, pulse, buckwheat, maize, potatoes, turnips, carrots, beets, parsnips, celery, and the various roots thrive well. The principal fruits are plums, apples, melons, grapes, strawberries, raspberries, blueberries, gooseberries, cranberries, currants, and cherries. Hay has always been considered a leading crop, and much of it is exported to the United States, where it finds a ready market. Farming is carried on extensively in the eastern townships, and in all parts of the country agriculture is prosecuted with more or less activity.

The amount of land under crops in 1881 was 4,147,984 acres, and in pasture, 2,207,422 acres. The crops raised were—spring wheat, 1,999,815 bushels; winter wheat, 19,189; barley, 1,751,539; oats, 19,990,205; rye, 430,242; pease and beans, 1,170,456; buckwheat, 2,041,670; maize, 888,169; potatoes, 11,873 297; turnips, 1,572,476; other roots, 2,050,904 bushels; hay, 1,614,906 tons; grass and clover seeds, 119,306 bushels. The number of horses in 1881 was 273,852; of working oxen, 49,237; of milch cows, 490,977; of other cattle, 490,119; of sheep, 889,833; of swine, 329,199 In 1881 2,730,546 ℔ of wool and 559,024 ℔ of honey were produced.

Forests.

Dense forests cover enormous tracts of territory, and afford a principal means of revenue to the province, as well as a source of industry for the people. The chief trees are white and red pine, spruce, ash, elm, beech, birch, maple, butternut, black walnut, fir, poplar, cedar, oak, cherry, hickory, basswood, &c. Upwards of fourteen hundred varieties of plants may be found, of which two hundred possess medicinal virtues. Lumbering is extensively carried on, and large quantities of dressed lumber and square timber are annually shipped to England.

Exports and imports.

The total value of the forest products exported in 1882–83 was $11,050,002; of the fisheries, $719,799; of the mines, $516,837; of animals and their produce, $11,714,674; of agricultural products, $7,795,427; of manufactures, $1,437,254. The grand total value of the exports was $41,591,939, whereof produce of the province, $33,339,549. Of late years an active trade has sprung up in the exportation of beef and cattle to England. The imports in the same year amounted to $42,166,729 dutiable goods, and $13,743,142 free goods; total $55,909,871.

Shipbuilding, once a leading industry of the province, has fallen off considerably, steamships and iron vessels having superseded wooden ships in the carrying trade. The number of vessels built in Quebec during 1883 was 42, tonnage 6594. On the 31st of December 1883, the vessels registered in the province, and remaining on the registry books of the several ports, were 1753, tonnage 216,577. There were engaged in the coasting trade, including steamers and sailing vessels, 6943 craft, representing a tonnage of 1,648,550. The number of saw and grist mills in the province in 1881 was 1729, employing 12,461 hands. There were also 419 tanneries, employing 2968 hands. Other industries are shingle-making, manufactures of wool and cloth, cheese and butter making, iron-working, sash, door, and blind factories, sugar-refining, boat-building, brewing and distilling, and the manufacture of edge tools, india-rubber goods, and boots and shoes. In 1871 the amount invested in industries in the province was $28,071,868; in 1881 it reached $59,216,992, when 85,673 men, women, and children were employed in the various industries, $18,333,162 were paid out in wages, raw material to the value of $62,563,967 was consumed, and the value of the articles produced was $104,662,258.

Quebec derives great importance from its fisheries, which are extensive and valuable, particularly those of the St Lawrence, which consist principally of cod, haddock, holibut, salmon, mackerel, shad, white fish, herrings, lobsters, and seals. In the lakes and rivers there are salmon, trout, and bass, and the sporting streams are among the best in the world. The right of fishing in inland waters belongs to the owners of the lands in front of or through which such waters flow. The provincial government holds a large number of ungranted lands bordering on rivers and lakes, and derives an income from the leasing of fishing privileges. A fish-breeding establishment is maintained by the Dominion Government at Tadousac, from which there are encouraging results. In 1881 there were 110 vessels and 801 men and 4779 boats and 6929 men engaged in the fisheries. The product netted in 1882 was $1,976,515; in 1883 it was $2,138,997.

Game is plentiful in Quebec (wild duck, teal, wild geese, partridges, woodcocks, snipe, pigeons, plover, &c.). About 295 different birds exist. Of wild animals the principal are bears, wolves, cariboo, deer, lynxes, foxes musk rats, minks, martens, squirrels, beavers, and hares.

Mineral produce. Gold, iron, and copper ores abound in notable quantities. The former is found chiefly on the banks of the Chaudière in the county of Beauce. In 1881 the quantity produced was 3411 oz.; in 1883 the product was 7902 oz., realizing $140,262. Copper is obtained in the eastern townships, and iron of superior quality abounds almost everywhere throughout the province. In 1881 the yield of this ore was 11,326 tons; of iron, 92,001; pyrites, 2300; peat, 14,597; plumbago, 270; mica, 4000 tons; building stone for dressing, 1,674,362 cubic feet; roofing slate, 4593 squares. In some sections small quantities of lead are found.

Communication. Good waggon roads intersect the province wherever there is a settlement. In 1883 the amount expended on colonization roads by the local government was $71,392. Telegraphic lines are established throughout the province, each line of railway, besides the great roads, having special wires. The postal facilities are excellent, and regular mails penetrate every part. Railway communication is ample and extensive, the chief lines being the Grand Trunk, the Canadian Pacific, and the Intercolonial. In 1884 Quebec had 1942 miles of railways in operation, while other lines are under construction and projected. The canal system is very complete, and commerce is greatly helped by the several waterways in operation. These are the Lachine Canal extending from Montreal to Lake St Louis; the Beauharnois Canal, uniting Lakes St Francis and St Louis; the Chambly Canal uniting Lake Champlain with the Richelieu river; and the Carillon and Grenville Canal.

Population. The province is divided into sixty-three counties, with a total area of 120,764,651 acres. Up to the 30th of June 1883 the total superficies of disposable lands surveyed and subdivided into farm lots was 6,539,160 acres. The population was 1,191,516 in 1871; in 1881 it was 1,359,027 (678,175 males and 680,852 females). The prevailing religion is that of the Roman Catholic Church, of which there are seven dioceses, viz., the archdiocese of Quebec, and the dioceses of Montreal, Three Rivers, St Hyacinthe, Sherbrooke, Rimouski, and Chicoutimi. The Protestant dioceses are two in number—Quebec and Montreal. According to the census of 1881 the religious denominations in the province were as follows:—

Church of Rome	1,170,718	Adventists	4,210
Church of England	68,797	Other denominations	5,647
Presbyterians	50,287	Of no religion	432
Methodists	39,220	No creed stated	2,609
Baptists	8,853	Jews	989
Congregationalists	5,244		
Universalists	2,021	Total	1,359,027

The greater portion of the population is composed of French-speaking people, natives of the soil. There are also a good many Scotch, English, and Irish, and their descendants. The Indians, mostly of the Algonquin, Iroquois, Huron, Abenakis, and Micmac tribes, number 7515, scattered in various parts of the province on reservations which they cultivate with more or less assiduity. They are peaceably disposed, and live in harmony.

The affairs of the province are administered by a lieutenant-governor and an executive council composed of six members with portfolios, assisted by a legislative assembly of sixty-five members, and a legislative council of twenty-four councillors. The latter hold their appointments for life, and the former are elected by the people every five years. The lieutenant-governor is appointed by the governor-general in council. Quebec returns to the Dominion House of Commons sixty-five representatives, and twenty-four appointees to the Dominion Senate.

The public revenue in 1883 amounted to $4,655,757, and the expenditure was $3,962,015. The principal source of revenue is the annual subsidy granted to the province, under the terms of the B.N.A. Act of 1867, by the Dominion Government. This subsidy in 1883 amounted to $959,252, and interest on trust funds in the hands of the Dominion Government, $55,459. The remainder of the revenue is derived from the crown domain and timber limits, licences, stamps on law and registration documents, and other miscellaneous receipts. The administration of justice cost in 1883 the sum of $372,400.

The judiciary consists of a Court of Queen's Bench, with a chief justice and five assistants; a superior court, with a chief justice and twenty-eight assistants; a court of review, with three judges forming a quorum; a court of vice-admiralty; courts of quarter sessions; and courts for the summary trial of petty causes. The provincial legislature meets at Quebec.

The militia (military districts Nos. 5, 6, and 7, operating under the Canada Militia Act of 1883) consists of an active force by arms of the following:—cavalry, officers and men, 448; field artillery, 321; garrison artillery, 593; engineers, 87; infantry, 9885; rifles, 924; total, 12,258. The number of active militia men authorized for annual drill during 1883 was 7965. Schools of cavalry and gunnery, situated at Quebec, and one of infantry at St John's, have been established for the purpose of training officers and non-commissioned officers of the militia.

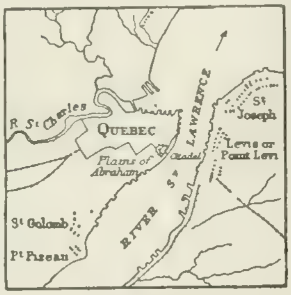
Education in Quebec is under the control of a superintendent and a council of public instruction appointed by the Government. The council is divided into two sections, called Roman Catholic and Protestant committees, who act independently, and, through the superintendent, control the Roman Catholic and Protestant institutions respectively. The province is divided into school municipalities containing from one to twenty-five schools each, under five commissioners elected by the people. As the school system includes religious instruction, the religious minority (Catholic or Protestant) in any municipality may separate from the majority, and organize schools of their own, under three trustees, and receive their proper share of the Government grant. Every citizen pays a tax which is levied on his property for the support of primary schools. In Montreal, Quebec, and Sherbrooke the Roman Catholics and Protestants are entirely separate for educational purposes. Thirty-six inspectors visit the schools twice a year, and report to the Government, by whom they are appointed and paid. In 1883 there were in the province 1071 municipalities, including 4404 elementary schools, 333 model schools, 246 academies, 31 colleges, 18 special schools, 3 normal schools, and 3 universities, making a total of 5038 institutions, attended by 245,225 pupils, under 6871 teachers. In support of these schools, the local contributions amounted to $2,809,739, and the Government grant to $352,677. The two Protestant universities are M'Gill University at Montreal, founded in 1821, and Bishops College at Lennoxville, founded in 1843. The Roman Catholic university (Laval) was founded by the Quebec seminary in 1852. It has a succursale at Montreal.

Charities. The public charitable institutions receiving aid from the Government are Beauport, St Ferdinand de Halifax, and St Jean de Dieu lunatic asylums. Grants are annually made to about ninety other institutions, including industrial schools and reformatories, the total amount reaching in 1883 $301,121.

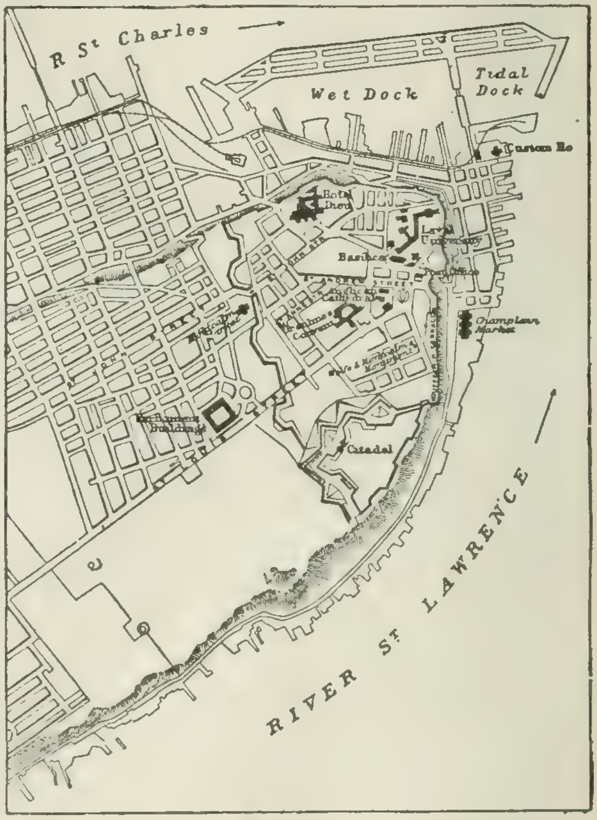
Towns. The capital is QUEBEC (*q.v.*). The largest and most important city is MONTREAL (*q.v.*). Other chief towns are Three Rivers, population 8670, so-called from the St Maurice, which here joins the St Lawrence by three mouths (it is one of the oldest cities, and the seat of a large lumber and iron trade); St Hyacinthe, 5321; Levis, 7597, where the quarantine for cattle is situated; Sorel, 5791; St John's, 4314; St François, Beauce, 4181; Sherbrooke, 7227; Valley Field, 3906; Malbaie, 3014; Baie St Paul, 3794; St Henri, 6415; Hull, 6890; St Jean Baptiste, 5874.

The quarantine station is at Grosse Isle, an island in the river St Lawrence, 31½ miles below Quebec. It is 2½ miles long by 1 mile in width.

History.—Quebec was first visited by the French, under Jacques Cartier, in 1535, and a second time in 1536, though it is said that Sebastian Cabot discovered the country in 1497. The regular settlement of the province, however, was not made until 1608, when Samuel de Champlain landed at the site now occupied by Quebec city. Here he established military and trading posts, and it was not long before the new possession became the seat of the Récollet and Jesuit missions, which were zealously carried on under the most trying circumstances for nearly a century and a half. The early settlers endured countless hardships from the incursions of the Indians, and the frequent wars in which they were forced to engage with the English and Dutch. In 1759 the marquis of Montcalm was defeated at Quebec by an English army under General Wolfe. A year later the French surrendered all their important ports, and the colony passed under English rule. In 1763 the treaty of Paris was signed, by the terms of which, and the conditions laid down a few years later in the memorable Quebec Act of 1774, the French were guaranteed by England their laws, language, and religion. In 1791 the province was divided into Upper and Lower Canada, but in 1841, after a series of internal dissensions, including the rebellion of 1837, and several political quarrels, the country was again united. In 1867 the provinces of old Canada, under the names of Ontario and Quebec, were erected with New Brunswick and Nova Scotia into the Dominion of Canada. (G. ST.)



Environs of Quebec.



Plan of Quebec.

QUEBEC, the ancient capital of Canada, and present capital of the province of Quebec, is situated on the north-west bank of the river St Lawrence at its junction with the St Charles, about 300 miles from the Gulf of St Lawrence and 180 miles below Montreal, in 46° 49′ 6″ N. lat. and 71° 13′ 45″ W. long. It is the most picturesque and most strongly fortified city on the continent. Quebec is built on the northern extremity of an elevated table-land which forms the left bank of the St Lawrence for a distance of 8 miles. The highest part of the headland is Cape Diamond, 333 feet above the level of the water, and crowned by the citadel, which covers an area of forty acres, and presents a bold and precipitous front on the south-east side, while towards the north and west the declivity is more sloping and gradual. The harbour of Quebec is spacious and capable of accommodating ships of the largest tonnage, and its docks and tidal basin, when completed, will rank among the most perfect works of the kind in the world. They are constructed of limestone and iron, and, including the graving dock on the Levis side of the river, will cost very nearly three millions of dollars. The harbour is protected towards the north-east by the island of Orleans, on either side of which there is an approach. The spring tides rise and fall about 18 feet. Quebec is divided into upper and lower town,—access to the former being obtained by a steep and winding street, several flights of narrow steps, and an elevator. In the lower town are situated the principal banks, merchants' offices, and wholesale and retail stores. The streets, with one or two exceptions, are narrow and irregular. In the upper town, where the streets are wider and well-paved, are the better class of dwelling houses, the public buildings, most of the churches, the public walks and gardens, retail stores and small shops. To the west are the suburbs of St John, St Louis, and St Roche. The latter occupies the lower plain, and is rapidly becoming a place of commercial importance. The other two suburbs are on the same level with the upper town. South-west of St John stretch the historic Plains of Abraham. On this battle-ground a column 40 feet high has been erected to mark the spot where General Wolfe in 1759 died victorious. In the governor's garden, which overlooks the St Lawrence, is a stately monument 65 feet in height, which is dedicated to the memory of Wolfe and Montcalm. An iron pillar surmounted by a bronze statue, the gift of Prince Napoleon Bonaparte, stands on St Foye road, and commemorates the achievements of the British and French troops in 1760. Four martello towers occupy commanding positions. A point of interest in the upper town is Dufferin Terrace, a magnificent promenade 1400 feet long and 200 feet above the level of the river. Part of this terrace occupies the site of the old Château St Louis, which was destroyed by fire in 1834. The view from the platform is very striking and beautiful. The Grand Battery also affords a fine prospect. Quebec was once the walled city of the north, but several of its ancient fortifications have been dismantled, and the old gates taken down. There are three gates now, instead of five as in former years, viz., St Louis, Kent, and St John's, each of which is very handsome and massive. Among the principal edifices are the parliamentary and departmental buildings,—a stately pile situated on Grande Allée,—the new court house now building, the post office, custom-house, city hall, masonic hall, the Basilica, or Roman Catholic cathedral (an irregular cut-stone building 216 feet long by 180 feet wide, and containing many fine oil paintings), the archiepiscopal palace, the Anglican cathedral (a plain structure in the Roman style), the skating rink, and the hall of the Young Men's Christian Association; four large markets supply the people with meat and country produce. There are eight Roman Catholic churches, five Church of England, two Presbyterian, one Methodist, one Baptist, one Lutheran, one Congregational, one Scandinavian, one French Protestant, and a Jewish synagogue, which is situated in the Masonic Hall. Laval University, which derives its name from the first bishop of Quebec, who founded in 1663 the seminary for the training of priests, is the principal educational establishment of the Roman Catholics. It was instituted in 1852 by a royal charter from Queen Victoria and a charter from Pope Pius IX. The building is large and spacious, and the university, which is held in high esteem, is well equipped with apparatus, a library of over 85,000 volumes, a museum, geological specimens, and a picture gallery. Laval has a strong staff of professors, lay and clerical, and the faculties are theology, law, medicine, and arts. In connexion with this institution are the grand seminary founded in 1663, where theology is taught, and the minor seminary for literature and philosophy. Laval Normal and Model School, the Ursuline Convent,—a very large establishment for the education of young ladies, founded in 1641,—the Convent of the Good Shepherd, and several nunneries complete the list of

Roman Catholic educational institutions. Morrin College (Presbyterian) was founded by Dr Morrin, and is affiliated with M'Gill University. Other Protestant schools are the boys' high school, the girls' high school, a number of academies, and public and private schools, all in a state of efficiency. In 1881 the number of children attending the various schools in Quebec was 9889, of whom half were girls. There is no free public library in the city, but the Literary and Historical Society,—the oldest chartered institution of the kind in Canada, founded by Lord Dalhousie in 1824,—the Canadian Institute, the Geographical Society, the Young Men's Christian Association, the Advocates' Library, and the Parliamentary Library have valuable collections of books. The principal benevolent institutions are the marine hospital, the Hôtel Dieu, founded in 1639 by the duchess of Aiguillon, the general hospital (1693), the Finlay Asylum, the Jeffrey Hale Hospital, the Church of England Female Orphans' Asylum, the Ladies' Protestant Home, St Bridget's Asylum, Grey Nunnery, and the lunatic asylum at Beauport. Nine daily newspapers are published at Quebec, six of which are in the French language. A good supply of water is afforded from Lake St Charles, but the city has suffered so severely from devastating fires in the past that in 1883 the common council ordered an additional pipe to be laid at a cost of half a million of dollars. Quebec is well lighted with gas and the electric light. Connexion is had with all parts of Canada and the United States by several railway lines, and the city is at the head of ocean steamship navigation to Europe. There are two lines of street cars. The head offices of three banks are situated in Quebec, viz., the Quebec Bank, the Union Bank of Lower Canada, and La Banque Nationale. Besides these there are two savings banks, the Post Office Savings Bank, and the agencies of the Bank of Montreal, the Bank of British North America, and the Merchants' Bank. The population of the city in 1871 was 59,699; in 1881, 62,446 (28,923 males and 33,523 females),—6200 being Protestants.

Shipbuilding was formerly one of the chief industries of Quebec, but of late years very few wooden ships have been built. In 1883 the number was twenty-five, representing a total tonnage of 4596 tons. Manufacturing is carried on to some extent, the principal manufactures being iron castings, machinery, cutlery, nails, leather, musical instruments, boots and shoes, paper, india-rubber goods, ropes, tobacco, steel, &c.

Quebec's staple export is timber, the greater portion of the shipments reaching town from the Ottawa and St Maurice districts. The rafts floating down the river are collected in the coves, and fastened by booms are moored along the banks. These coves extend along the river for upwards of 6 miles above the city. On the right bank of the stream, not far from Quebec, are extensive sawmills. The port is one of the leading emporiums of the export trade between Canada and Great Britain. The number, tonnage, and crews of the vessels entered and cleared at Quebec for several years is as follows:—

Year.	Entered.			Cleared.		
	No.	Tons.	Crews.	No.	Tons.	Crews.
1880	657	675,634	17,221	611	672,562	14,687
1881	783	802,186	19,888	851	847,615	20,225
1882	642	676,327	17,675	680	681,235	17,162
1883	682	737,059	18,687	653	631,213	15,652
1884	698	767,395	19,351	698	686,790	16,408

Large quantities of timber—especially white pine (10,427,000 feet in 1883), oak, and red pine—are exported from Quebec. The total value of exports in 1883 was $9,268,983; of imports $4,976,713, and of import duty received $823,213·63. The value of the real estate is set down at $24,000,000.

The city returns three members to the Canadian House of Commons, and three to the provincial House of Assembly. It is governed by a mayor, eight aldermen, and sixteen councillors, who hold their offices for two years. Quebec is the seat of the Roman Catholic archbishop, and the see of the bishop of the Church of England.

Quebec was first visited by the French navigator Jacques Cartier in 1535, when it consisted of a sparsely-settled Indian village called Stadacona. In July 1608 the city was founded by Champlain, who bestowed on it its present name. Its growth was slow, and the numerous wars with the Indians and the English rendered the work of colonization and settlement precarious and difficult. In 1629 the English captured it, but three years later it was restored to the French. In 1663 the colony was created a royal government, and Quebec became the capital. In 1690 Sir William Phips with a numerous fleet attempted to reconquer it, but the French governor, Count de Frontenac, destroyed many of his vessels and forced the English to fly. The French held possession until 1759, when it fell into the hands of the British under Wolfe, and it was finally ceded to Britain by the treaty of Paris in 1763. In 1775 General Montgomery with an American force attacked the city, but he perished before its walls and his troops were dispersed. Since then its capture has not been again attempted. (G. ST.)

QUEDAH or KEDAH. See MALAY PENINSULA, vol. xv. p. 322.

QUEDLINBURG, an ancient town of Prussian Saxony, in the district of Magdeburg, is pleasantly situated on the Bode, near the north-west base of the Harz Mountains. It is still partly surrounded by a turreted wall. On the west it is commanded by the old chateau of the imperial abbesses of Quedlinburg, with the interesting abbey church, the body of which was erected in the 11th century. In the crypt, dating from the 10th century, are interred Henry the Fowler and his wife Matilda. The Late Gothic town-house, with additions of the 18th century, contains a good collection of local antiquities. The town also possesses several other churches and numerous schools and charitable foundations. Quedlinburg is famous for its nurseries and market-gardens, and exports vegetable and flower seeds to all parts of Europe and America. It supplies most of the seed used for the cultivation of beetroot for sugar in Silesia, Austria, and Poland. It also carries on manufactures of cloth, iron, and chemicals, and a trade in grain and cattle. The poet Klopstock was a native of Quedlinburg. The population in 1880 was 18,437, almost all Protestants.

The town of Quedlinburg, which was founded by Henry the Fowler about the year 930, on the site of the old village of Quitlingen, became a favourite residence of the Saxon emperors, and was the scene of several diets and assemblies of princes. It afterwards joined the Hanseatic League, and attained its greatest prosperity in the 13th or 14th century. The convent was established a few years after the town, and was also richly endowed with lands and privileges. The abbesses, who were frequently members of the imperial house, ranked among the independent princes of the German empire and had no ecclesiastical superior except the pope. The town at first strove zealously to maintain its independence against the abbess, and to this end called in the aid of the bishops of Halberstadt. In 1477, however, the abbess Hedwig, aided by her brothers Ernest and Albert of Saxony, forced the bishops to renounce their claims; and for the next two centuries both town and abbey remained under the protection of the electors of Saxony. In 1539 the Reformation was embraced, and the nunnery was converted into a Protestant sisterhood. In 1697 the elector of Saxony sold his rights over Quedlinburg to the elector of Brandenburg, whose troops forthwith entered the town. The abbesses retained their right of private jurisdiction, and the disputes between them and the Prussian Government were not finally settled till the secularization of the abbey in 1803. The last two abbesses were the Princess Anna Amelia (1755-1787), sister of Frederick the Great, and the Princess Sophia Albertina, daughter of King Adolphus Frederick of Sweden.

QUEEN ANNE'S BOUNTY is the name applied to a perpetual fund of first-fruits and tenths granted by a charter of Queen Anne, and confirmed by statute in 1703 (2 & 3 Anne, c. 11), for the augmentation of the livings of the poorer Anglican clergy. First-fruits (*annates*) and tenths (*decimæ*) formed originally part of the revenue paid by the clergy to the papal exchequer. The former consist of the first whole year's profit of all spiritual preferments, the latter of one-tenth of their annual profits after the first year. Benefices under the annual value of £50 are now exempt from the tax. The income derived from first-fruits and tenths was annexed to the revenue of the crown in 1535 (26 Hen. VIII. c. 3), and so continued until 1703. Since that date there has been a large mass of legislation dealing with Queen Anne's Bounty, the effect of which it is impossible to deal with fully in this place. The governors consist of the archbishops and bishops, some of the principal officers of the Government, and the chief legal and judicial authorities. The augmentation proceeds on the principle of assisting the smallest benefices first. All the cures not exceeding £10 per annum must have received £200 before the governors can proceed to assist those not exceeding £20 per annum. In order to encourage benefactions, the governors may give £200 to cures not exceeding £45 a year, where any person will give the same or a greater sum. The average income from first-fruits and tenths is a little more than £14,000 a year. In 1883 the trust funds in the hands of the governors amounted to £1,306,717. The grants in 1883 amounted to £15,400, the benefactions to £20,195. The accounts are laid annually before the queen in council and the Houses of Parliament. The duties of the governors are not confined to the augmentation of benefices. They may in addition lend money for the repair and rebuilding of residences and for the execution of works required by the Ecclesiastical Dilapidations Acts, and may receive and apply compensation money in respect of the enfranchisement of copyholds on any benefice. The governors are unpaid; the treasurer and secretary receives a salary of £1000 a year. He is appointed by patent under the great seal, and holds office during the pleasure of the crown.

QUEEN CHARLOTTE ISLANDS, a group of islands lying off the west coast of British Columbia, to which they belong. They were so called by Captain Dixon, who visited them in the "Queen Charlotte" in 1787, and spent more than a month on their coasts. They are composed of two chief islands, Graham Island to the north and Moresby Island to the south, separated by a very narrow channel; but around these, especially in the south, are innumerable smaller islands. The whole group has the form of a wedge with the point towards the south. The extreme length is about 180 miles, and the greatest breadth 60 miles. The total area cannot be determined, as the longitude of the west coast has not yet been definitely ascertained. See vol. iv. Pl. XXXV.

The islands are mountainous, and appear to be a partially submerged continuation of the mountain chain traversing Vancouver's Island, which lies to the south, separated from the group by Queen Charlotte Sound. The mountains are situated more particularly in the southern island, which is little more than a skeleton of mountains washed at their base by the waters of numerous inlets. Many summits here rise above 5000 feet in height. The larger island to the north, which has a length of about 77 miles and a breadth equal to the maximum breadth of the group, is in general lower, though here also there are hills rising to between 2000 and 3000 feet. Both the mountains and lowlands are well wooded, but in general the timber is not found in accessible spots in sufficient quantity to encourage attempts to develop the lumber trade. At present the principal commercial resources of the islands are derived from the fish that frequent these shores. Immense shoals of dog-fish visit the north and north-east, and they are utilized for their oil by a company established on Skidegate Inlet on the east side of Moresby Island. Holibut, herring, salmon, cod, and coal-fish or "skil" (this last also rich in oil and a valuable food-fish) are likewise abundant. The climate is extremely moist, especially on the west side of the watershed.

Geologically the group appears to be composed mainly of Triassic, Cretaceous, and Tertiary strata, with intrusive masses here and there of granite and other igneous rocks. The Triassic deposits occupy almost the whole of the southern part of the group, and it is uncertain whether some Palæozoic rocks may not be exposed at certain points as they are in corresponding situations on the mainland of British Columbia. The Cretaceous deposits lie unconformably on those of Triassic age on both sides of Skidegate Inlet and Channel (in the south of Graham Island and north-east of Moresby Island), and are interesting geologically from containing a bed of anthracitic coal. These deposits are again unconformably overlaid by those of Tertiary age extending over the greater part of Graham Island; and the unconformity in this case is accompanied by evidence of great disturbance, indicating that this was the chief period of mountain-making in the group.

The islands are inhabited by an interesting race of Indians called the Haidas, who are chiefly found on the coasts, where they support themselves by fishing, partly also by the cultivation of the potato, which was probably introduced among them by some of the early voyagers. They tattoo their bodies, sometimes paint their faces, and have many singular customs; but their greatest peculiarity consists in their habit of erecting great numbers of carved posts as ornaments in front of their dwellings. Their number is rapidly decreasing, and in the last official report on the exploration of this group (Victoria, 1884), it is estimated at only eight hundred.

The fullest account of the Queen Charlotte Islands and their inhabitants is to be found in the report of George M. Dawson in the *Report of Progress* for 1878-79 of the Geological Survey of Canada.

QUEENSBERRY, JAMES DOUGLAS, SECOND DUKE OF (1662-1711), was the eldest son of William, third earl and first duke, high treasurer of Scotland, and Isabel Douglas, sixth daughter of William, first marquis of Douglas. He was born at Sanquhar Castle 18th December 1662, and educated at the university of Glasgow, after which he spent some time in foreign travel. He sided with the prince of Orange at the Revolution, and was appointed a privy councillor, and colonel of the Scotch troop of horse guards. On the death of his father in 1695 he succeeded him as extraordinary lord of session, and was also appointed keeper of the privy seal. In 1702 and 1703 he was appointed by Queen Anne secretary of state, and commissioner to the parliament of Scotland. In the latter year he was deprived of his offices, but he was again restored in 1705, and in the following year was constituted high commissioner on the part of Scotland for carrying out the Treaty of Union between the two kingdoms, which, chiefly owing to his influence and skill, was completed in 1707. In recognition of his services he received a pension of £3000 per annum, and on the 26th May 1708 was created a British peer by the title of duke of Dover. On 9th February 1709 he was appointed third secretary of state. He died 6th July 1711.

QUEEN'S COUNTY, an inland county in the province of Leinster, Ireland, is bounded N.W. and N. by King's County, E. by Kildare and a detached portion of King's County, S. by Carlow and Kilkenny, and W. by Tipperary. Its greatest length from east to west is about 35 miles, and its greatest breadth from north to south about 30 miles. The area is 424,854 acres, or about 663 square miles. The surface is for the most part level or gently undulating, but in the north-west rises into the elevations of the Slieve Bloom Mountains, the highest summit being Ardern, 1733 feet. Like the level country, they belong to the limestone formation, but are wrapped round with folds of Old Red Sandstone. In the central part of the county there is a large extent of bog. The south-east portion is included in the Leinster coal-field. Iron ore, copper, and manganese are found in small quantities. Potter's clay is plentiful; and slate, sandstone, and marble are quarried in some places. Nearly the whole of the county is drained either by the Barrow, which has its source in the Slieve Bloom Mountains, and forms at various points the boundary with King's County, Kildare, and Carlow, or by the Nore, which enters the county from Tipperary near Borris-in-Ossory, and flows east and then south till it reaches Kilkenny. The lakes are few and small, the largest being Lough Anaghmore on the north-western boundary. The Grand Canal enters the county at Portarlington, and runs southwards to the Barrow in Kildare, a branch passing westwards 12 miles to Mountmellick.

Agriculture.—The climate is dry and salubrious. Originally a great extent of the surface was occupied with bog, but by draining much of it has been converted into good land. For the most part it is very fertile except in the hilly districts towards the north, and there is some remarkably rich land in the south-east. The total extent under crops in 1884 was 129,617 acres, of which 73,536 acres were under tillage and 56,081 acres under meadow and clover. Of the 42,755 acres under corn crops 639 acres were under wheat, 24,467 acres under oats and 17,639 acres under barley. Of the 30,601 acres under green crops, 15,888 were under potatoes, and 12,077 under turnips. Dairy farming is extensively carried on. The total number of cattle in 1883 was 78,496, of which 20,421 were milch-cows. There were 70,530 sheep, 33,834 pigs, 5433 goats, and 249,619 poultry. Horses and mules numbered 14,494, and asses 5742.

Agriculture forms the chief occupation, but the manufacture of woollen and cotton goods is carried on to a small extent.

Railways.—The Great Southern and Western Railway crosses the country from north east to south-west with stations at Portarlington, Maryborough, Mountrath, and Ballybrophy. At Portarlington a branch passes westward to Mountmellick; there is also a branch passing southward from Maryborough, and another passing westward from Ballybrophy.

Adminstration.—The county is divided into eleven baronies, and contains 53 parishes and 1156 townlands. Ecclesiastically it is in the dioceses of Leighlin and Ossory, with portions in those of Kildare, Killaloe, and Dublin. Judicially it is in the home circuit. Assizes are held at Maryborough, the county town, and quarter sessions at Abbeyleix, Borris-in-Ossory, Carlow-Graigue, Maryborough, Mountmellick, and Stradbally. There are fifteen petty sessions districts. The poor-law unions of Abbeyleix and Donaghmore are wholly within the county, and portions of those of Athy, Carlow, Mountmellick, and Roscrea. The county is included in the Dublin military district, and there is a barrack station at Maryborough.

Population.—Within the last forty years the population has diminished by more than one-half. In 1841 it numbered 153,930, which in 1871 had diminished to 79,765, and in 1881 to 73,121. The following were the largest towns:—Mountmellick (3126), Maryborough (2872), Portarlington (partly in King's County) (2357), and Mountrath (1865).

History.—Anciently the territory now included in Queen's County was divided between the districts of Leix, Offaly, Clamnaliere, and Ossory. In the reign of Philip and Mary, it was made shire ground under the name of Queen's County, in honour of the sovereign, the place chosen for the county town being named Maryborough. Three miles south of Stradbally is Dun of Clopook, an ancient dun or fort occupying the whole extent of the hill, and there is another large fort at Lugacurren. Aghaboe, where there are the ruins of the abbey, was formerly the seat of the bishopric of Ossory. There are no remains of the Abbey of Timahoe founded by St Mochua in the 6th century, but in the neighbourhood of the site there is a fine round tower. Among the principal old castles are the fortress of the O'Moores in ruins occupying the precipitous rock of Dunamase, three miles east of Maryborough, Borris-in-Ossory on the Nore, and Lea castle on the Barrow, 2 miles below Portarlington, erected by the Fitzgeralds in 1260, burnt by Edward Bruce in 1315, again rebuilt, and in 1650 laid in ruins by the soldiers of Cromwell.

QUEENSLAND, a British colony, the north-eastern portion of Australia, is situated between New South Wales and Torres Strait, and between the Pacific Ocean and the Northern Territory of South Australia. Its southern boundary is about 29° S. lat.; its western is 141° E. long. from 29° to 26° S. lat., and 138° E. thence to the Gulf of Carpentaria; its northern is about 9° S. including the Torres Straits islands. In extreme length it is 1400 miles; in breadth, 1000. Its area is 669,520 square miles, or about 5½ times that of the United Kingdom. The population is under 300,000.

With a seaboard of over 2500 miles, it is well favoured with ports on the Pacific side. Moreton Bay receives the Brisbane river, on whose banks Brisbane, the capital, stands. Maryborough port is on the Mary, which flows into Wide Bay; Bundaberg, on the Burnett; Gladstone, on Port Curtis; Rockhampton, up the Fitzroy (Keppel Bay); Mackay, on the Pioneer; Bowen, on Port Denison; Townsville, on Cleveland Bay. Cairns and Port Douglas are near Trinity Bay; Cardwell is on Rockingham Bay; Cooktown, on the Endeavour; Thursday Island port, near Cape York; and Normanton, near the Gulf of Carpentaria. The new gulf port is at Point Parker. The quiet Inner Passage, between the shore and the Great Barrier Reef, 1200 miles long, favours the north-eastern Queensland ports. Ipswich, Toowoomba, Oxley, Beenleigh, Maryborough, and Mackay are farming centres; Warwick, Roma, Ciermont, Blackall, Aramac, Hughenden, and Mitchell are pastoral ones. Gympie, Charters Towers, Ravenswood, and Palmerville are gold-mining towns; while Stanthorpe and Herberton have tin mines. Townships are laid out by Government as occasion requires. There are fifteen large districts, viz., Moreton, Darling Downs, Wide Bay, Burnett, Maranoa, Warrego, and South Gregory, southward; Port Curtis, Leichhardt, South Kennedy, Mitchell, and North Gregory, central; North Kennedy, Burke, and Cook, northward. Cape York Peninsula is the northern limit. A few persons were sent to the Brisbane in 1826; but the Moreton Bay district of New South Wales was thrown open to colonization in 1842. It was named "Queensland" on its separation from the mother colony in 1859. A natural but unfounded prejudice against its supposed warmer position retarded its progress, or confined its few inhabitants to pastoral pursuits. The discovery of abundant wealth in minerals and sugar-lands, with the growing conviction of its singular salubrity, greatly advanced the immigration prospects of the colony. A broad plateau, of from 2000 to 5000 feet in height, extends from north to south, at from 20 to 100 miles from the coast, forming the Main Range. This region is the seat of mining, and will be of agriculture. The Coast Range is less elevated. A plateau goes westward from the Great Dividing Range, throwing most of its waters northward to the gulf. The Main Range sends numerous but short streams to the Pacific, and a few long ones south-westward, lost in earth or shallow lakes, unless feeding the river Darling. Going northward, the leading rivers, in order, are the Logan, Brisbane, Mary, Burnett, Fitzroy, Burdekin, Herbert, Johnstone, and Endeavour. The Fitzroy receives the Mackenzie and Dawson; the Burdekin is supplied by the Cape, Belyando, and Suttor. The chief gulf streams are the Mitchell, Flinders, Leichhardt, and Albert. The great dry western plains have the Barcoo, Diamantina, Georgina, Warrego, Maranoa, and Condamine. There are few lakes. A succession of elevated and nearly treeless downs of remarkable fertility contrasts with the heavily timbered country favoured by the rains. Cape York Peninsula is an epitome of Queensland. There is good land alternating with bad. The hills are rich in gold, silver, copper, tin, and coal. The forests are valuable, and the scrub is dense. Flats near the mouths of the many streams are admirable for sugar-cane and rice, while rising slopes suit coffee trees. West of the range dividing the gulf waters from the Pacific is a sandy grassless region where the only vegetation is a poisonous pea. Suddenly the traveller passes from this desert to the glorious downs around Hughenden, a garden-land beside the Flinders. Farther north-west is the charming Leichhardt river district, and the marvellous mineral Cloncurry highland. Southward of that again is the country of the Diamantina and

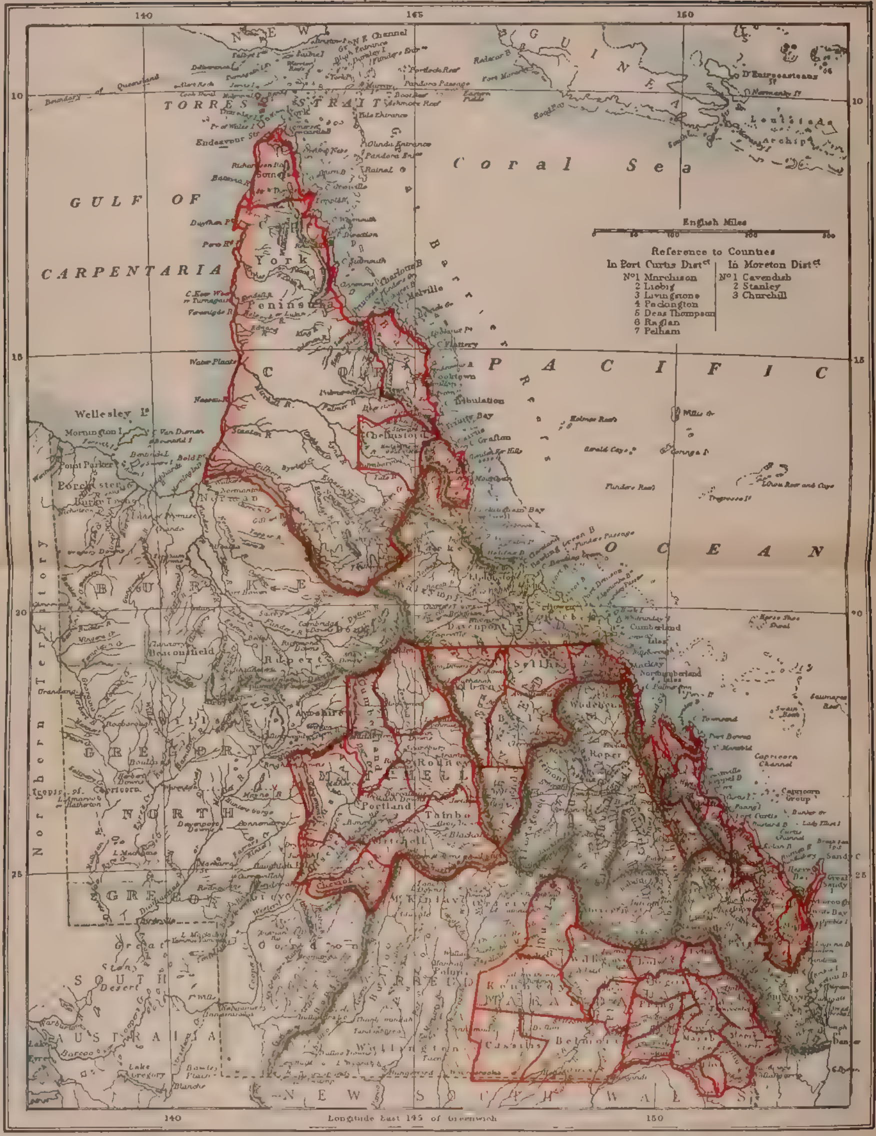
Georgina, with little rain, but having vast tracts of good black soil threaded by slight ridges of barren sandstone. Droughts are there followed by floods from thunder showers. The south-western portion is inferior to all, having heavy sand-rises between the grassy belts. Still the pastoral settlers are taking up areas there. All that dry warm west is remarkably healthy for man and beast. The productive and better-watered part between the Main Range and the Pacific has the principal population.

Climate.—The coast-lands, with an annual rainfall of from 40 to 130 inches, are favoured by the south-east trade-winds and the summer north-west monsoons. During 1882 there fell at Johnstone river, 17° S., nearly 160 inches on one hundred and ninety-seven days. Northern Queensland, up to the ranges, is well watered. Central and southern districts are not so aided by the monsoons. The highlands have on their eastern side from 30 to 70 inches, but on their western only from 15 to 30. The gulf region has from 30 to 60. The southern hills have far less rain than the northern ones. The arid western area depends on occasional thunderstorms, though nature provides a grass that long resists the drought. The low south-west basin, trending to the depressed lake region of South Australia, has repeatedly seasons of intense dryness. In temperature, Brisbane has a mean of 69°—between 34° and 105°. The hilly districts, even in the tropics, have slight frosts in winter, but a high barometer in the dry warm weather. North Queensland has less heat than its latitude would seem to threaten. Tropical ports show a lower summer thermometer than may sometimes be seen in Sydney, Adelaide, and Melbourne. The western heat is stimulating in its dryness and electrical condition. The oppression on the northern coast is felt during the rainy season, though the showers cool the air. The prevalence of south-east winds off the sea mitigates the trials of summer. The dreaded "hot wind," brought southward by the usual course from central Australian deserts, descends upon the southern colonies, avoiding Queensland. Still the ordinary western breeze, passing over so great an expanse of land, while positively cold on winter nights, is sufficiently hot during the summer.

In a recent year the colonial registrar-general gave the death-rate of Brisbane municipality at 13 in the thousand, Toowoomba 17, and Rockhampton 15. In the tropics it was 12 at Charters Towers and Cooktown, 15 at Townsville; but 29 at Mackay, where the sickly Polynesians abound. The prevalent diseases are rather from disordered liver and bowels than lungs and throat. Low fevers, seldom fatal, continue for a time in all newly opened-up country throughout Australia, as in America. Female mortality, even in the tropical ports, is considerably less than that of males. Infants, as a rule, thrive better in the colony, according to numbers, than in England. Cooktown, in lat. 16° S., is regarded by some as the sanatorium of the future. Queensland can give invalids any climate they may desire—moist and equable, dry and exhilarating, warm days and cool nights, soft coast airs for bronchial affections, and more bracing ones for other consumptives.

Geology.—Queensland is geologically connected with New South Wales and Victoria by the great chain of hills continued through the eastern portion of Australia, from Cape York to Bass's Strait. That immense range consists largely of Palæozoic formations with igneous rocks. The granites, porphyries, and basalts have greatly tilted and metamorphosed the sedimentary deposits of Silurian, Devonian, Carboniferous, and Oolitic ages. The width of this elevated and mineral part of the colony varies from 50 to 400 miles. Ancient formations, however, rise in the broad western plains, and everywhere indicate metallic treasures. Nearer the eastern coast granite and porphyritic rocks appear in greater force than in the Dividing Range, and the voyager rarely loses sight of them all the way from Moreton Bay to Cape York. They add much to the attractiveness of the scenery, especially in Whitsunday Passage. The old sedimentary strata consist of sandstones, limestones, conglomerates, and slates of various kinds. The Carboniferous beds are of great extent, occupying thousands of square miles (perhaps as many as 100,000), on the highlands, and on both sides of the Main Chain. It is in north and central Queensland that the mineral is found of the true Palæozoic character, bearing the distinctive floral features of the English and New South Wales Newcastle formation. The Jurassic and Liassic rocks of the southern hilly districts are rich in cannel coal. The Wollumbilla beds are similar to the Upper Wiannamatta ones of New South Wales. The Mesozoic or Secondary formations prevail largely to the westward. Ammonites, belemnites, and ichthyosauri declare the same condition of things as once existed in the English midlands. The Cretaceous and Oolitic series on the western plains occupy nearly a third of Queensland, and their grassy surface is being rapidly covered with flocks of sheep. A descent below the ocean level produced the Tertiary beds. The so-called "desert sandstone" may have once covered nearly the whole of the colony, though suffering great denudation afterwards, to the decided satisfaction of settlers. It still stretches over much of the extensive plateau and both slopes. In some places it is hundreds of feet thick. The favourite Downs have got free from this arid incubus. Tertiary freshwater beds, not marine ones, are seen towards the coast. The volcanic element is very distinguishable, and is a source of the large area of fertile soil. Throughout the ranges, and over many of the downs, basalts and lavas abound. Though no eruptive cone appears, there are hundreds of well-defined extinct craters, some being 4000 feet above sea-level, surrounded by sheets of lava and masses of volcanic ashes. The Great Barrier Reef, following the line of the north-east coast for 1200 miles, preserves the memory of an ancient shore; the coral animalculæ built on the gradually sinking cliffs. The reefs approach the coast-line within five miles northward and one hundred southward, having an area of 30,000 square miles, and protecting eastern Queensland from the violence of Pacific storms. A narrow deep trough in the sea-bottom extends from Moreton Bay to Fiji. Within 100 miles of Cape Moreton the water is 16,000 feet in depth. While the alluvial gold and tin-workings are among the Tertiary and post-Tertiary formations, the veins and lodes of gold, silver, copper, tin, and other metals are in the solid granite, or in the ancient sedimentary rocks, particularly in association with dioritic and other igneous intrusions. Greenstone has there some of the richest of copper lodes. The celebrated tin mines of Tinaroo are in granite mountains 3000 feet high, where Englishmen work without discomfort within the tropics. Some of the tropical coal-fields are also at a considerable elevation, though nowhere are they situated in an insalubrious locality. The more southern coal seams are in districts as healthful as they are beautiful. The Queensland fossils greatly resemble those of other parts of the world. Those, however, of the more recent Tertiary times indicate the presence of animals akin to existing marsupials, though some of the kangaroo order stood a dozen feet in height, and had the bulk of a hippopotamus. The diprotodon, 16 feet in length, may have pulled down branches or young trees for its support. The rise of land would have diminished water-supply in the interior, and caused the gradual disappearance of the gigantic marsu-

QUEENSLAND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TORRES STRAIT
Endeavour Str.
Boundary of Queensland
Coral Sea
GULF OF CARPENTARIA
York Peninsula
B a r r i e r R e e f s
P A C I F I C
O C E A N
Wellesley Is
Mornington I.
Cook
Burke
Carpentaria
Wellington
Kennedy
Leichhardt
Port Curtis
Wide Bay
Burnett
Darling Downs
Maranoa
Warrego
Gregory
North Gregory
South Gregory
Mitchell
Cumberland
Northumberland
Mackay
Cardwell
Cooktown
Trinity Bay
Rockingham Bay
Port Denison
Bowen
Capricorn Channel
Capricorn Group
Great Sandy I.
Moreton Bay
Brisbane
Ipswich
Toowoomba
Normanton
Burketown
Point Parker
Gilbert R.
Mitchell R.
Palmer R.
Flinders R.
Diamantina R.
Barcoo R.
Warrego R.
Thomson R.
Cooper's Cr.
Lake Gregory
Northern Territory
SOUTH AUSTRALIA
Stony Desert
NEW SOUTH WALES
English Miles
0
50
100
200
300
Reference to Counties
In Port Curtis Distct
No 1 Murchison
2 Liebig
3 Livingstone
4 Packington
5 Deas Thompson
6 Raglan
7 Pelham
In Moreton Distct
No 1 Cavendish
2 Stanley
3 Churchill
Longitude East 145 of Greenwich

pials. A monster bird, like the New Zealand moa, twice as large as the existing emu, once strode over Queensland plains. An ichthyosaurus, computed nearly thirty feet in length, was found on the surface of the Flinders river downs. The Secondary fossils have less resemblance than those of Western Australia to the European species. Near the Condamine a fossil monitor twenty feet long was unearthed. The northern coal-fields display the *Glossopteris*, *Sigillaria*, and *Lepidodendron*. The northern beds exhibit the mesozoic *Thinnfeldia odontopterodes*, *Alethopteris australis*, and *Podozomites distans*. Some existing Queensland fish, as the ceratodus, are allied to those of the Carboniferous age in Great Britain.

Minerals.—Gold is found in alluvial deposits and in quartz veins. The most important of the former were near the northern Palmer river, but auriferous quartz now almost monopolizes the digger's attention. The recognized gold workings are over 7000 square miles. While there were 3454 Europeans, early in 1883, engaged in quartz mining, only 280 were on alluvial ground; in the same year 2046 Chinese worked alluvial claims. Charters Towers in the north and Gympie in the south are the chief gold centres; but Mount Morgan, south of Rockhampton, is the richest mine yet discovered. The gold export realized £1,498,433 in 1875, but only £829,655 in 1882. The decrease is owing to the greater dependence of the miners on blasting rock.[1]

Gold is often found mixed with silver, copper, or lead. One lode had to the ton 75 to 120 ounces of silver and from ½ oz. to 4½ oz. of gold. Silver ore is being worked to great advantage now near Ravenswood, Star river, and Sellheim river. Copper has been long so low-priced in England that its extraction in the colony, with high-rated labour, has been seriously checked. The cupriferous area is very large there. Mount Perry, Peak Downs, Herberton, and Cloncurry are the leading copper sites. The "Australian" mine of Cloncurry, 200 miles south of the gulf, is very rich. In one place a lode, 80 to 120 feet wide, showed 30 per cent. of bismuth and 40 of copper to the ton. Tin streams were first opened at Stanthorpe, near the southern border. Tin lodes of astonishing richness exist in the Wild river district about 19° S. lat. There are single claims of tin stream, or on tin lodes, besides tin land leases, at Tate river, Wild river, and other localities. The Tinaroo yield in the five years has been £383,350. Called the Cornwall of Australia, this tin district shows gold, silver, copper, and antimony. The tin export of the colony during 1883 was £298,845. Iron ores abound, but with no present prospect of being utilized. Bismuth, graphite, antimony, nickel, cinnabar, and other metals are known. Precious stones are gathered from gold and tin workings. Building stones are plentiful in variety, and good in quality. Granite, porphyry, basalt, sandstone, and marbles are wrought. The coal is, after all, the most important and useful of the minerals. Already steamers, foundries, and railways are being supplied from Queensland pits. Several beds are known near Moreton Bay. About Ipswich and Darling Downs the coal is clean to the touch. Some specimens cake, others do not. All are good for gas and steam purposes. The Darling Downs beds are in an ancient lake, and are valuable for fuel and oil. On 100 ℔ of that coal being burnt, 529 ℔ of water were evaporated to 505 from Newcastle coal, leaving 16 ℔ of ash to 7 for the other. That cannel is of Lias age. Much rests under the Eolian sandstone and basalt of the west. The Burrum mineral, between Maryborough and Bundaberg, is true coal, yielding, at the first opening, 3000 tons a month. One seam would give 5,000,000 tons. The Dawson, Bowen, and Mackenzie river basins, of vast extent, are Palæozoic, as in the Drummond range, and westward over the main chain. Coal is found in the York peninsula. On the coal of Queensland the distinguished Australian geologist, the Rev. J. Tenison Woods, expresses himself thus:—"The fact that the coal formations cover so vast an extent of the territory, and so many valuable coal-fields having been discovered, makes me confident in predicting that its resources in coal are enormous, are equal, if not superior, to any other colony, and will raise her shores to be in the end the grand coal emporium of the southern hemisphere."

Agriculture.—Until the last few years little cultivation was to be seen, and only 180,000 acres yet receive such attention. Labour was supposed to pay better in other employments. Still there can be grown in Queensland corn of all varieties, hay, English vegetables, sweet potatoes, melons, cassava, cocoa, indigo, arrowroot, ginger, coffee, rice, tobacco, cotton, spices, cinchona, cocoa-nut, bread-fruit, and sugar-cane, with the fruits of England, India, and China. Lucerne is much grown for stud stock, where winter food is needed. Bananas, oranges, grapes, pine-apples, mangoes, guavas, tamarinds, and dates thrive well. Coffee is being extensively produced. Many Ceylon planters have recently settled in the colony. Cotton pods, tended mostly in Moreton district, are now a paying crop. The mulberry success is paving the way for silk culture. The Roma grapes and oranges are much esteemed. Bananas grow on any coast-lands. Arrowroot and tobacco are profitable. Sweet potatoes are extensively used. Rice will be a crop of the future. Farmers in the southern hills raise corn and English fruits. Dairy farming belongs more to a cooler latitude. Wheat can be successfully produced, when labour is cheaper, over an area of 60,000 square miles. Stanthorpe wheat gave 67 ℔ to the bushel. Maize is a more certain crop. But sugar-cane is now the Queensland farmer's chief resource. From the southern border up to Cape York, if near the coast, it can be raised. All round Moreton Bay, and in the Maryborough and Bundaberg neighbourhood, it does well; but in the more northern parts, as at the Mackay, Cairns, Burdekin, Johnstone, and Herbert fields, the yield is greater, and the plant comes earlier to maturity. In the Mackay sugar district, during 1884, there were 22,000 acres in cane. Coast Queensland has not only warmth, and rich alluvial or scrub soil, but abundance of rain when growth requires it, with fine weather at cane ripening for manufacturing sugar. Some planters have their own appliances for the extraction of juice and the manufacture of sugar, but the small farmers combine to have machinery in their district, or else dispose of cane or juice for cash to the neighbouring sugar-maker. Polynesians or Kanakas have been used for the sugar-house, though Europeans do all the work of growth and manufacture in South Queensland. Chinese merchants are establishing cane grounds, worked by their own countrymen; and Germans and Scandinavians have extensively embarked in this industry.

Pastoral farming is still the leading industry of the colony, and is rapidly extending over all districts. An occasional check to its prosperity comes by drought in the dry western interior. But a few good seasons, in that healthy wilderness, enable the sheepmaster to recoup himself,—especially as, in the remoter parts, he has a securer tenure and a very small rental. In "settled districts," and within 30 miles of the coast, a "run" is subject to resumption by the state, at six months' notice, should any part be required to be cut up for farms. In the more distant "unsettled district" a lease of twenty-one years is fairly secure. The rent advances every seven years of the term from about half a farthing to a penny an acre. In the dry parts, where grass is insufficient, cattle and sheep thrive well on the salt bush and other shrubs. The only really unavailable pastoral region is that portion of the north-western slope of the Main Range already referred to. The spear-grass sometimes sends its barbed tufts into the flesh of sheep. Wild dogs, floods, and droughts have to be encountered, though the animals to be tended are unaffected by ailments plaguing flocks and herds in Britain. The western plains, dry but fertile, are best for sheep; the hills and moist coast-lands for cattle and horses. The merino sheep yields excellent wool on tropical pastures, contrary to former expectations. The sheep had increased from 3,000,000 to 12,000,000 between 1860 and 1883; and cattle, from 430,000 to 4,320,000. To meet future droughts, subterranean streams have been found by artesian wells in the most arid wastes, and the storage of water after floods will furnish a supply in dry weather.

Flora.—The Queensland flora comprehends most of the forms peculiar to Australia, with the addition of about five hundred species belonging to the Indian and Malayan regions. The eastern portion of New Holland may have a vegetation of a somewhat different type from that of the western, but both have older representatives than those found in the central zone from the gulf to the Southern Ocean. The palms in the north-east of Queensland include the *Cycas* and the screw or *Pandanus*. The pines take an important position in the colony,—as the Moreton Bay pine (*Araucaria Cunninghamii*), the Burnett bunya bunya (*Araucaria Bidwelli*), the kauri or dundathu (*Dammara robusta*), and the she pine (*Podocarpus elata*). The *Callitris* or cypress family like poor soil. The cedar forests are buried in scrub towards the mouths of eastern rivers. Coast-lands are crowded with trees, though brigalow-scrub, with the silver-leaved tops, prevails far inland. There are trees rising above 300 feet. One monster, near the Johnstone river, was seen 88 feet in girth at 55 feet from the ground, and 150 at the base. The Moreton Bay fig-tree has immense wall-like abutments. The bottle or gouty stem tree of the north, *Delabechia Gregorii*, is allied to the African baobab. Flowers are numerous, yielding often a powerful fragrance, though most commonly exhibited on shrubs. Queensland is notably a timber region, having both hard and soft woods. Above three hundred useful woods, many taking a fine polish, were sent to a recent exhibition. An active export of some, particularly cedar and pine, is conducted at Maryborough and Port Curtis. Woods there are in use for building purposes, furniture, dyeing, shipbuilding, coachbuilding, hoops and staves, turnery, gunstocks, veneering, &c. Among the *Eucalypti* are those known as Moreton Bay ash, mahogany, yellow box, blackbutt, ironbark, turpentine, bloodwood, messmate, with the blue, red, grey, forest, swamp, scented, and spotted gum trees. The ironwood, brigalow, and myall are of the *Acacia* genera. Among the *Casuarinæ* are the he, she, swamp, forest, and river oaks. Names are found oddly given by colonists. Their red cedar is the *Cedrela Toona*; white cedar, the *Melia composita*; pencil cedar, the *Dysoxylon Muelleri*; white wood, the *Alstonia*; light yellow wood, the *Flindersia Oxleyana*; dark yellow wood, the *Rhus*; beech, the *Gmelina Leichhardtii*; coachwood, the *Ceratopetalum*; ebony, the *Maba*; musk, the [illegible]; Leichhardt's tree, the *Sarcocephalus cordatus*; mahogany, the *Tristania*; tulip, the *Stenocarpus sinuatus*; honeysuckle, the *Banksia*; pea-tree, the *Melaleuca*; bottlebrush, the *Callistemon lanceolatus*; beefwood, the *Banksia*; satinwood, the *Xanthoxylum brachyacanthum*; coral tree, the *Erythrina*; apple, the *Angophora subvelutina*; teak, the *Dissiliaria baloghioides*; feverbark, the *Alstonia constricta*; sandalwood, the *Eremophila Mitchelli*; lignum vita, the *Vitex*; silky oak, the *Grevillea robusta*. Among the so-called native fruits, the plum and apple are the *Owenia*; orange and lime are the *Citrus*; cumquatis is the *Atalantia*; cherry, the *Exocarpus*; pomegranate, the *Capparis nobilis*; olive, the *Olea*; chestnut, the *Cantharospermum australe*; pear, the *Xylomelum pyriforme*; quandong, the *Fusanus*; nut, the *Macadamia ternifolia*; tamarind, the *Diploglottis Cunninghamii*. The nonda, a native fruit, grows up to 60 feet. The nut of the bunya bunya, so prized by the blacks, is reserved over a district 30 miles by 12. Other trees are also protected by Government. The native grasses are nearly a hundred in number. The desert drought-resisting Mitchell grass is *Danthonia pectinata*; the weeping Polly is *Poa caespitosa*; the dogtooth, *Chloris divaricata*; the blue star, *Chloris ventricosa*; the barcoo or Landesborough, *Anthistiria membranacea*; the kangaroo, *Anthistiria australis*; another kangaroo, *Andropogon refractus*; the rat-tail, *Andropogon nervosus*; the oat, *Anthistiria venacea*; another perennial oat, *Microlæna stipoides*; the umbrella, *Aristida ramosa* and *Panicum virgatum*. The native carrot is *Daucus brachiatus*; the native plantain, *Plantago varia*; the sorghum or rice, *Aryza sativa*; and the bamboo, *Stipa ramosissima*. The salt-bush (*Atriplex*, *Rhagodia*, *Chenopodium*, &c.) is found useful in the absence of grasses. The danthonia and sporobolus strike deep roots. The Burdekin cane is relished by stock. The seeds of *Panicum lævinode* are used as food by the natives. Among plants poisonous to animals are the poison pea, fuchsia, scab-lily, indigo, thorn-apple, box, mistletoe, and nutgrass. Many English and foreign varieties of fodder are being now introduced. Useful fibres are of a number of kinds. Ferns are plentiful on the eastern side. Climbing ferns abound. *Grammitis ampla* has leaves a yard long. A Rockingham Bay fern, one foot high, has the habit of a tree fern. The epiphytes, growing on trees, are often very beautiful in tropical scrubs. Elk's horn, *Platycerium alcicorne*, as well as the large stag's horn, are in much esteem. Forest ferns are similar to those in neighbouring colonies, excepting some tufted *Lindsæa*. The Australian bracken is peculiar to the southern hemisphere. Rock ferns are very graceful. The North Queensland *Asplenium laserpitiifolium* is greatly admired. A tropical *Aspidium*, with leaves 6 feet long, throws out runners. The *Grammitis Muelleri*, with scaly hairs, is peculiar to North Queensland. Swamp ferns are mostly seen to the north-east. Tree ferns attain magnificent proportions, rising 20 and 30 feet.

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[1] As an illustration of success the Day Dawn mine of Charters Towers may be cited. Some Germans long struggled in vain, and with difficulty got enough gold to supply them with food. Suddenly they struck a rich reef. After considerable gains they formed a company to work the ground. Upon a paid-up capital of £12,000, the shareholders' dividends in four years came to £138,399. Gympie affords even more remarkable instances of good fortune.

Fauna.—The Queensland fauna is much like that described under NEW SOUTH WALES. But forms are now living there whose allies are elsewhere recognized as Tertiary Fossils. The marsupials constitute a prominent family. The platypus or water mole is duck-billed and web-footed. The dingo is a howling, nocturnal dog. Queensland birds are very beautiful. One is something like the New Guinea bird of paradise. Other species of the feathered order are kindred to some in the Asiatic islands. Bower birds have a satin plumage, and indulge in play-bowers, adorned with shells and stones. The regent bird and rifle bird are peculiarly attractive in colours. Mound builders lay their eggs in sand heaps. The wild turkey and other game may be easily obtained. North Queensland has a fine cassowary. Reptiles consist of alligators, lizards, and snakes; few of the last, particularly of larger species, are hurtful to man.

Fisheries.—The sperm whale has become rare of late in North Australian seas. Deep-sea fishing is unknown in Queensland. About the coasts are the usual edible Australian forms, as whiting, rock cod, bream, flathead, schnapper, guardfish, &c. Sharks and alligators are there. The shell-grinder, *Cestracion*, is similar to a shark found as fossil in Europe. Sword fish grow to a great size. Some Queensland fish resemble varieties in Indian seas. The Chinese are the best fishermen in Australian waters. The huge dugong, or sea cow, feeding on bay grasses, has a delicate flesh, of the flavour of veal, and furnishes an oil with the qualities of cod-liver oil. The fishery of the trepang, bêche-de-mer, or sea slug employs a considerable number of boats about the coral reefs. Boiled, smoke-dried, and packed in bags, the trepang sells for exportation to China, though its agreeable and most nourishing soup is relished by Australian invalids. At Cooktown and Port Douglas more than £100 per ton may be had for the produce. The pearl fishery is a prosperous and progressive one in or near Torres Straits. A licence is paid, and the traffic is under Government supervision. Thursday Island is the chief seat of this industry. The shells are procured by diving, and fetch from £120 to £200 a ton. Mother-of-pearl and tortoiseshell constitute important exports of the colony, capable of great expansion. Oysters are as fine flavoured as they are abundant. Turtles are caught to the northward.

Commerce.—So extensive a coast-line, and so much of that protected by the Barrier Reef, cannot but be favourable to commerce. The Torres Strait mail service has opened up increased opportunities for trade with China, India, Java, &c. Contiguity to New Caledonia and the Pacific Isles will conduce to mercantile relations. There are several lines of coasting steamers. The great development of the mining, pastoral, and sugar industries, the rapid growth of railways, an easy tariff, and the settlements of York Peninsula are giving a great impetus to commerce. The exports for 1882 were £3,534,452; of which wool brought £1,329,019; gold £829,655; tin £269,904; stock £280,466; sugar £153,188; tallow £129,549; preserved meats £119,343; pearls £105,869; hides £88,359; bêche-de-mer £25,032. The imports for that year were £6,318,463. Among these imports some items may be cited: —for manufactured cotton, silk, and woollen goods £839,352, unmanufactured £194,489; for metal goods and hardware £910,029; flour and grain, £453,307; oilman's stores, £376,987; spirits, wines, and beer, £320,925; books and stationery, £113,798; tea, £109,286. Few of these articles are yet re-exported. The exports for 1883 advanced to £4,652,880, to which wool contributed £2,277,878, and sugar £538,785. The shipping exceeds 1,500,000 tons. Dock conveniences, ships, and colonial-made steam dredgers exercise the state care. The development of coal mines is aiding both shipping and railway extension. With the establishment of British rule in New Guinea, a serious danger to Queensland interests will be averted, and a happy opportunity offered for the enlargement of its commerce.

Manufactures.—The colony is too young, its population too scattered, its resources in raw material too extensive, for any great advance at present in the industrial stage. Yet already large foundries are established, in which agricultural instruments, mining machinery, sugar appliances, steam engines, and locomotives are constructed. Tanneries, breweries, sugar-mills, distilleries, tobacco-factories, cotton-ginning, woollen factories, wine-making, meat-preserving, boot-factories, &c., are being carried on. The sawmills near Maryborough are, perhaps, equal to anything in the southern hemisphere, relays of men working at night by electric light.

Roads and Railways.—Nearly ninety divisional boards, throughout the colony, raise means by rates for highway improvements, Government supplementing their revenue, as in the case of municipalities, by special grants in aid. Coaches travel inland 700 miles from the capital. At the end of 1884, besides several hundreds of miles of railway in process of construction, the lines opened to traffic were 1201 miles. The western line is from Brisbane, over Darling Downs, through Roma. The south-west will be reached by Cunnamulla. From Rockhampton westward the railway has gone 350 miles on towards the downs of the Barcoo. The line from Townsville, parallel to the last, after passing Charters Towers, will go on to Hughenden and the Flinders river region. The three great lines will be hereafter connected, and the Cloncurry and gulf country united with the western ports. Maryborough is thus connected with Gympie and Burrum, Bundaberg with Mount Perry, Brisbane with Warwick, and Brisbane with several suburbs. The heavy loans of the colony are mainly devoted to the construction of railways.

Administration.—The governor is appointed by the Queen. The executive council has 8 members, the legislative council 33, and the assembly 55. The term of parliament is five years. There were in January 1884 42 electorates, 18 municipalities, 4 boroughs, 85 divisional boards, 49 police districts. Excepting very occasional difficulties with blacks in remote and scrubby districts, order is thoroughly observed. Numerous religious and temperance organizations are of assistance in securing respect for law. Among official departments are those of the colonial secretary, treasurer, auditor-general, public works and mines, public lands, customs, administration of justice, post office, police, immigration, and medical board.

Revenue.—Of a revenue of £2,102,095 in 1881–2, £806,719 came from taxation. For the year ending June 30, 1884, the total was £2,566,358. Of this, the customs gave £866,475; excise, £34,441; land sales, £365,536; pastoral rents, £246,103; railways, £581,642; post and telegraph, £155,996. The expenditure was £2,317,674. In the settled districts, during 1883, 304 runs had an area of 11,162 square miles, at a rental of £21,419. In the unsettled districts 8939 runs had 475,601 square miles, paying £216,638, averaging less than a farthing an acre. Expired and renewed leases realize in a creasing rates. The absolute public debt in 1884 was £16,570,850. Of that amount the outlay on railways was about 12 millions; immigration, 2; harbours, 1¼. Roads and telegraph lines took other sums.

Education.—Queensland led the way among the Australian colonies, in the establishment of a system of public instruction free, unsectarian, and compulsory. At the same time, however, the parliament declined to grant further state aid to the clergy and religious edifices of Protestant Episcopalians, Presbyterians, Wesleyans, and Roman Catholics, formerly drawing from the treasury. State or provisional schools are formed wherever there is a sufficient gathering of children. The annual public cost was £2, 17s. per scholar. There are, however, self-supporting private schools. Masters and mistresses of state schools are paid by the Government according to their own educational status, the number of children, and the proficiency of instruction. Excellent training schools for teachers are established. Five superior grammar schools are partly supported by the state; the municipal councils have voluntarily aided those institutions, and offered scholarships to their pupils. The Government gives free education in grammar schools to successful scholars in state schools, besides three years' exhibitions to universities to a certain number passing a high examination. State aid is also rendered to schools of art, schools of design, free libraries, and technical schools.

Population.—The estimated population in January 1884 was 290,000, of whom three-fifths were males. Polynesian labourers, imported for three years, are about 8000. The Chinese, now restricted by a heavy poll tax, may be 18,000. The Aborigines, very fast dying out, mainly by contact with civilization, may be from 10,000 to 12,000.

History.—The Portuguese may have known the northern shore nearly a century before Torres, in 1605, sailed through the strait since called after him, or before the Dutch landed in the Gulf of Carpentaria. Captain Cook passed along the eastern coast in 1770, taking possession of the country as New South Wales. Flinders visited Moreton Bay in 1802. Oxley was on the Brisbane in 1823, and Allan Cunningham on Darling Downs in 1827. Sir T. L. Mitchell in 1846–7 made known the Maranoa, Warrego, and Barcoo districts. Leichhardt in 1845–47 traversed the coast country, going round the gulf to Port Essington, but was lost in his third great journey. Kennedy followed down the Barcoo, but was killed by the blacks while exploring York Peninsula. Burke and Wills crossed western Queensland in 1860. Landesborough, Walker, M'Kinlay, Hann, Jack, Hodgkinson, and Favence continued the researches. Squatters and miners have opened new regions. Before its separation in 1859 the country was known as the Moreton Bay district of New South Wales. A desire to form fresh penal depôts led to the discovery of Brisbane river in December 1823, and the proclamation of a penal settlement there in August 1826. The convict population was gradually withdrawn again to Sydney, and the place was declared open to free persons only in 1842. The first land sale in Brisbane was on August 9, 1843. An attempt was made in 1846, under the ministry of Sir James Graham and Mr Gladstone, to establish at Gladstone on Port Curtis the colony of North Australia for ticket-of-leave men from Britain and Van Diemen's Land. Earl Grey's Government under strong colonial appeals arrested this policy, and broke up the convict settlement. In 1841 there were 176 males and 24 females; in 1844, 540 in all; in 1846, 1867. In 1834 the governor and the English rulers thought it necessary to abandon Moreton Bay altogether, but the order was withheld. The first stock belonged wholly to the colonial Government, but flocks and herds of settlers came on the Darling Downs in 1841. In 1844 there were 17 squatting stations round Moreton Bay and 26 in Darling Downs, having 13,295 cattle and 184,651 sheep. In 1849 there were 2812 horses, 72,096 cattle, and 1,077,983 sheep. But there were few persons in Brisbane and Ipswich. The Rev. Dr Lang then began his agitation in England on behalf of this northern district. Some settlers, who sought a separation from New South Wales, offered to accept British convicts if the ministry granted independence. In answer to their memorial a shipload of ticket-of-leave men was sent in 1850. In spite of the objection of Sydney, the Moreton Bay district was proclaimed the colony of Queensland on December 10, 1859. The population was then about 20,000, and the revenue £6475. Little trade, no manufactures, wretched roads, defective wharfage, struggling townships, and poor schools marked that epoch. Political liberty occasioned a general advance. The first parliament, with the ministry of Mr (now Sir R. G. W.) Herbert, organized a good school system, carried an effective land bill, and established real religious equality. While the pastoral interest rapidly grew, the agricultural and trading classes got firm footing. The revelation of gold and copper treasures increased the prosperity. But a reaction followed; wool prices fell, cotton-growing ceased, early sugar-cane efforts failed, and trouble succeeded excessive speculation in land and mines. A steady application to legitimate pursuits, however, soon restored confidence; and the colony, as its resources have gradually developed, has continued to advance and prosper. (J. BO.)

QUEENSTOWN, formerly COVE OF CORK, a market town and seaport in the county of Cork, Ireland, is picturesquely situated, 13 miles east-south-east of Cork, on the south side of Great Island, on the slope of an eminence rising somewhat abruptly above the inner Cork harbour. It consists chiefly of terraces, rising above each other, and inhabited by the wealthier classes. On account of the mildness of the climate it is much frequented by valetudinarians in winter. Previous to the American War the Cove of Cork was a very small fishing village, but within the last fifty years it has rapidly increased. It received its present name on the occasion of the visit of Queen Victoria in 1849. The harbour, which is 4 miles long by 2 broad, and is defended by the Carlisle and Camden Forts at its entrance, and by Fort Westmoreland on Spike Island, can afford shelter to a very large fleet of vessels. The port is the calling station for the American mail steamers. Among the principal buildings are the new Catholic cathedral for the diocese of Cloyne, and the Protestant Episcopal church for the united parishes of Clonmel and Temple Robin. A fine promenade, over a mile in length, connects Queenstown with Rushbrook, a favourite watering-place. The population of Queenstown in 1871 was 10,334, and in 1881 it was 9755.

QUERCITRON is a yellow dye-stuff obtained from the bark of the quercitron oak, *Quercus tinctoria* (see vol. xvii. p. 693). The tree is a native of the United States, but is now also cultivated in France and South Germany. The dye-stuff is prepared by grinding the bark in mills after it has been freed from its black epidermal layer, and sifting the product to separate the fibrous matter, the fine yellow powder which remains forming the quercitron of commerce. The ruddy-orange decoction of quercitron contains quercitannic acid (vol. xvii. p. 692) and an active dyeing principle, quercitrin, $C_{33}H_{30}O_{17}$. The latter substance is a glucoside, and in aqueous solution under the influence of sulphuric acid it splits up into a rich tinctorial principle, quercetin, $C_{27}H_{18}O_{12}$, and a variety of sugar called isodulcite, $C_6H_{14}O_6$. The reaction may be thus formulated

$$C_{33}H_{30}O_{17} + H_2O = C_{27}H_{18}O_{12} + C_6H_{14}O_6.$$

Quercetin precipitates in the form of a crystalline powder of a brilliant citron yellow colour, entirely insoluble in cold and dissolving only sparingly in hot water, but quite soluble in alcohol. Either by itself or in some form of its glucoside quercitrin, quercetin is found in several vegetable substances, among others in cutch, in Persian berries (*Rhamnus catharticus*), buckwheat leaves (*Polygonum Fagopyrum*), Zante fustic wood (*Rhus Cotinus*), and in rose petals, &c. Quercitron was first introduced as a yellow dye in 1775. For many years it has been used principally in the form of FLAVIN (*q.v.*). Flavin is prepared by boiling quercitron in water and precipitating the tinctorial principle by sulphuric acid. By one method soda crystals are added in preparing the solution. The yellow precipitate is washed to free it from acid. pressed, and dried. From 100 parts of quercitron about 85 of flavin are obtained, having a tinctorial power more than twice that of the original bark. Quercitron and its industrial derivatives are principally employed in calico-printing. With alumina (red liquor mordant) they yield a bright canary colour, with tin salt a fine clear yellow, with iron liquor grey, olive, or black according to the strength of the mordant, and with mixed alumina and iron liquor an orange tint.

QUERÉTARO, a city of Mexico, capital of the state of the same name, lies on a plateau 5900 feet above the sea, 152½ miles north-west of Mexico by the Central Mexican Railway. It is a well-built place with a beautiful tree-planted alameda, a cathedral, and several handsome churches and convents (Santa Clara, worthy of special note), a hospital, and other public buildings; and it is supplied with excellent water from the mountains by a great stone aqueduct erected at the expense of the Marquis de Villar del Aquila whose statue adorns one of the squares. In manufactures it occupies a high place, producing cotton and woollen goods, leather, soap, and wood-carvings. The great Hercules cotton-factory, about 2 miles by rail from the town, is enclosed by a high loop-holed wall and defended by a small company of soldiers; in this way the proprietors have maintained their position since 1840 in spite of all the revolutions that have swept over the country. About 1400 operatives (all Mexicans) are employed, and work is carried on both day and night. Unbleached cotton is the staple product. The population of the city was stated at 38,000 in 1882.

Querétaro was captured by the Spaniards in 1536, and made a city in 1655. In 1848 it was the seat of a congress by which peace between Mexico and the United States was ratified, and in 1867 the emperor Maximilian, unable to hold it against the republicans under Escobedo, was made prisoner and shot on the Cerro de las Campanas to the north of the town.

QUERN. See FLOUR, vol. ix. p. 343–4.

QUESNAY, FRANÇOIS (1694–1774), was one of the most eminent economists of the 18th century. He was born at Mérey, near the village of Montfort l'Amaury, about 28 miles from Paris, on the 4th of June, 1694, a year memorable also for the birth of Voltaire. He was the son of a worthy advocate, who had the reputation of ruining his own practice by reconciling the parties who came to consult him about their suits. The modest resources of the family were derived principally from the cultivation of a small landed estate, Quesnay's mother in particular busying herself much with the details of its management, which she thoroughly understood. His boyish years were thus spent amidst country scenes and the occupations of the farm, and he retained to the end a strong predilection for rural life and a special interest in the welfare of the agricultural population. Little attention was given to his early literary instruction; it is said that he could not read till he was eleven years of age, when he was taught partly by the family gardener, who used as the text book the *Maison Rustique* of Jean Liébault, a work "wherein" (to quote the words of its old English translator, Richard Surflet, 1606) "is conteined whatever can be required for the building or good ordering of a husbandman's house or countrey farme." This book Quesnay is said to have studied with such assiduity as to have almost known it by heart. He learned Greek and Latin and the elements of several sciences with scarcely any aid from masters. He was possessed with an ardent and untiring desire for knowledge, and we are told that more than once he walked to Paris for a book, which he read on his way back the same day, thus travelling twenty leagues on foot.

At the age of sixteen he became apprentice to a surgeon in the neighbourhood of Mérey, who was not able to teach him much, and he soon went to Paris to continue his professional education. He there devoted himself with great ardour for five or six years to the study of medicine and surgery, diligently attending the hospitals, and following the courses of anatomy, chemistry, and botany; he also learned drawing and engraving, in which he acquired considerable skill, and gave some attention to metaphysics, to which he had been attracted by the reading of Malebranche's *Recherche de la Vérité*. About 1718 he established himself at Mantes, and soon obtained a distinguished *clientèle*. He became known to the Maréchal de Noailles, who conceived a high esteem for him, and persuaded the queen, whenever she came to Maintenon, which was not very far from Mantes, to consult no physician but Quesnay. A celebrated practitioner of the time, named Silva, having published a treatise on bleeding, which, though of little merit, was loudly applauded by his friends, Quesnay wrote a refutation of it, founded on the principles of hydrostatics, which brought his name much into notice. When La Peyronnie had procured about 1730 the foundation of an academy of surgery with the view of elevating that profession, he selected Quesnay for the post of perpetual secretary. Coming to Paris to fill it, he obtained through La Peyronnie's influence the office of surgeon in ordinary to the king. He was the author of the remarkable preface which was prefixed to the first volume of the *Mémoires* of the academy. He was for a long time much occupied with the controversies between the faculty of medicine and the college of surgery concerning the respective limits of the two professions, and wrote most of the pieces in which the claims of the latter were asserted. Finding that frequent attacks of the gout were rendering him incapable of performing manual operations, he procured in 1744 the degree of doctor of medicine from the university of Pont-à-Mousson; but, though thus changing the nature of his practice, he continued to defend the rights of the surgical profession. He soon after purchased the reversion to the office of physician in ordinary to the king, and afterwards became his first consulting physician; in this capacity he was installed in the palace of Versailles, occupying apartments near those of Madame de Pompadour. Louis XV. esteemed Quesnay much, and used to call him his thinker; when he ennobled him, he gave him for arms three flowers of the pansy (*pensée*), with the motto *Propter excogitationem mentis.*

He now devoted himself principally to economic studies, taking no part in the court intrigues which were perpetually going on around him. About the year 1750 he became acquainted with M. de Gournay, who was also an earnest inquirer in the economic field; and round these two distinguished men was gradually formed the philosophic sect of the *Économistes*, or, as for distinction's sake they were afterwards called, the *Physiocrates*. The most remarkable men in this group of disciples were the elder Mirabeau (author of *L'Ami des Hommes*, 1756–60, and *Philosophie Rurale*, 1763), the Abbé Baudeau (*Introduction à la Philosophie Économique*, 1771), Le Trosne (*De l'Ordre Social*, 1777), Morellet (best known by his controversy with Galiani on the freedom of the corn trade), Mercier Larivière, and Dupont de Nemours. Of the writings of the last two, as well as of the general doctrine of the physiocrats, some account has been given in the article POLITICAL ECONOMY (see vol. xix. pp. 359 *sq.*). The principal economic work of Quesnay himself was the *Tableau Économique*, which Laharpe called *l'Alcoran des Économistes*. A small *édition de luxe* of this work, with other pieces, was printed in 1758 in the palace of Versailles under the king's immediate supervision, some of the sheets, it is said, having been pulled by the royal hand. Already in 1767 the book had disappeared from circulation, and no copy of it is now procurable; but the substance of it is has been preserved in the *Ami des Hommes* of Mirabeau, and the *Physiocratie* of Dupont de Nemours. In Quesnay's *Maximes Générales du Gouvernement Économique d'un Royaume Agricole*, which was put forward as an *Extrait des Économies Royales de Sully*, and was printed along with the *Tableau* in 1758, besides stating his economic doctrines, he expresses his opinion in favour of a legal despotism as the best form of government. "Let the sovereign authority be single, and superior to all the individuals of society and all the unjust enterprises of private interest. . . . . The system of counter-forces in a government is a harmful one, which produces only discord among the great and the oppression of the weak." He had contributed to the *Encyclopédie* in

1756 the articles "Fermiers" and "Grains," which contained the earliest announcement of his principles through the press; and he published a number of minor pieces in the *Journal de l'Agriculture, du Commerce, et des Finances*, and in the *Éphémérides du Citoyen*. His *Droit Naturel*, which was included in the *Physiocratie* of Dupont de Nemours, is especially noteworthy as showing the philosophic foundation of his economic system in the theory of the *jus naturæ*.

Interesting notices of Quesnay's character and habits have been preserved to us in the *Mémoires* of Marmontel and those of Mme. du Hausset, *femme de chambre* to Mme. de Pompadour.[1] His probity and disinterested zeal for the public good did not suffer from the atmosphere of the court; he never abused his credit with the sovereign or the favourite for any selfish end. To raise the national agriculture from the decay into which it had fallen and to improve the condition of the working population were the great aims he kept steadily in view. His conversation was piquant, humorous, and suggestive, often taking the form of moral and political apologues. Some of his weighty sayings are quoted by contemporary writers. Here is one of them. Having met in Madame de Pompadour's salon an official person who, in recommending violent measures for the purpose of terminating the vexatious disputes between the clergy and the parliament, used the words, "C'est la hallebarde qui mène un royaume," Quesnay replied, "Et qu'est ce qui mène la hallebarde?" adding, after a pause, "C'est l'opinion; c'est donc sur l'opinion qu'il faut travailler." Diderot, D'Alembert, Duclos, Helvetius, Buffon, Turgot, Marmontel, used to meet in his rooms in the palace, and also several of the physiocrats above named; and Madame de Pompadour, who affected the patronage of philosophy and science, sometimes came to join them and converse with them. Amongst them, when they were alone, subjects were sometimes discussed in a tone which would not have pleased the royal ear. Thus, one day, Mirabeau having said, "The nation is in a deplorable state," Larivière replied in prophetic words, "It can only be regenerated by a conquest like that of China, or by some great internal convulsion; but woe to those who live to see that! The French people do not do things by halves!" Adam Smith, during his stay on the Continent with the young duke of Buccleuch in 1764–66, spent some time in Paris, where he made the acquaintance of Quesnay and some of his followers; he paid a high tribute to their scientific services in his *Wealth of Nations*, and would have dedicated that work to Quesnay, had the latter been alive at the time of its publication.

At the age of seventy Quesnay went back to the study of mathematics. He thought, we are told, that he had discovered the quadrature of the circle, and was not prevented by the remonstrances of his friends from printing his supposed solution of the problem. He died in 1774, having lived long enough to see his great pupil, Turgot, in office as minister of finance. Quesnay had married in 1718, and had a son and a daughter; his grandson by the former was a member of the first Legislative Assembly.

The economic writings of Quesnay are collected in the 2d vol. of the *Principaux Économistes*, published by Guillaumin, with preface and notes by Eugène Daire. His writings on medicine and surgery have now only an historic interest. They were as follows:—1. *Observations sur les effets de la saignée*, 1730 and 1750; 2. *Essai physique sur l'économie animale avec l'art de guérir par la saignée*, 1736 and 1747; 3. *Recherches critiques et historiques sur l'origine, les divers états, et les progrès de la chirurgie en France* (said to have been the joint work of Quesnay and Louis), 1744, and, with slightly altered title, 1749; 4. *Traité de la suppuration*, 1749; 5. *Traité de la gangrène*, 1749; 6. *Traité des fievres continues*, 1753; 7. *Observations sur la conservation de la vie* (said to have been printed at Versailles along with the *Tableau Économique*), 1758. His other writings were the article "Évidence" in the *Encyclopédie*, and *Recherches sur l'évidence des verites géometriques*, with a *Projet de nouveaux éléments de géométrie*, 1773. Quesnay's *Éloge* was pronounced in the Academy of Sciences by Grandjean de Fouchy (see the *Recueil* of that Academy, 1774, p. 134). There is a good portrait of him, engraved by J. Ch. François, which is reproduced in the *Dictionnaire d'Économie Politique* of Coquelin and Guillaumin. (J. K. I.)

QUESNEL, Pasquier (1634–1719), Roman Catholic theologian, was born in Paris on July 14, 1634, and, after graduating in the Sorbonne with distinction in 1653, joined the Congregation of the Fathers of the Oratory in 1657, receiving priest's orders in 1659. In 1675 he published an edition of the works of Leo the Great, in the notes to which the Gallican liberties were defended. The work was consequently put upon the *Index* in the following year, and Quesnel's relations with his ecclesiastical superiors became so strained that in 1681 he had to retire to Orleans. Four years later, finding himself unable to sign a document imposed on all members of the Oratory in condemnation of Jansenism, he fled to Brussels, where he was intimately associated with Arnauld, and where, encouraged by him, he published in 1691–95 a complete edition of the *Réflexions Morales sur le Nouveau Testament*, a work of edification on which he had first begun to engage himself shortly after joining the Oratory, and a part of which had appeared as early as about 1671. The nature of its contents, and still more the known sympathies of its author, made the book an object of unwearying Jesuit hostility; Quesnel was imprisoned for a short time in the palace of the archbishop of Mechlin in 1703, but happily succeeded in escaping into Holland; his papers, however (compromising, it is said, to many persons), fell into the hands of the enemy, and long were to the Père La Chaise his "pot au noir" (as he called it) by means of which he was able to darken the prospects of his adversaries as he chose. The bull *Unigenitus*, in which no fewer than 101 sentences from the *Réflexions Morales* were condemned as heretical, was obtained from Clement IX. in September 8, 1713 (see vol. xiii. p. 567). Quesnel died at Amsterdam on December 2, 1719. A complete list of his works is given by Moreri.

QUETELET, Lambert Adolphe Jacques (1796–1874), astronomer, meteorologist, and statistician, was born at Ghent, February 22, 1796, and educated at the lyceum of that town. In 1819 he was appointed professor of mathematics at the athenæum of Brussels; in 1828 he became lecturer at the newly created museum of science and literature, and he continued to hold that post until the museum was absorbed in the free university in 1834. In 1828 he was appointed director of the new royal observatory which it had been decided to found, chiefly at his instigation. The building was finished in 1832, and the instruments were ready for work in 1835, from which date the observations were published in 4to volumes (*Annales de l'Observatoire Royal de Bruxelles*), but Quetelet chiefly devoted himself to meteorology and statistics. From 1834 he was perpetual secretary of the Brussels Academy, and published a vast number of articles in its *Bulletin*, as also in his journal *Correspondance Mathématique et Physique* (11 vols., 1825–39). He died on February 17, 1874.[2]

Quetelet's astronomical papers refer chiefly to shooting stars and similar phenomena. He organized extensive magnetical and meteorological observations, and in 1839 he started regular observations of the periodical phenomena of vegetation, especially the flowering of plants. The results are given in various memoirs published by the Brussels Academy and in his works *Sur le Climat de la Belgique* and *Sur la Physique du Globe* (the latter forms vol. xiii. of the *Annales*, 1861). He is, however, chiefly known by the statistical investigations which occupied him from 1823 onward. In 1835 he published his principal work, *Sur l'Homme et le Développement de ses Facultés, ou Essai de Physique Sociale* (2d ed. 1869), containing a résumé of his statistical researches on the development of the physical and intellectual qualities of man, and on the "average man," both physically and intellectually considered. In 1846 he brought out his *Lettres à S. A. R. le Duc régnant de Saxe-Coburg et Gotha sur la théorie des probabilités appliquée aux sciences morales et politiques* (of which Sir J. Herschel wrote a full account in the *Edinburgh Review*), and in 1848 *Du Systéme Social et des Lois qui le régissent* (dedicated to the prince consort). In these works he shows how the numbers representing the individual qualities of man are grouped round the numbers referring to the "average man" in a manner exactly corresponding to that in which single results of observation are grouped round the mean result, so that the principles of the theory of probabilities may be applied to statistical researches on the subjects. These ideas are further developed in various papers in the *Bulletin* and in his *L'Anthropométric, ou Mesure des différentes Facultés de l'Homme* (1871), in which he lays great stress on the universal applicability of the binomial law,—according to which the number of cases in which, for instance, a certain height occurs among a large number of individuals is represented by an ordinate of a curve (the binomial), symmetrically situated with regard to the ordinate representing the mean result (average height).

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[1] These *Mémoires* were first printed by Quintin Craufurd in his *Mélanges d'Histoire et de Littérature*, 1806, and again in 1817; they have since been published in the *Collection des Mémoires relatifs à la Révolution Française*, 1824, and also in the *Bibliothèque des Mémoires relatifs à l'Histoire de France pendant le 18^{me} Siècle.*

[2] His son Ernest Quetelet (1825-78) was from 1856 attached to the observatory and made a great number of observations of stars with proper motion, from which a large catalogue of stars is now (1885) being published.

QUETTA, a valley in Baluchistan, and the most northern district in the province. It embraces an area of about 90 square miles, and is situated near the Afghan frontier between 30° 2′ and 30° 14′ N. lat. and between 66° 55′ and 67° E. long The general aspect of the country is hilly, rocky, and sterile, particularly towards the north; but in many parts the soil is rich and good, yielding wheat, rice, madder, tobacco, and lucerne, besides numerous grasses. The district has abundant orchards, furnishing grapes, apples, pears, pomegranates, figs, &c.; melons and all kinds of English vegetables are also largely cultivated. The valley is watered by the Lora stream. Wild sheep, goats, and hogs abound in the hills of the district. The climate appears to be healthy and the temperature moderate, ranging from 30° Fahr. in the winter to about 80° in the summer. Since 1876 Quetta has been the seat of a British political officer. Its occupation secures the Pishin valley, holds in check border tribes, and keeps open the roads of the Kojak and Gwaja passes over the Khwaja Amran range leading to Kandahar. During the Afghan compaigns of 1878–80 Quetta formed the base of operations of the southern column. In 1879 a railway was commenced to Quetta, with a view to its being pushed on to Kandahar. The line starts from the Sind railway system at Sukkur and runs *via* Jacobabad to Sibi, and is now in course of construction to Quetta; it is to be termed the Sind-Pishin railway. Quetta (or Shal, meaning "the fort" or "kot"), the capital, is situated at the northern extremity of the valley, near the head of the Bolan Pass and close to the Pishin valley, at an elevation of 5900 feet above the level of the sea. The town is surrounded by a mud wall; in its centre, on an artificial mound, is a fort which commands a very fine and extensive view of the neighbouring valley.

QUEVEDO VILLEGAS, Francisco (1580–1645), the greatest satiric writer of Spain, was born in 1580 at Madrid, where his father, who came from the mountains of Burgos, was secretary to Anne of Austria, fourth wife of Philip II. Early left an orphan and without other protection than that of his guardian, D. Agustin de Villanueva, protonotary of Aragon, the young man educated himself and chose his own career. Full of zeal to conquer all knowledge, he betook himself to Alcala, the nearest university to Madrid, where in a few years he covered a vast field of study, acquiring a knowledge of classical and modern tongues—of Italian and French, Hebrew and Arabic, of philosophy (or what passed by that name), theology, civil law, and economics. His masters were astounded at his erudition, and his fame reached beyond Spain; at twenty-one he was in correspondence with Justus Lipsius on questions of Greek and Latin literature, and the great scholar loaded him with praises and treated him as an equal. These years of study left a great and permanent influence on Quevedo's style; to them are due the pedantic traits and mania for quotations which strike and offend us in most of his works.

The licentiate of Alcala next betook himself to the court and mingled with the corrupt society that surrounded Philip III., or rather the duke of Lerma, then the real ruler of Spain. The cynical greed of the ministers, the meanness of their flatterers, the corruption of all the royal officers, the financial scandals, the shamelessness of the women, brutalized by the low place given to them in family life and by the practices of a purely formalist religion, formed a spectacle which soon awoke in Quevedo his talent as a painter of manners. At Madrid or at Valladolid, where the court resided from 1601 to 1605, he mingled freely with these intrigues and disorders, and soon lost the purity of his morals, but not his independence, his uprightness and integrity. From this period date his first *Dreams* (*Sueños*), satirical fantasies in which the spirit and manner of Lucian and Dante are combined. "Dream of Skulls," "The Possessed Alguazil," "The Stables of Pluto," "The Madhouse of Love," such are the titles of these earliest writings composed in 1607–8, which in some degree recall the "Dances of Death" of the later Middle Ages; the author is transported in sleep to hell, where he assists at the long and lamentable procession of men of all conditions, professions, and trades who move toward their punishment, clad in their most characteristic vices and absurdities. The series was continued from 1612 to 1622 by "The World as it is" and the "Review of Witticisms." With the *Dreams* may be associated certain works of similar scope and tone, *e.g.*, *To every one according to his Works*, and *Fortune made Reasonable*, where Jupiter in concert with Fortune, whom he has caused to stop her wheel, orders all kinds of men instantly to resume their true nature and the condition they deserve: thus the physician becomes a hangman, the accused a judge, the painted lady a duenna and witch, and so forth.

In 1609 Quevedo entered into relations with the famous D. Pedro Tellez Giron, duke of Osuna, with whom his fortunes were linked for more than ten years. The duke, celebrated for his bold enterprises of war against the Queen of the Adriatic, for his share in the conspiracy of Venice in 1618, for the luxurious splendour of his viceregal rule in Sicily and Naples, and finally for his terrible disgrace, recognized Quevedo's unusual merits and made him his secretary. Thus between 1611 and 1620 he learned politics,—the one science which he had perhaps till then neglected,—initiated himself into the questions that divided Europe, and penetrated the designs and ambitions of the neighbours of Spain as well as the secret history of the guilty intriguers protected by the favour of Philip III. The result was that he wrote several political works, particularly a lengthy treatise, *The Policy of God and the Government of Christ*, in which he lays down the duties of kings by displaying to them how Christ has governed His church. The disgrace of the duke of Osuna (1620) reached Quevedo, who was arrested and exiled to La Torre de Juan Abad in New Castile, where he possessed lands and of which he afterwards became seignior. Quevedo, though involved in the process against the

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[1] A detailed *Essai sur la Vie et les Travaux de L. A. J. Quetelet*, by his pupil and assistant E. Mailly, was published at Brussels in 1875.

duke, remained faithful to him in his misfortunes, and bore exile and prison with resignation. On the death of Philip III. (31st March 1621), he recommended himself to the first minister of the new king by celebrating his accession to power and saluting him as the vindicator of public morality in an elegant epistle, in the style of Juvenal, on *The Present Habits of the Spaniards.* Olivares recalled him from his exile and gave him a charge in the palace, and from this time Quevedo resided almost constantly at court, where he acquired a position of great weight, only comparable to that of Voltaire in the France of last century. Like Voltaire, he became a sort of oracle, and exercised in Spain a kind of political and literary jurisdiction due to his varied relations and knowledge, but especially to his biting and unbridled wit, which had no respect of persons and laid bare every sore. General politics, social economy, war, finance, literary and religious questions, all fell under his dissecting knife, and he had a dissertation, a pamphlet, or a song for everything. One day he is defending St James, the sole patron of Spain, against a powerful coterie that wished to associate St Teresa with him, and meeting these antagonists with the vehemence of a warm patriot and the learning of a professional theologian; next day he is writing against the duke of Savoy, the hidden enemy of Spain, or against the measures taken to change the value of the currency; or once more he is engaged with the literary school of Gongora, whose affectations and designed obscurity of style seem to him to sin against the genius of the Castilian tongue. And in the midst of this incessant controversy on every possible subject he finds time to compose a comic romance, *Don Pablo of Segovia* (1626),—a masterpiece of sparkling verve and fun, which admirably continues the series of *Lazarillo de Tormes* and *Guzman de Alfarache*,—to pen a dissertation on *The Constancy and Patience of Job* (1631), to translate St Francis de Sales and Seneca, to compose thousands of verses, and to correspond with Spanish and foreign scholars.

But Quevedo was not to maintain unscathed the high position won by his knowledge, talent, and biting wit. The government of Olivares, which he had welcomed as the dawn of a political and social regeneration, made things worse instead of better, committed fault upon fault, and led the country to ruin. Quevedo saw this and could not hold his peace. An anonymous petition in verse enumerating to the king in strong terms the grievances of his subjects was found in the early part of December 1639 under the very napkin of Philip IV. It was shown to Olivares, who exclaimed, "I am ruined"; but before his fall he sought vengeance on the libeller. His suspicions fell on Quevedo, who had enemies glad to confirm them. Quevedo was arrested on December 7, and carried under a strong escort to the neighbouring convent of Leon, where he was kept in rigorous confinement till the fall of the minister (23d January 1643) restored him to light and freedom, but not to the health which he had lost in his dungeon. He had little more than two years to live, and these were spent in inactive retreat, first at La Torre de Juan Abad, and then at the neighbouring Villanueva de los Infantes, where he died September 8, 1645.

Quevedo was of middle height, with black, somewhat crisp hair, a very fair complexion, a broad forehead, and very sharp eyes always furnished with spectacles. The upper part of his body was well built but the lower part deformed: he limped, and his feet turned inwards. Though of very dissolute manners, he loved study most, and lived surrounded by books. He had a table on wheels for reading in bed and a stand that enabled him to read at table. His conversation, as one might guess from his books, was sparkling, full of unexpected turns and slyness, and many bon-mots are ascribed to him. A few days before his death, as he was about to dictate his last will, the curate who attested it invited him to assign a sum for music at his funeral. "Music!" said the dying man; "let those who hear it pay for that."

As a satirist and humorist Quevedo stands in the first rank of Spanish writers; his other literary work does not count for much. J. J. Chifflet, in a letter of February 2, 1629, calls him "a very learned man to be a Spaniard," and indeed his erudition was of a solid kind, but he merits attention not as a humanist, philosopher, and moralist, but as the keen polemic writer, the pitiless mocker, the profound observer of all that is wicked and absurd in human nature, and at the same time as a finished master of style and of all the secrets of the Spanish tongue. His style indeed is not absolutely pure, and already belongs to the period of decadence. Quevedo, who ridiculed so well the bad taste of "cultism," fell himself into another fault and created the style called "conceptism," which hunts after ambiguous expressions and "double entendres." But, though involved and overcharged with ideas, his style is of singular force and originality; after Cervantes he is the greatest Spanish writer of the 17th century.

There is an excellent collected edition of Quevedo's prose works with a good life of the author by D. Aureliano Fernandez Guerra (*Bibl. Rivadeneyra*, vols. xxiii. and xlviii.); his poetical works in vol. lxix. of the same collection are badly edited by D. Florenzio Janer. (A. M. F.)

QUEZAL, or **Quesal**, the Spanish-American name for one of the most beautiful of birds, abbreviated from the Aztec or Maya *Quetzal-totoll*, the last part of the compound word meaning fowl, and the first, also written *Cuetzal*, the long feathers of rich green with which it is adorned.[1] The Quezal is one of the Trogons (*q.v.*), and was originally described by Hernandez (*Historia*, p. 13), whose account was faithfully copied by Willughby. Yet the bird remained practically unknown to ornithologists until figured in 1825, from a specimen belonging to Leadbeater,[2] by Temminck (*Pl. col.*, 372) who, however, mistakenly thought it was the same as the *Trogon pavoninus*, a congeneric but quite distinct species from Brazil, that had just been described by Spix. The scientific determination of the Quetzal-bird of Central America seems to have been first made by Bonaparte in 1826, as *Trogon paradiseus*, according to his statement in the Zoological Society's *Proceedings* for 1837 (p. 101); but it is not known whether the fact was ever published. In 1832 the *Registro Trimestre*, a literary and scientific journal printed at Mexico, of which few copies can exist in Europe, contained a communication by Dr Pablo de la Llave, describing this species (with which he first became acquainted prior to 1810, from examining more than a dozen specimens obtained by the natural-history expedition to New Spain and kept in the palace of the Retiro near Madrid) under the name by which it is now commonly known, *Pharomacrus mocino*.[3] These facts, however, being almost unknown to the rest of the world, Gould, in the Zoological *Proceedings* for 1835 (p. 29), while pointing out Temminck's error, gave the species the name of *Trogon resplendens*, which it bore for some time. Yet little or nothing was generally known about the bird until Delattre sent an account of his meeting with it to the *Echo du Monde Savant* for 1843, which was reprinted in the *Revue Zoologique* for that year (pp. 163–165). In 1860 the nidification of the species, about which strange stories had been told to the naturalist last named, was determined, and its eggs, of a pale bluish-green, were procured by Mr Robert Owen (*P. Z. S.*, 1860, p. 374; *Ibis*, 1861, p. 66, pl. ii. fig. 1); while further and fuller details of its habits (of which want of space forbids even an abstract here) were made known by Mr Salvin (*Ibis*, 1861, pp. 138–149) from his own observation of this very local and remarkable species. Its chief home is in the mountains near Coban in Vera Paz, but it also inhabits forests in other parts of Guatemala at an elevation of from 6000 to 9000 feet.

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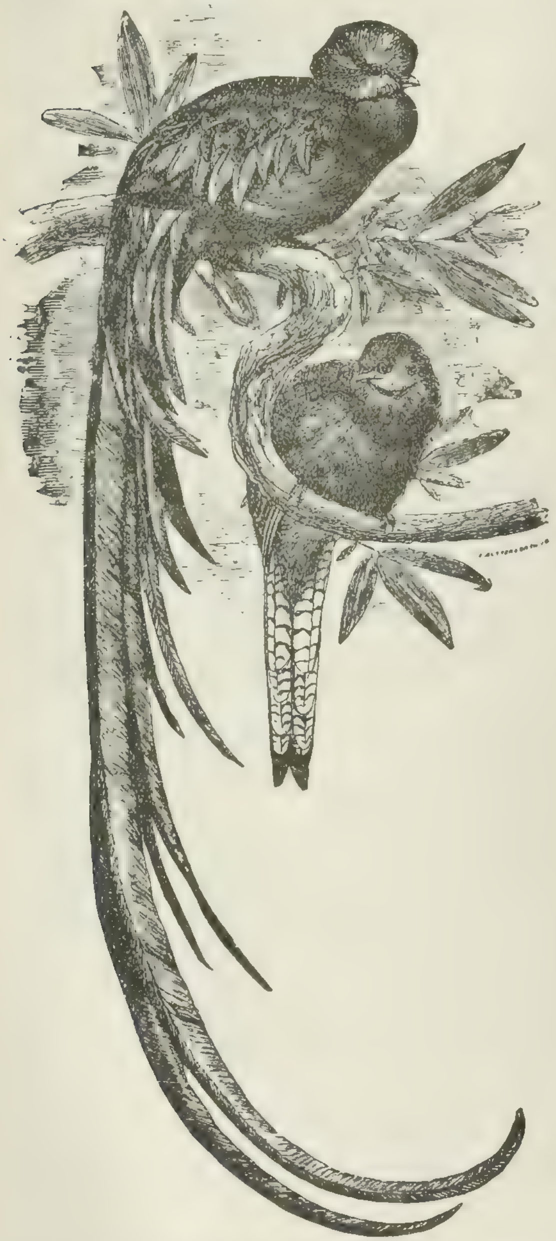
[1] The Mexican deity Quetzal-coatl had his name, generally translated "Feathered Snake," from the *quetzal*, feather or bird, and *coatl*, snake, as also certain kings or chiefs, and many places, *e.g.*, Quetzalapan, Quetzaltepec, and Quetzaltenango, though perhaps some of the last were named directly from the personages (*cf.* Bancroft, *Native Races of the Pacific States*, vol. v., Index). Quetzal-itzli is said to be the emerald.

[2] This specimen had been given to Mr Canning (a tribute, perhaps, to the statesman who boasted that he had "called a New World into existence to redress the balance of the Old") by Mr Schenley, a diplomatist, and was then thought to be unique in Europe; but, apart from those which had reached Spain, where they lay neglected and undescribed, James Wilson says (*Illustr. Zoology*, pl. xi. text) that others were brought with it, and that one of them was given to the Edinburgh Museum. On the 21st day of the sale of Bullock's Museum in 1819 Lot 88 is entered in the Catalogue as "The Tail Feathers of a magnificent undescribed Trogon" and probably belonged to this species.

[3] De la Llave's very rare and interesting paper was reprinted by M. Sallé in the *Revue et Magazin de Zoologie* for 1861 (pp. 23-33).



Quezal, male and female.

The Quezal is hardly so big as a Turtle-Dove. The cock has a fine yellow bill and a head bearing a rounded crest of filamentous feathers; lanceolate scapulars overhang the wings, and from the rump spring the long flowing plumes which are so characteristic of the species, and were so highly prized by the natives prior to the Spanish conquest that no one was allowed to kill the bird when taken, but only to divest it of its feathers, which were to be worn by the chiefs alone. These plumes, the middle and longest of which may measure from three feet to three feet and a half, with the upper surface, the throat, and chest, are of a resplendent golden-green,[1] while the lower parts are of a vivid scarlet. The middle feathers of the tail, ordinarily concealed, as are those of the Peacock, by the uropygials, are black, and the outer white with a black base. In the hen the bill is black, the crest more round and not filamentous, the uropygials scarcely elongated, and the vent only scarlet. The eyes are of a yellowish-brown. Southern examples from Costa Rica and Veragua have the tail-coverts much narrower, and have been needlessly considered to form a distinct species under the name of *P. costaricensis*. There are, however, some good congeneric species, *P. antisianus*, *P. fulgidus*, *P. auriceps*, and *P. pavoninus*, from various parts of South America, and, though all are beautiful birds, none possess the wonderful singularity of the Quézal.

QUEZALTENANGO, a city of Guatemala, capital of the province of its own name, lies on the Siguila in a fertile district about 25 or 30 miles to the west of Lake Atitlan, on the high road between the city of Guatemala and the Mexican province of Chiapas. It has a cathedral and other public buildings, carries on the manufacture of cotton and wool, and contains from 20,000 to 30,000 inhabitants, mostly Indians. In the days of the Quiché power Quezaltenango, or, as it was then called, Xelahuh, was one of the largest and most flourishing cities in the country. The Spanish city was founded by Alvarado in 1524.

QUIETISM, a peculiar form of MYSTICISM (*q.v.*) within the modern Catholic Church, mainly associated with the names of Madame GUYON and MIGUEL DE MOLINOS (*qq.v.*). See also FÉNELON.

QUILIMANE, or KILIMANE (the former being the Portuguese spelling), a Portuguese town on the east coast of Africa, at the head of a district of the province of Mozambique, lies 12 miles inland from the mouth of the river Quilimane or Qua Qua, which, an independent stream during the rest of the year, during the rainy season becomes a deltaic branch of the Zambesi, with which it is connected by Mutu, a cross channel or ditch. The town lies on the north bank of the river at a point where it is still about a mile broad, and as many as fifty coasting vessels may be seen at a time in the harbour. Large steamers are obliged to lie off the river mouth till high tide. Almost all the European merchants live in one long acacia-shaded street or boulevard skirting the river, while the Indian merchants or Banyans occupy another street running at right angles. The natives have their hut-clusters hid among the tropical vegetation which begins at the very end of the street and rapidly passes off into the uninvaded swamp-forest. The whole site is low and unhealthy, and the Portuguese have done next to nothing to improve it. The total population is between 6000 and 7000. Quilimane, at one time the capital of the Arab kingdom of Angoza, was seized by the Portuguese in the 16th century, and became in the 18th and the early part of the 19th the chief slave mart on the east coast of Africa. In modern times it has been the starting point of several exploring expeditions—notably of Livingstone's up the Zambesi to Lake Nyassa in 1861.

QUILL. See FEATHERS and PEN.

QUILLOTA, a town of Chili, at the head of a district in the province of Valparaiso, lies 30 miles by rail north-east of Valparaiso, on the south or left bank of the Aconcagua, about 20 miles from its mouth. It is one of the oldest towns in the country, and since the opening of the railway in 1863 it has grown so that in population

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[1] Preserved specimens, if exposed to the light, lose much of their beauty in a few years, the original glorious colour becoming a dingy greenish-blue.

(11,369 in 1875) it is exceeded only by the capital and six other towns. It is famous for the quality of its chirimoyas (*Anona Cherimolia*) and lucumas; and in the neighbourhood there are rich copper mines. In 1822 and 1851 it suffered from earthquakes.

QUILON, a seaport town in Quilon district, Travancore state, Madras presidency, India, between the towns of Trevandrum and Aleppi, in 8° 54′ N. lat. and 76° 37′ E. long. It is a healthy town, and contained in 1881 a population of 13,588. It enjoys great facilities of water communication, and has an active export trade in timber, cocoa-nuts, ginger, pepper, &c. The outer point of the town (Tangacheri) is slightly elevated above the adjoining ground, and contains high cocoa-nut trees. Besides being a very projecting point, Quilon is rendered still more unsafe to approach by the bank of hard ground called the Tangacheri reef which extends some distance to the south-west and west of the point and along the coast to the northward. There is, however, good anchorage in a bight about 3 miles from the fort. Quilon is one of the oldest towns on the Malabar coast, and continued to be a place of considerable importance down to the beginning of the 16th century. It was garrisoned by a strong British force from 1803 to 1830; but the subsidiary force has since been reduced to one native regiment, whose cantonments lie to the east of the town. The town is 385 miles south-west of Madras.

QUIMPER, or QUIMPER-CORENTIN, a town of France, formerly the capital of the county of Cornouailles, and now the chief town of the department of Finistère, is situated 158 miles north-west of Nantes and 68 miles south-east of Brest on the railway between those towns. The delightful valley in which it lies is surrounded by high hills and traversed by the Steir and the Odet, which, meeting above the town, form a navigable channel for vessels of 150 tons during the rest of their journey to the sea (11 miles). With its communal population of 15,288, Quimper ranks in Finistère next to Brest and Morlaix. The only articles in which it has any considerable trade are fish and marine manures; and in 1882 the total movement of the port was 31 vessels (2976 tons) entering and 36 vessels (3352 tons) clearing. The real interest of the town lies in its old churches and its historic associations. Of the old town-walls a few portions are still preserved in the terrace of the episcopal palace and in the neighbourhood of the college. Quimper is the seat of a bishop belonging to the province of Rennes. The cathedral, dedicated to the patron saint St Corentin and erected between 1239 and 1515, has a fine façade, the pediment of which is crowned by an equestrian statue of King Grallon, and adorned (like several other external parts of the building) with heraldic devices cut in granite. Two lateral towers with modern spires (1854–56) and turrets reach a height of 247 feet. The total length of the building is 303 feet and its width 52, the length of the transept 118 feet and the height 66. The nave and the transept are in the style of the 15th century, and the central boss bears the arms of Anne of Brittany (1476–1514). The terminal chapel of the apse dates from the 13th century. In the side chapels are the tombs of several early bishops. The high altar, tabernacle, and ciborium are costly works of contemporary art. The pulpit panels represent episodes in the life of St Corentin. Of the other churches may be mentioned St Matthieu, rebuilt at the beginning of the 16th century, with a fine belfry; the church of Locmaria, dating from the 11th century; and the college chapel, in the "Jesuit" style. The old seminary is now used as a poorhouse, and there is also a lunatic asylum in the town. The public library in the town-hall possesses 25,000 volumes. The museum built in 1869–70 contains archæological collections and about 1300 paintings and drawings. In 1868 a bronze statue of Laennec the inventor of the stethoscope (born at Quimper in 1781) was erected in Place St Corentin

Quimper, or at least its suburb Locmaria (which lies below the town on the left bank of the Odet), was occupied in the time of the Romans, and numerous traces of the ancient foundations still exist. At a later period Quimper became the capital of Cornouailles and the residence of its kings or hereditary counts. It is said to have been Grallon Meur (*i.e.*, the Great) who brought the name of Cornouailles from Great Britain and founded the bishopric, which was first held by St Corentin about 495. Hoel, count of Cornouailles, marrying the sister and heiress of Duke Conan in 1066, united the countship with the duchy of Brittany. Quimper was surrounded by walls in the course of the 13th century. It suffered greatly in the local wars of succession. In 1344 it was savagely sacked by Charles of Blois. Monfort did not succeed in his attempt to take the town by storm on August 11, 1345, but it opened its gates to his son John IV. in 1364 after the victory at Auray. At a later period it sided with the League. Besides Laennec, already mentioned, it has given birth to Kerguélen the navigator, Fréron the critic, Hardouin the antiquary, and Count Louis de Carne. Doubtless on account of its distance from the capital, Quimper, like Carpentras and Landerneau, has undeservedly been made a frequent butt of French popular wit.

QUINAULT, PHILIPPE (1635–1688), a dramatist of merit, and the only European writer who has made the opera libretto a work of literature (so much so that the popularity of opera may be said to be not a little due to him), was born at Paris on June 3, 1635. He was educated by the liberality of Tristan, the author of *Marianne*. His first play was produced at the Hôtel de Bourgogne in 1653 when Quinault was only eighteen. It is said that it was the occasion of an important innovation in dramatic history. Tristan had offered it and it had been accepted as his own at the price of a hundred crowns, which, though little enough, was twice the regular price of a few years before. When Tristan told the actors that it was the work of a novice they wished to throw up their bargain and only held to it on the terms of a ninth part of the receipts. The piece succeeded and Quinault followed it up, but he also read for the bar; and in 1660, when he married a widow with money, he bought himself a place in the Cour des Comptes. Then he tried tragedies (*Agrippa*, &c.) with more success than desert. He received one of the literary pensions then recently established, and was elected to the Academy in 1670.

Up to this time he had written some sixteen or seventeen comedies, tragedies, and tragi-comedies, of which the tragedies were mostly of very small value and the tragi-comedies not of much more. But his comedies—especially his first piece *Les Rivales*, *L'Amant Indiscret* (1654) (which has some likeness to Molière's *Étourdi*, and was with it used to make up Newcastle's and Dryden's *Sir Martin Mar-all*), *Le Fantôme Amoureux* (1659), and *La Mère Coquette* (1665), perhaps the best—are much better. None of these styles, however, made Quinault worthy of a place here. In 1671 he contributed to the singular miscellany of *Psyche*, in which Corneille and Molière also had a hand, and which was set to the music of Lulli. Here he showed a remarkable faculty for lyrical drama, and from this time till just before his death he confined himself to composing libretti for Lulli's work. This was not only very profitable (for he is said to have received four thousand livres for each, which was much more than was usually paid even for tragedy), but it established Quinault's reputation as the master of a new style,—so much so that even Boileau, who had previously attacked and satirized his dramatic work, was converted, less to the opera, which he did not like, than to Quinault's remarkably ingenious and artist-like work in it. His libretti are among the very few which are readable without the music, and which are yet carefully adapted to it. They certainly do not contain very exalted poetry or very perfect drama

But they are quite free from the ludicrous doggerel which (not merely in English) has made the name libretto a byword, and at the same time they have quite enough dramatic merit to carry the reader, much more the spectator, along with them. It is not an exaggeration to say that Quinault, coming at the exact time when opera became fashionable out of Italy, had very much to do with establishing it as a permanent European *genre*. His first piece after *Psyche* was a kind of classical masque, *The Feast of Love and Bacchus* (1672). Then came *Cadmus* (1674), then in the same year and the three following *Alceste*, *Thésée*, *Atys* (one of his best-liked pieces), and *Isis*. All these, it may be observed, were classical in subject, and so was *Proserpine* (1680), which was superior to any of them. *The Triumph of Love* (1681) is a mere ballet, but in *Persée* and *Phaeton* Quinault returned to the classical opera. Then he finally deserted it for romantic subjects, in which he was even more successful. *Amadis* (1684), *Roland* (1685), and *Armide* (1686) are his masterpieces, the last being the most famous and the best of all. It should perhaps be observed that the very artificiality of the French lyric of the later 17th century and its resemblance to alexandrines cut into lengths were aids to Quinault in arranging lyrical dialogue. Lulli died in 1687, and Quinault, his occupation gone (for the two had now worked together for more than fifteen years, and it would probably have been difficult to find another composer equally well suited to his librettist), became devout, began a poem called the "Destruction of Heresy," and died on November 26, 1688. The best edition of his works is that of 1739 (Paris, 5 vols.).

QUINCE. Among botanists there is a difference of opinion whether or not the quince is entitled to take rank as a distinct genus or as a section of the genus *Pyrus*. It is not a matter of much importance whether we call the quince *Pyrus Cydonia* or *Cydonia vulgaris*. For practical purposes it is perhaps better to consider it as distinct from *Pyrus*, differing from that genus in the twisted manner in which the petals are arranged in the bud, and in the many-celled ovary, in which the numerous ovules are disposed horizontally, not vertically as in the pears. The quinces are much-branched shrubs or small trees with entire leaves, small stipules, large solitary white or pink flowers like those of a pear or apple, but with leafy calyx-lobes, and a many-celled ovary, in each cell of which are numerous horizontal ovules. The common quince is a native of Persia and Anatolia, and perhaps also of Greece and the Crimea, but in these latter localities it is doubtful whether or not the plant is not a relic of former cultivation. By Franchet and Savatier *P. Cydonia* is given as a native of Japan with the native name of "maroumerou." It is certain that the Greeks knew a common variety upon which they engrafted scions of a better variety which they called *κυδώνιον*, from Cydon in Crete, whence it was obtained, and from which the names Cydonia, Codogno (Italian), Coudougner and Coing (French), Quitte (German), and Quince have been derived. Pliny (*H. N.*, xv. 11.) mentions that the fruit of the quince, *Malum cotoneum*, warded off the influence of the evil eye; and other legends connect it with ancient Greek mythology, as exemplified by statues in which the fruit is represented, as well as by representations on the walls of Pompeii. The fragrance and astringency of the fruit of the quince are well known, and the seeds are used medicinally for the sake of the mucilage they yield when soaked in water, a peculiarity which is not met with in pears. This mucilage is analogous to, and has the same properties as, that which is formed from the seeds of linseed. In English gardens three varieties are cultivated—the apple-shaped quince, the pear-shaped quince, and the Portugal quince; the last-named has larger fruits than the other two (4 inches in length, 3–3¼ in width), of a rich yellow colour when ripe and with less astringency, hence it is better suited for culinary and confectionary purposes than the other two, but is said to be somewhat more tender. The common quince and its varieties are very largely used as "dwarfing" stocks on which choice pears are engrafted. The effect is to restrain the growth of the pear, increase and hasten its fruitfulness, and enable it to withstand the effects of cold (see HORTICULTURE, vol. xii. p. 213). The common Japan quince, *Pyrus* or *Cydonia japonica*, is grown in gardens for the sake of its flowers, which vary in colour from creamy white to rich red, and are produced during the winter and early spring months. *C. Maulei*, a recently introduced shrub from Japan, bears a profusion of equally beautiful orange-red flowers, which are followed by fruit of a yellow colour and agreeable fragrance, so that, when cooked with sugar, it forms an agreeable conserve, as in the case of the ordinary quince. The fruit of the ordinary Japan quince is quite uneatable.

QUINCY, a city of the United States, the county seat of Adams county, Illinois, occupies a limestone bluff 125 feet above low-water mark on the east bank of the Mississippi at the extreme western point of the State. The river is crossed here by the great bridge of the Hannibal and St Joseph Railroad. Quincy Bay, an arm of the river, is the finest natural harbour for steamboats on the upper Mississippi. By water Quincy is 160 miles above St Louis, and by rail 263 miles south-west of Chicago *via* Galesburg. Commanding an extensive view, being well built, having excellent waterworks, and forming an important centre in the railway system of the region, Quincy is both an attractive and a prosperous place, with very miscellaneous industries. Among the public buildings are the court-houses, St John's cathedral (1877), a medical college (1873), a city library, and several hospitals and asylums. The population in 1860 was 13,718; in 1870, 24,052 (1073 coloured); and in 1880, 27,268 (1508 coloured). Laid out in 1825 or about three years after the arrival of the first white settler, Quincy was made a town in 1834, and a city in 1839.

QUINCY, a township and seaport of the United States, in Norfolk county, Massachusetts, on a small bay of its own name in the south of Massachusetts Bay and 7 miles south-south-east of Boston by rail. It is best known for its great granite quarries, in connexion with which was constructed in 1827 the first (horse) railway in the United States, and as the birthplace of Governor John Hancock and Presidents John Adams and John Quincy Adams. Among the principal buildings—chiefly situated in the village, which lies on an elevated plain near the centre of the township—are the granite town-house, the so-called Adams Temple (a church erected in 1828), beneath the portico of which are the tombs of the two Presidents Adams, the Adams Academy, a home for infirm sailors, a public library, and the mansions of the Quincy and Adams families, whose estates occupied the greater portion of the township. Quincy, which till 1792 formed part of Braintree, had 5017 inhabitants in 1850, 6779 in 1860, 7442 in 1870 and 10,570 in 1880.

QUINCY, JOSIAH, JR. (1744–1775), born in Boston, Mass., 1744, is the most eminent of a well-known family whose founder emigrated to New England in 1633. At the time of his death, at the age of thirty-one, he had won distinction as a lawyer, and his place was secured in history as among the most eloquent, the most clear-sighted, and the most devoted of the men who led the American colonists in the measures preliminary to the revolution. In 1767 he entered upon the public discussion of political questions, maintaining with great ability and courage the duty of his countrymen to resist any encroachments upon their right to self-government. In 1770 he wrote *An Address of the Merchants, Traders, and Freeholders of Boston* in favour of a non-importation Act, asserting, about the same time, in a newspaper article that Americans would "know, resume, assert, and defend their rights" by the "arts of war" if "the arts of policy" should fail. In December 1773 he took an active and leading part in the town-meeting which virtually ordered the destruction of the cargoes of the tea-ships in Boston harbour. The appeal to the other towns for help to sustain Boston against the enforcement of the consequent Acts of Parliament was written by him; and soon after there appeared under his own name *Observations on the Boston Port Bill, with Thoughts on Civil Society and Standing Armies*, his longest and most important political paper, which made him a marked man both in England and America. He sailed a few months afterwards for England with the approval of the leading revolutionists, to present, though unofficially, to the ministry and other public men the grievances and the determination of the colonists. After six months failing health—he had long been threatened with consumption—compelled him to return home, and he died on shipboard as the vessel was entering the harbour of Gloucester, Massachusetts, April 26, 1775.

A memoir written by his only son, JOSIAH QUINCY (1772–1864), containing his life, correspondence, and the *Observations on the Boston Port Bill*, was published in 1825 (2d ed. 1874). This only son of Josiah Quincy, jun., born in Boston in February 1772, lived to be three times the age of his father, and filled public stations for more years than his father lived; he was a member of Congress during the eventful period from 1805 to 1813; as the second mayor of Boston his sagacity and energy insured the future prosperity of that city; in Congress he maintained at the head of the Federal party the struggle with the disastrous foreign policy of the administrations of Jefferson and Madison, and the dangerous growth of the slave-power, which he never ceased to oppose; as president of Harvard College for sixteen years (1829–45) he increased the usefulness and added to the influence of that seat of learning. He wrote a history of the college for two hundred years, which was also largely a history of Massachusetts. He died in June 1864 in the ninety-third year of his age. A life of him, by his youngest son Edmund Quincy, an accomplished scholar and well-known author, was published in 1867.

QUINET, EDGAR (1803–1875), was born at Bourg-en-Bresse, in the department of the Ain, France, on February 17, 1803. His father, Jerome Quinet, had been a commissary in the army, but being a strong republican and disgusted with Napoleon's usurpation, he gave up his post and resided either at Bourg or at a country house which he possessed in the neighbourhood, devoting himself to scientific and mathematical study. Edgar, who was an only child, was much alone, but his mother (whose name was Eugénie Rozat Lagis, and who was a person of education and strong though somewhat unorthodox religious views) exercised great influence over him. He was sent to school first at Bourg and then at Lyons, where he took no part in a celebrated barring out which led to the expulsion of his schoolfellow Jules Janin. On leaving school his father wished him to go into the army and then suggested business. But Quinet was determined upon literature, and after a time got his way. His first publication, the *Tablettes du Juif Errant*, appeared in 1823. Being struck with Herder's *Philosophie der Geschichte*, he undertook to translate it, learnt German for the purpose, published his work in 1827, and obtained by it considerable credit. At this time he was introduced to Cousin and made the acquaintance of Michelet. He had visited Germany and England before the appearance of his book. Cousin procured him a post on a Government mission to the Morea in 1829, and on his return he published in 1830 a book on *La Grèce Moderne*. Some hopes of employment which he had after the revolution of February were frustrated by the reputation of speculative republicanism which he had acquired. But he joined the staff of the *Revue des Deux Mondes*, and for some years contributed to it numerous essays, the most remarkable of which was that on "Les Épopées Françaises du XIIème Siecle," an early though not by any means the earliest appreciation of the long-neglected *chansons de geste*. *Ahasvérus*, his first original work of consequence, appeared in 1833. This is a singular prose poem in language sometimes rather bombastic but often beautiful. Shortly afterwards he married Minna Moré, a German girl with whom he had fallen in love some years before. Then he visited Italy, and, besides writing many essays, produced two poems, *Napoléon* and *Promethée* (1833), which being written in verse (of which he was not a master) are inferior to *Ahasvérus*. In 1838 he published a vigorous reply to Strauss's *Life of Jesus*, and in that year he received the Legion of Honour. In 1839 he was appointed professor of foreign literature at Lyons, where he began the brilliant course of lectures afterwards embodied in the *Génie des Religions*. Two years later he was transferred to the Collége de France and the *Génie des Religions* itself appeared (1842).

Quinet's Parisian professorship was more notorious than fortunate, owing, it must be said, to his own fault. His chair was one of Southern Literature, but, neglecting his proper subject, he chose, in conjunction with Michelet, to engage in a violent polemic with the Jesuits and with Ultramontanism. Two books bearing exactly these titles appeared in 1843 and 1844, and contained, as was usual with Quinet, the substance of his lectures. These excited so much disturbance and the author so obstinately refused to confine himself to literature proper that in 1846 the Government put an end to them—a course which was not disapproved by the majority of his colleagues. By this time Quinet was a pronounced republican and something of a revolutionist. He appeared in arms during the disturbances which overthrew Louis Philippe, and was elected by the department of the Ain to the Constituent and then to the Legislative Assembly, where he figured among the extreme Radical party. He had published in 1848 *Les Révolutions d'Italie*, one of his principal though not one of his best works. He wrote numerous pamphlets during the short-lived second republic, attacked the Roman expedition with all his strength, and was from the first an uncompromising opponent of Prince Louis Napoleon. He was banished from France after the *coup d'état*, and established himself at Brussels. His wife had died some time previously, and he now married Mademoiselle Assaki, the daughter of a Roumanian poet. At Brussels he lived for some seven years, during which he published *Les Esclaves* (1853), a dramatic poem, *Marnix de Ste Aldéyonde* (1854), a study of that Reformer in which he very greatly exaggerates Sainte Aldegonde's literary merit, and some other books. He then moved to Veytaux on the shore of the Lake of Geneva, where he continued to reside till the fall of the empire. Here his pen was busier than ever. In 1860 appeared a singular book somewhat after the fashion of *Ahasvérus* entitled *Merlin l'Enchanteur*, in 1862 a *Histoire de la Campagne de 1815*, in 1865 an elaborate book on the French Revolution, in which the author, republican as he was, blamed the acts of the revolutionists unsparingly, and by that means drew down on himself much wrath from more thoroughgoing partisans. Many pamphlets date from this period, as does *La Création* (1870), a third book of the class of *Ahasvérus* and *Merlin*, but even vaguer, dealing not with history, legend, or philosophy, but with physical science for the most part.

Quinet had refused to return to France to join the Liberal opposition against Napoleon III., but immediately after Sedan he returned. He was then restored to his professorship, and during the siege wrote vehemently against the Germans. He was elected deputy by the department of the Seine in 1871, and was one of the most obstinate opponents of the terms of peace between France and Germany. He continued to write till his death, which occurred at Versailles on the 27th March 1875. *Le Siége de Paris et la Défense Nationale* appeared in 1871, *La République* in 1872, *Le Livre de l'Exilé* in the year of its author's death and after it. This has been followed by three volumes of letters and some other work. Quinet had already in 1858 published a semi-biographic book called *Histoire de mes Idées.* The whole of his very numerous works, the chief of which have been already named, have appeared in a uniform edition of which some thirty volumes are now published. His second wife. in 1870, published certain *Mémoires d'Exil.* There is in English an elaborate *Early Life and Writings of Edgar Quinet*, by R. Heath (London, 1881), but it does not go beyond the year 1842

Quinet's character was extremely amiable, and his letters to his mother. his accounts of his early life, and so forth are likely always to make him interesting. He was also a man of great moral conscientiousness, and as far as intention went perfectly disinterested, though it may perhaps be questioned whether the disappointment which he met with for years after the revolution of February had not an insensible influence in determining his republicanism. But he never temporized, and, as has been said above, hesitated not to criticize his own party as severely as his opponents. He had, however, as a writer, a thinker, and a politician, drawbacks which prevented him from taking the first rank, and which will probably make his works, except those which are purely personal, less and less read in the future. As a writer his chief fault is want of concentration, as a thinker and politician vagueness and want of practical determination. His work is very extensive and abounds in passages of great beauty. But no single book of his can be called a masterpiece, and none is of such a kind that the reader feels the subject to have been thoroughly treated in accordance with a definite and consistent principle or series of principles. Of verse he had but little command, and his abundance in a certain kind of effusive prose wants chastisement and criticism. The singular rhapsodies, of which in the three books *Ahasvérus*, *Merlin*, and *La Création* he has left great store, are too diffuse, too inorganic, and too devoid of coherent and positive intention to rank very high. They are more like recorded dreams than anything else. His historical and philosophical works on the other hand, though showing much reading, fertile thought, abundant facility of expression, and occasionally, where prejudice does not come in, acute judgment, are rather (as not a few of them were in fact) reported lectures than formal treatises. His rhetorical power was altogether superior to his logical power; and the natural consequence is that his work is full of contradictions. These contradictions were, moreover, due not merely to an incapacity or an unwillingness to argue strictly, but also to the presence in his mind of a large number of inconsistent tastes and prejudices which he either could not or would not coordinate into an intelligible creed. Thus he has the strongest attraction for the picturesque side of mediævalism and catholicity, the strongest repulsion for the restrictions which mediæval and Catholic institutions imposed on individual liberty. He refused to submit himself to any form of positive orthodoxy, yet when a man like Strauss pushed unorthodoxy to its extreme limits Quinet revolted. As a politician he acted with the extreme Radicals, yet universal suffrage, the cardinal doctrine of Radicalism. disgusted him as unreasonable in its principle and dangerous in its results. His pervading characteristic, therefore. is that of an eloquent vagueness, very stimulating and touching at times, but as deficient in coercive force of matter as it is in lasting precision and elegance of form. He is less inaccurate in fact than Michelet, but he is also much less one-ideaed, and the result is that he seldom attains to the vivid representation of which Michelet was a master. (G. SA.)

QUININE, the most important of the active principles contained in cinchona bark (see CINCHONA. vol. v. p. 780). Although the value of this bark in the treatment of intermittent fevers became widely known in 1638 through the cure of the countess of Chinchon, it was not until 1810 that any attempt was made to determine definitely the active principles to which its properties were due. In that year Gomez of Lisbon obtained a mixture of alkaloids by treating an alcoholic extract of the bark with water and then adding a solution of caustic potash. To this he gave the name of cinchonino. In 1820 two French chemists, Pelletier and Caventou, proved that the cinchonino of Gomez contained two alkaloids which they named quinine and cinchonine. Some years afterwards quinidine and cinchonidine were discovered, and subsequently several other alkaloids, but in smaller quantity, in different varieties of the bark.

Chemistry.—The alkaloids appear to exist in cinchona bark chiefly in combination with cinchotannic and quinic acids, since solvents of the alkaloids in the free state do not dissolve out any from the powdered bark. The cinchotannic acid apparently becomes altered by atmospheric oxidation into a red-colouring matter, known as cinchono-fulvic acid or cinchona red, which is very abundant in some species, as in *C. succirubra.* For this reason those barks which, like *C. Calisaya*, *C. officinalis*, and *C. Ledgeriana*, contain but little colouring matter are preferred by manufacturers, the quinine being more easily extracted from them in a colourless form. The value of cinchona bark for the manufacture of quinine depends on the amount of quinine sulphate that can be prepared from it in the crystalline form. The exact mode of extraction adopted by manufacturers is kept a profound secret. That hitherto adopted by the Indian Government for the preparation of the cinchona febrifuge (see below) has the merit of simplicity, but the whole of the alkaloid present in the bark is not obtained by it. This method is to exhaust the powdered bark as far as possible by means of water acidulated with hydrochloric acid and then to precipitate the mixed alkaloids by caustic soda. Another method which is said to give better results consists in mixing the powdered bark with milk of lime, drying the mass slowly with frequent stirring, exhausting the powder with boiling alcohol, removing the excess of alcohol by distillation, adding sufficient dilute sulphuric acid to dissolve the alkaloid and throw down colouring matter and traces of lime, &c., filtering, and allowing the neutralized liquid to deposit crystals. The sulphates of the alkaloids thus obtained are not equally soluble in water, and the sulphate of quinine can consequently be separated by fractional crystallization, since, being less soluble in water than the other sulphates, it crystallizes out first.

The quinine of commerce is the neutral sulphate, containing 7½ molecules of water of crystallization, and having the formula $(C_{20}H_{24}N_2O_2)_2 . H_2SO_4 + \frac{15}{2} H_2O$. When crystallized from alcohol, or when dried over sulphuric acid, it contains only 2 molecules. Cownley has shown that the salt containing 2 molecules of water is the most permanent one, for when the commercial sulphate containing 7½ molecules is dried at 100° C. it becomes anhydrous, and when subsequently exposed freely to the air it rapidly absorbs 2 molecules of water; and that the commercial salt, if exposed to the air, effloresces until only 2 molecules of water are retained.[1]

Two other sulphates are known. The one contains a single equivalent of acid, and in commerce bears the name of acid sulphate or soluble sulphate of quinine; it is soluble in 11 parts of water, but with considerable difficulty in absolute alcohol. The other sulphate contains 2 equivalents of sulphuric acid, is very soluble in cold water, but quite insoluble in ether; it is not an article of commerce. Both these sulphates crystallize with 7 molecules of water.

The neutral sulphate of quinine occurs in commerce in the form of slender white acicular crystals, which are very light and bulky. It is soluble in about 740 parts of cold water, but in 30 of boiling water, 60 of rectified spirits of wine (sp. gr. 0·85), and 40 of glycerin. Its solubility in water is lessened by the presence of sodium or magnesium sulphate, but is increased by nitrate of potassium, chloride of ammonium, and most acids. It is not soluble in fixed oils or in ether, although the pure alkaloid is soluble in both. It becomes phosphorescent on trituration. When prescribed it is generally rendered more soluble in water by the addition of dilute sulphuric acid or of citric acid, one drop of the former or $\frac{3}{4}$ths of a grain of the latter being used for each grain of the sulphate of quinine.

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[1] *Pharm. Jour.*, [3], vol. vii. p. 189.

When a solution of quinine is exposed to sunlight it assumes a yellowish or brown colour due to the formation of "quiniretin," a body which is isomeric with quinine but has not an alkaline reaction, is not precipitated by tannin, and has an aromatic as well as a bitter taste. Quinine is precipitated from its solution by alkalies and their carbonates. It is very soluble in solution of ammonia, and also slightly soluble in lime water.

The acid solution of sulphate of quinine is fluorescent, especially when dilute; it is levogyrate; and when a solution of chlorine is first added and then ammonia an emerald green colour, due to the formation of thalleoquin, is developed. This test answers with a solution containing only 1 part of quinine in 5000, or in a solution containing not more than $\frac{1}{20,000}$ part if bromine be used instead of chlorine. The fluorescence is visible in an acid solution containing one part in 200,000 of water.

Quinine forms with sulphuric acid and iodine a compound known as herapathite, $4C_{20}H_{24}N_2O_2.3SO_4H_2.6I + 3H_2O$, which possesses optical properties similar to those of tourmaline; it is soluble in 1000 parts of boiling water; and its sparing solubility in cold alcohol has been utilized for estimating quinine quantitatively. The other alkaloids are distinguished from quinine thus:—quinidine resembles quinine, but is dextrogyrate, and the iodide is very insoluble in water; the solution of cinchonidine, which is levogyrate, does not give the thalleoquin test, nor fluorescence; cinchonine resembles cinchonidine in these respects, but is dextrogyrate.

Commercial sulphate of quinine frequently contains from 1 to 10 per cent. of the sulphate of cinchonidine owing to the use of barks containing it. The sulphate of cinchonidine is more soluble than that of quinine; and, when 1 part of quinine sulphate suspected to contain it is nearly dissolved in 24 parts of boiling water, the sulphate of quinine crystallizes out on cooling, and the cinchonidine is found in the clear mother liquor, from which it can be precipitated by a solution of tartrate of potassium and sodium. Samples of quinine in which cinchonidine is present usually contain, according to Hesse, a smaller percentage of water than the pure sulphate, the cinchonidine salt exercising a reducing influence on the quinine salt in this respect. Traces of quinidine are also sometimes, though rarely, found in commercial quinine, but, since quinidine is even more valuable as a medicine than quinine, its presence does not detract in a medicinal point of view from the value of the latter.

Owing to its voluminous character, as much as 18 per cent. of water may remain present in apparently dry samples of sulphate of quinine. If it loses more than 14·6 per cent. of water when dried at 100° C. it contains an excessive amount of moisture. Owing to its variability in this respect the hydrochlorate of quinine has been recommended as a more constant salt; it also possesses advantages from a therapeutical point of view.

Sulphate of quinine manufactured from cuprea bark (*Remijia pedunculata*) is liable to contain from ·10 to ·90 per cent. of sulphate of homoquinine, which almost coincides in solubility with sulphate of quinine. Homoquinine has been shown by Paul and Cownley to be decomposed on treatment with caustic soda into quinine and a new alkaloid, cupreine, in the proportion of 2 to 3. They have also shown that cupreine is soluble in a solution of caustic soda (differing in this respect from quinine), and that therefore it is easy to prepare sulphate of quinine perfectly free from either homoquinine or cupreine. So far as the medicinal properties of cupreine and homoquinine are at present known they appear to be of no practical importance.[1]

In consequence of the high price of the alkaloid an attempt was made a few years since by the Government of India to manufacture from cinchona bark a cheap febrifuge which should represent the alkaloids contained in the bark and form a substitute for quinine. This enterprise met with such success that in 1881 as much as 8714 ℔ of the febrifuge were prepared; and during the previous year 9144 ℔ were distributed, of which 4880 ℔ were supplied to the Government institutions at a cost of little more than a rupee per ounce.

This mixture is known as cinchona febrifuge, and is prepared chiefly from *C. succirubra*, which succeeds better in India than the other species in cultivation, and grows at a lower elevation, being consequently procurable in large quantities at a comparatively low price. A mixture of the cinchona alkaloids, consisting principally of cinchonidine sulphate, with smaller quantities of the sulphates of quinine and cinchonine, is sold under the name of "quinetum" at a cheaper rate than quinine.

In 1870 the Indian Government purchased no less than 81,600 ounces of sulphate of quinine, besides 8832 ounces of the sulphates of cinchonine, cinchonidine, and quinidine; but at the present date it is able to meet the requirements of its establishments almost entirely by the cinchona febrifuge prepared at the Government plantations in India.

Although quinine is manufactured in the United States, a large quantity has been imported from Europe since the high duty levied on its manufacture has been removed. There is considerable difficulty in obtaining trustworthy statistics as to the extent of the manufacture of quinine. The largest sale that has taken place in America appears to have been in 1883, when 1½ tons were put up to auction, and in the same year 16,000 ounces were sold in London and a similar quantity at Berlin.

Physiological Action.—Quinine arrests the movements of the white corpuscles of the blood, rendering them round and darkly granulate, and, by preventing them from making their exit from the blood-vessels, diminishes or arrests the formation of pus in inflammation and causes contraction of the spleen when that organ is enlarged. It acts upon the cerebro-spinal nervous system, giving rise to headache and a sense of tension in the brain; these symptoms may be removed by the addition of hydrobromic acid or prevented by the use of the hydrobromide of quinine. It acts through the sympathetic nervous system on the heart, and is thus capable of restraining all the animal processes which develop heat, organic changes, or muscular action. It is antagonistic to atropine in its physiological action.

The use of quinine in medicine dates from its discovery in 1820. Its chief value is as an antiperiodic, especially in intermittent fevers, but also in other diseases when they assume a periodic character, such as neuralgia, asthma, hooping cough, &c. In blood poisoning, whether arising from natural or traumatic causes, it has been found of great utility. Its curative powers in sunstroke have been repeatedly proved in the East Indies, and a dose of quinine will often cut short an attack of catarrh if taken in the early stage. In malarial districts persons have been exposed to miasmatic influence without danger after taking a dose or two of five grains of quinine once or twice a day. In the smallest medicinal doses it is purely tonic, in larger ones stimulant; but it differs from other medicines of the same class in the stimulant action being longer sustained. In large doses it acts as a sedative, and in excessive doses it is poisonous. In some individuals it produces an erythematous eruption, and it is also known to act as an oxytocic. Large doses also sometimes produce deafness, and act injuriously in all inflammatory states of the mucous membrane.

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[1] *Pharm. Jour. and Trans.*, [3], vol. xii. p. 497, and vol. xv. p. 729.

The other alkaloids of cinchona bark—quinidine, cinchonidine, and cinchonine—also possess similar properties, quinidine being even more effectual than quinine; but cinchonine appears to produce nausea and gastric disturbance. This is also the case with the cinchona febrifuge prepared from *C. succirubra*.

Until the year 1867 English manufacturers of quinine were entirely dependent upon South America for their supplies of cinchona bark, which were obtained exclusively from uncultivated trees, growing chiefly in Bolivia, Peru, and Ecuador, the principal species which were used for the purpose being *Cinchona Calisaya*, Wedd.: *C. officinalis*, Hook.; *C. macrocalyx*, var. *Palton*, How.: *C. Pitayensis*, Wedd.; *C. micrantha*, R. and P.: and *C. lancifolia*, Mutis. Since the cultivation of cinchona trees was commenced in Java, India, Ceylon, and Jamaica, several other species, as well as varieties and hybrids cultivated in those countries, have been used.[1] Recently *C. lancifolia*, var. *Calisaya*, Wedd., known as the calisaya of Santa Fé, has been strongly recommended for cultivation, because the shoots of felled trees afford bark containing a considerable amount of quinine; *C. Pitayensis* has also been lately introduced into the Indian plantations on account of yielding the valuable alkaloid quinidine, as well as quinine, but the last two species have not as yet been grown in sufficient quantities to afford marketable bark.

The first importation from India took place in 1867, since which time the cultivated bark has arrived in Europe in constantly increasing quantities, London being the chief market for the Indian barks and Amsterdam for those of Java. The principal sales take place in May. In 1876, when Indian calisaya bark first came into the European market, the imports into London were the following:—*Cinchona succirubra*, 45,000 lb; *C. officinalis*, 20,000 lb; *C. Calisaya*, 1000 lb. During the last few years *Cinchona Calisaya* has also been cultivated extensively in Bolivia and in Tolima, United States of Colombia, and this bark, which had almost disappeared from commerce, is likely in a few years to again become an available source of quinine.

In order to obtain the cultivated bark as economically as possible, experiments were made some years ago by M'Ivor and others which resulted in the discovery that, if the bark were removed from the trunks in alternate strips so as not to injure the cambium, or actively growing zone, a new layer of bark was formed in one year which was richer in quinine than the original bark and equal in thickness to that of two or three years' ordinary growth. This is known in commerce as renewed bark. The process has been found to be most conveniently practised when the trees are eight years old, at which age the bark separates most easily. The yield of quinine has been ascertained to increase annually until the eleventh year, at which it seems to reach its maximum. The portion of the trunk from which the bark has been removed is sometimes protected by moss, and the new bark which forms is then distinguished by the name of mossed bark. The species which yield the largest amount of quinine are by no means the easiest to cultivate, and experiments have consequently been made in cross-fertilization and grafting with the view of giving vigour of growth to delicate trees yielding a large amount of alkaloid or of increasing the yield in strong growing trees affording but little quinine. Grafting, however, has not been found to answer the purpose, since the stock and the graft have been found to retain their respective alkaloids in the natural proportion just as if growing separately. Hybridization also is very uncertain, and is very difficult to carry out effectually: hence the method of propagating the best varieties by cuttings has been adopted except in the case of those which do not strike readily, as in *C. Ledgeriana*, in which the plants are grown from the shoots of felled trees.

A few years ago it was discovered that a bark imported from the United States of Colombia under the name of cuprea bark, and derived from *Remijia pedunculata, Triana*, and other species, contained quinine to the extent of ½ to 2½ per cent., and in 1881 this bark was exported in enormous quantities from Santander, exceeding in amount the united importations of all the other cinchona barks; and by reason of its cheapness this has since that date been largely used for the manufacture of quinine.

The imports of cinchona bark into London in 1884, including cuprea bark, are stated to have been 59,287 bales, into France 9271 bales, and into New York 8150 bales.

Cinchona bark as imported is never uniform in quality. The South-American kinds contain a variable admixture of inferior barks, and the cultivated Indian barks comprise, under the respective names of yellow, pale, and red barks, a number of varieties of unequal value. For this reason a sample from every bale is analysed before the importations are offered for sale.

The alkaloids are contained, according to Howard, chiefly in the cellular tissue next to the liber. No definite knowledge has as yet been attained of the exact steps by which quinine is formed in nature in the tissues of the bark, nor have the numerous endeavours that have been made to build up quinine artificially or to obtain some idea of its constitution by splitting it up into its component parts been more successful. Nearly all that is known at present has resulted from analyses of the leaves, bark, and root. From these it appears that quinine is present only in small quantities in the leaves, in larger quantity in the stem bark, and increasing in proportion as it approaches the root, where quinine appears to decrease and cinchonine to increase in amount, although the root bark is generally richer in alkaloids than that of the stem. The altitude at which the trees are grown seems to affect the production of quinine, since it has been proved that the yield of quinine in *C. officinalis* is less when the trees are grown below 6000 feet than above that elevation, and that cinchonidine, quinidine, and resin are at the same time increased in amount. It has also been shown by Broughton that *C. peruviana*, which yields cinchonine but no quinine at a height of 6000 feet, when grown at 7800 feet gives nearly as much crystallized sulphate of quinine, and almost as readily, as *C. officinalis*. Karsten also ascertained by experiments made at Bogota on *C. lancifolia* that the barks of one district were sometimes devoid of quinine, while those of the same species from a neighbouring locality yielded 3½ to 4½ per cent. of the sulphate; moreover, Dr De Vrij found that the bark of *C. officinalis* cultivated at Utakamand varied in the yield of quinine from 1 to 9 per cent. In these cases the variation may have been due to altitude. Free access of air to the tissues also seems to increase the yield of quinine, for the renewed bark is found to contain more quinine than the original bark.

See *Pharmacographia*, 2d ed., pp. 339-370; Howard, *Quinology of the East Indian Plantations*; Hesse in *Pharm. Jour. and Trans.*, ser. 3, vol iv. pp. 649-750, 795, Bartholow, *Materia Medica and Therapeutics*; King, *Manual of Cinchona Cultivation*. (E. M. H.)

QUINSY. See TONSILITIS.

QUINTANA, MANUEL JOSÉ (1772–1857), Spanish poet and man of letters, was born at Madrid on April 11, 1772, and after completing his studies at Salamanca was called to the bar. In 1801 he produced an unsuccessful tragedy *El Duque de Viseo*; his *Pelayo* (1805), appealing as it did to the spirit of resistance to foreign oppression, was much more successful. The first volume of his somewhat rhetorical and superficial *Vidas de Españoles Célebres*, in 1807, containing lives of Spaniards who had successfully opposed the enemies of their country, was similar in motive, and at the outbreak of the revolution of 1808 Quintana, as journalist (*Variedades*, and *Semanario patriótico*), as secretary to the cortes and the regency, and also as "the Spanish Tyrtæus" (*Odas á España libre*, 1808), rendered important services to the patriotic cause. On the return of Ferdinand VII. in 1814 he shared the fate of other "liberals" or "constitutionalists," and had to endure six years' imprisonment in Pamplona, obtaining his release only in 1820, when he was named president of the department of public instruction under the new Government. The counter-revolution of 1823 again drove him from office, to which he was once more restored after the death of the king in 1833. In 1835 he was made a senator and peer; and in 1855, at a meeting of the cortes, a laurel crown was placed on his head by Queen Isabella II., whose "governor" he had been during her minority. He died at Madrid on March 11, 1857.

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[1] In Java, *C. Calisaya*, vars. *anglica*, *javanica*, *Hasskarliana*, and *Ledgeriana*; *C. officinalis*, var. *angustifolia*; *C. lancifolia*; *C. caloptera*, Miq.; *C. micrantha* and *C. succirubra*, How. In India, *C. succirubra*, *C. officinalis*, vars. *angustifolia*, *crispa*, *Uritusinga*, and *Bonplandiana*, and to a lesser extent *C. Calisaya*, vars. *Boliviana* and *microcarpa*; *C. micrantha*, *C. Peruviana*, How., and *C. nitida*, R. and P., form only a small proportion of the plantations. Since Mr J. E. Howard, the eminent quinologist, pointed out that *C. Pahudiana*, How., and *C. Calisaya*, vars. *javanica*, *Hasskarliana*, and *anglica*, were likely to lead to disappointment as quinine-yielding species, these have been replaced in the plantations as rapidly as possible by the more valuable species, of which *C. Ledgeriana*, yielding from 5 to 10 per cent. or even more of quinine, *C. officinalis*, and a hybrid between *C. officinalis* and *C. succirubra* which has been named *C. robusta*, Trimen, are the most important.

The works of Quintana form the 19th volume in Ribadaneyra's *Biblioteca de Autores Españoles* (1852). The third and last volume of the *Vidas* appeared in 1833. The biographies of Nuñez de Bilboa, Pizarro, The Cid, Guzman el Bueno, Gonsalvo de Cordova, and one or two others have been translated into English.

QUINTILIAN (M. FABIUS QUINTILIANUS) was born in the obscure Spanish town of Calagurris (Calahorra), on the Ebro, in the country of the Vascones, not later than 35 A.D. Concerning his family and his life but few facts remain. His father taught rhetoric, with no great success, at Rome, and Quintilian must have come there at an early age to reside, and must have there grown up to manhood. The years from 61 to 68 he spent in Spain, probably attached in some capacity to the retinue of the future emperor Galba, with whom he returned to the capital. Quintilian must have brought back with him a considerable reputation as a rhetorician. For at least twenty years after the accession of Galba he was at the head of the foremost school of oratory in Rome, and may fairly be called the Isocrates of his time. He also gained some but not a great repute as a pleader in the courts. His greatest speech appears to have been a defence of the queen Berenice, on what charge is not known. For a member of a learned profession his circumstances were easy; but the question of Juvenal, "How is it that Quintilian owns so many estates?" ought perhaps not to be accepted as evidence of great wealth. Vespasian created for him a professorial chair of rhetoric, liberally endowed with public money, and from this time he was unquestionably, as Martial calls him, "the supreme controller of the restless youth." About the year 88 Quintilian retired from teaching and from pleading, to compose his great work on the training of the orator (*Institutio Oratoria*). After two years' retirement he was entrusted by Domitian with the education of two grand-nephews, whom he destined as successors to his throne. Quintilian gained the titular rank of consul, and probably died not long before the accession of Nerva (96 A.D.). A good many years earlier his wife had died at the age of nineteen, leaving him two sons, one of whom died when seven years old, the other in his eleventh year, while the father was engaged upon his great work.

Such is the scanty record that remains of Quintilian's uneventful life. But it is possible to determine with some accuracy his relation to the literature and culture of his time, which he powerfully influenced. His career brings home to us the vast change which in a few generations had passed over Roman taste, feeling, and society. In the days of Cicero rhetorical teaching had been entirely in the hands of the Greeks. Even Cicero, when he wrote his rhetorical works, was driven to plead that it could not be disgraceful to teach what it was not disgraceful to learn. The Greek language, too, was in the main the vehicle of instruction in rhetoric. The first attempt to open a Latin rhetorical school, in 94 B.C., was crushed by authority, and not until the time of Augustus was there any professor of the art who had been born to the full privileges of a Roman citizen. The appointment of Quintilian as professor by the chief of the state marks the last stage in the emancipation of rhetorical teaching from the old Roman prejudices.

During the hundred years or more which elapsed between the death of Cicero and the birth of Quintilian education all over the Roman empire had spread enormously, and the education of the time found its end and climax in rhetoric. Mental culture was for the most part acquired, not for its own sake, but as a discipline to develop skill in speaking, the paramount qualification for a public career. Rome, Italy, and the provinces alike resounded with rhetorical exercitations, which were promoted on all sides by professorships, first of Greek, later also of Latin rhetoric, endowed from municipal funds. The mock contests of the future orators roused a vast amount of popular interest. In Gaul, Spain, and Africa these pursuits were carried on with even greater energy than at Rome. The seeds of the existing culture, such as it was, bore richer fruit on the fresh soil of the Western provinces than in the exhausted lands of Italy and the East. While Quintilian lived, men born in Spain dominated the Latin schools and the Latin literature, and he died just too soon to see the first provincial, also of Spanish origin, ascend the imperial throne.

As an orator, a teacher, and an author, Quintilian set himself to stem the current of popular taste which found its expression in what we are wont to call silver Latin. In his youth the influence of the younger Seneca was dominant. But the teacher of Quintilian was a man of another type, one whom he ventures to class with the old orators of Rome. This was Domitius Afer, a rhetorician of Nîmes, who rose to the consulship. Quintilian, however, owed more to the dead than to the living. His great model was Cicero, of whom he speaks at all times with unbounded eulogy, and whose faults he could scarce bring himself to mention; nor could he well tolerate to hear them mentioned by others. The reaction against the Ciceronian oratory which had begun in Cicero's own lifetime had acquired overwhelming strength after his death. Quintilian failed to check it, as another teacher of rhetoric, equally an admirer of Cicero, had failed—the historian Livy. Seneca the elder, a clear-sighted man who could see in Cicero much to praise, and was not blind to the faults of his own age, condemned the old style as lacking in power, while Tacitus, in his *Dialogue on Orators*, includes Cicero among the men of rude and "unkempt" antiquity. The great movement for the poetization of Latin prose which was begun by Sallust ran its course till it culminated in the monstrous style of Fronto. In the courts judges, juries, and audiences alike demanded what was startling, quaint, or epigrammatic, and the speakers practised a thousand tricks to satisfy the demand. Oratory became above all things an art whose last thought was to conceal itself. It is not surprising that Quintilian's forensic efforts won for him no great reputation.

The *Institutio Oratoria* is one long protest against the tastes of the age. Starting with the maxim of Cato the Censor that the orator is "the good man who is skilled in speaking," Quintilian takes his future orator at birth and shows how this goodness of character and skill in speaking may be best produced. No detail of training in infancy, boyhood, or youth is too petty for his attention. The parts of the work which relate to general education are of great interest and importance. Quintilian postulates the widest culture; there is no form of knowledge from which something may not be extracted for his purpose; and he is fully alive to the importance of method in education. He ridicules the fashion of the day, which hurried over preliminary cultivation, and allowed men to grow grey while declaiming in the schools, where nature and reality were forgotten. Yet he develops all the technicalities of rhetoric with a fulness to which we find no parallel in ancient literature. Even in this portion of the work the illustrations are so apposite and the style so dignified and yet sweet that the modern reader, whose initial interest in rhetoric is of necessity faint, is carried along with much less fatigue than is necessary to master most parts of the rhetorical writings of Aristotle and Cicero. At all times the student feels that he is in the company of a high-toned gentleman who, so far as he could do so without ceasing to be a Roman, has taken up into his nature the best results of ancient culture in all its forms. His literary sympathies are extraordinarily wide. When obliged to condemn, as in the case of Seneca, he bestows generous and even extravagant praise on such merit as he can find. He can cordially admire even Sallust, the true fountain-head of the style which he combats, while he will not suffer Lucilius to lie under the aspersions of Horace. The passages in which Quintilian reviews the literature of Greece and Rome are justly celebrated. The judgments which he passes may be in many instances traditional, but, looking to all the circumstances of the time, it seems remarkable that there should then have lived at Rome a single man who could make them his own and give them expression The form in which these judgments are rendered is admirable. The gentle justness of the sentiments is accompanied by a curious felicity of phrase. Who can forget "the immortal swiftness of Sallust," or "the milky richness of Livy," or how "Horace soars now and then, and is full of sweetness and grace, and in his varied forms and phrases is most fortunately bold"? Ancient literary criticism perhaps touched its highest point in the hands of Quintilian.

To comprehensive sympathy and clear intellectual vision Quintilian added refined tenderness and freedom from self-assertion Taking him all in all, we may say that his personality must have been the most attractive of his time—more winning and at the same time more lofty than that of the younger Pliny, his pupil, into whom no small portion of the master's spirit, and even some tincture of the master's literary taste, was instilled. It does not surprise us to hear that Quintilian attributed any success he won as a pleader to his command of pathos, a quality in which his great guide Cicero excelled. In spite of some extravagances of phrase, Quintilian's lament (in his sixth book) for his girl-wife and his boy of great promise is the most pathetic of all the lamentations for bereavement in which Latin literature is so rich. In his precepts about early education Quintilian continually shows his shrinking from cruelty and oppression. The educational method of "Orbilius, abounding in blows," has never been more earnestly rebuked.

Quintilian for the most part avoids passing opinions on the problems of philosophy, religion, and politics. The professed philosopher he disliked almost as much as did Isocrates. He deemed that ethics formed the only valuable part of philosophy and that ethical teaching ought to be in the hands of the rhetoricians. In the divine government of the universe he seems to have had a more than ornamental faith, though he doubted the immortality of the soul. As to politics Quintilian, like others of his time, felt free to eulogize the great anti-Cæsarean leaders of the dying republic, but only because the assumption was universal that the system they had championed was gone for ever. But Quintilian did not trouble himself, as Statius did, to fling stones at the emperors Caligula and Nero, who had missed their deification. He makes no remark, laudatory or otherwise, on the government of any emperor before Domitian. No character figured more largely in the rhetorical controversies of the schools than the ideal despot, but no word ever betrayed a consciousness that the actual occupant of the Palatine might exemplify the themes. Quintilian has often been reproached with his flattery of Domitian. No doubt it was fulsome. But it is confined to two or three passages, not thrust continually upon the reader, as by Statius and Martial. To refuse the charge of Domitian's expected successors would have been perilous, and equally perilous would it have been to omit from the *Institutio Oratoria* all mention of the emperor. And there was at the time only one dialect in which a man of letters could speak who set any value on his personal safety. There was a choice between extinction and the writing of a few sentences in the loathsome court language, which might serve as an official test of loyalty. So Quintilian, man of honour though he was, swallowed the test as best he might, even as two generations ago in England unbelievers took the sacrament to avoid exclusion from municipal affairs.

The Latin of Quintilian is not always free from the faults of style which he condemns in others. It also exhibits many of the usages and constructions which are characteristic of the silver Latin. But no writer of the decadence departs less widely from the best models of the late republican period. The language is on the whole clear and simple, and varied without resort to rhetorical devices and poetical conceits. Besides the *Institutio Oratoria*, there have come down to us under Quintilian's name 19 longer and 145 shorter *Declamationes*, or school exercitations on themes like those in the *Controversiæ* of Seneca. The longer pieces are certainly not Quintilian's. The shorter were probably published, if not by himself, at least from notes taken at his lessons. It is strange that they could ever have been supposed to belong to a later century; the style proclaims them to be of Quintilian's school and time. The works of Quintilian have often been edited. Of the editions of the whole works the chief is that by Burmann (1720); of the *Institutio Oratoria* that by Spalding, completed by Zumpt and Bonnell (1798–1834, the last volume containing a lexicon), and that by Halm (1868). The tenth book of the *Institutio Oratoria* has often been separately edited, as by Krueger, Bonnell, Mayor (unfinished), and others. There is a critical edition of the 145 *Declamationes* by C. Ritter (1885). (J. S. R.)

QUINTUS SMYRNÆUS, a late epic poet of Greece, sometimes called Quintus Calaber because his poem was discovered at Otranto in Calabria. Next to nothing is known of him. He appears to have lived in the latter part of the 4th century, shortly before Nonnus. He speaks of himself as having tended sheep in his youth at Smyrna (bk. xii. 308 *sq.*). His epic in fourteen books, known as *τὰ μεθ᾽ Ὅμηρον* or the *Posthomerica*, takes up the tale of Troy at the point where Homer's *Iliad* breaks off, *i.e.*, after the death of Hector, and carries it down to the capture of the city by the Greeks. It describes the doughty deeds and deaths of Penthesilea the Amazon (bk. i.), Memnon, son of the Morning (bk. ii.), and Achilles (bk. iii.); the funeral games in honour of Achilles (bk. iv.); the contest for the arms of Achilles and the death of Ajax (bk. v.); the exploits of Neoptolemus and Deiphobus, the deaths of Paris and Œnone, the capture of Troy by means of the wooden horse, the sacrifice of Polyxena at the grave of Achilles, the departure of the Greeks, and their dispersal by the storm (bks. vi.–xiv.). The poet has no originality; in conception and style his work is closely modelled on Homer. His materials are borrowed from the cyclic poems from which Virgil also drew, in particular the *Æthiopis* of Arctinus and the *Little Iliad* of Lesches. The style is clear, but the poem is flat and tedious, in spite of the abundance of similes with which the poet seeks to relieve its dulness.

The first edition of Quintus Smyrnæus was published by Aldus Manutius in 1504 or 1505; in this century there have been editions by Tychsen, 1807, Lehrs in the Didot edition of Hesiod, &c., 1841, and two editions by Köchley in 1850 (Weidmann) and 1853 (Teubner). Sainte-Beuve has an essay on him.

QUITO, the capital of the republic of Ecuador, South America, an archbishopric, and the chief town of a department, lies 14′ of latitude south of the equator, and in 79° 45′ W. long., at a height of 9520 feet above the sea. In ancient times it was connected with Cuzco by a paved highway, portions of which still exist; but under Spanish rule it was allowed to relapse almost into the natural isolation of its position. Since 1870, however, two carriage roads have been constructed from Quito to Milagro on the Guayaquil river and to the province of Manabi respectively. The railway projected between the city of Guayaquil and Quito has as yet advanced inland only to Chimbo bridge at the foot of the Andes, so that the really difficult part of the enterprise remains untouched; a telegraph line, however, has been opened. The distance between these two leading cities of the republic is 200 miles by road, and the transit of goods takes fourteen days and costs from 10 to 14 dollars per cargo of 250 ℔. Though built on the eastern skirts of the magnificent volcano of Pichincha (15,827 feet) and within 5 miles of its crater, Quito is not within sight of the summit, a secondary eminence known to the Incas as Yavirá, and now as Panecillo, rising between. The site is an irregular plain traversed by two ravines running down from the mountain, one of which is arched over so as not to interfere with the alignment of the streets. Though the streams flow east at first, they really belong to the system of the Perucho which discharges into the Pacific near Esmeraldas. The houses, mostly of sun-dried brick, are usually low and squat, and not a chimney is to be seen. The public buildings are also of a massive and heavy-looking Spanish type. In the principal square are the cathedral, with a fine marble porch, the Government house, with a colonnade running the whole length of the façade, and the palace of the nuncio. But the finest building in Quito is the college of the Jesuits, part of which is occupied by the university, an institution long rendered interesting to Englishmen by the presence of the venerable botanist Dr William Jameson. There is a public library in the city of 20,000 volumes, and a polytechnic school was instituted in 1872. The local manufactures are confined to coarse cotton and woollen stuffs, thread, lace, hosiery, silk, and a certain amount of jewellery. About 1870 the population was estimated by Dr Jameson at between 30,000 and 40,000; the *Almanach de Gotha* for 1885 states it as 80,000.

Quito (the city of the Quitus, a race akin to the Quichuas of Peru) was peacefully conquered by the Spanish captain Sebastian Benalcazar in 1533. It received the rank of a Spanish city in 1541 from Charles V., and became the capital of the province of Quito in the viceroyalty of New Granada. More than once it has suffered severely from earthquakes: in 1797, for example, 40,000 of its inhabitants were thus destroyed; and in March 22, 1859, property was damaged to the value of $3,000,000.

QUOITS. This pastime resembles the ancient discus throwing which formed one of the five games of the Greek pentathlon (see DISCUS, vol. vii. p. 258). The modern quoit, however, is a far lighter missile, and consists of a circular iron ring to be thrown or pitched in play at a fixed object. This ring is flattened, having a thick inner edge and thin outer one. The latter is slightly indented at a given spot to receive the tip of the player's forefinger without cutting it. There is no limit to the weight of a quoit, but this should be specified before commencing a match. The diameter is restricted to 8 inches over all. Two iron pins, called "hobs," are driven into the ground at a certain distance apart, generally 19 yards. There may be one or more players a side, and each has two quoits. These he may throw successively; or else each player throws one only at a time and a second round follows in the same order, as may have been agreed on. The throwing takes place the reverse way after each round. A player grasps the quoit with his forefinger along the outer edge and the tip in the dent, holding the two surfaces between the thumb and the other fingers. In pitching, a slight rotary motion is imparted by the wrist, in order that the quoit may pass smoothly and horizontally through the air, and alight flat Each player attempts to make his quoit pitch on the hob or pin so that the head of the latter passes through the circular opening in the centre of the missile. Such a success is termed a "ringer," and two is scored. Quoits of opposite sides alighting equidistant from the pin do not score at all. If a player has both his quoits nearer the pin than any of his opponents he scores two; while if only one be nearer he is entitled to count one to his credit. The game is popular in many country towns and villages of England and in the mining districts of the Midlands and Lancashire. The rules were drawn up as follows in 1869:—

1. That the distance from pin to pin be 19 yards, and that the player stand level with the pin, and deliver his quoit with the first step. 2. That no quoit be allowed which measures more than 8 inches external diameter, but the weight may be unlimited. 3. That the pins be 1 inch above the clay. 4 That all measurements be taken from any visible part of the pin to the nearest visible part of the quoit. No clay or quoit to be disturbed. 5. That no quoit count unless fairly delivered in the clay free from the outer rim, and that no quoit on its back count unless it holds clay or is knocked out by another quoit. That no quoit rolling on the clay count unless it first strikes another quoit or the pin. 6. That each player deliver his quoits in succession, his opponent then following. 7. That an umpire be appointed, and in all cases of dispute his decision be final.

QUO WARRANTO, in English law, is the name given to an ancient prerogative writ calling upon any person usurping any office, franchise, liberty, or privilege belonging to the crown to show "by what warrant" he maintained his claim. It lay also for non-user or misuser of an office, &c. If the crown succeeded, judgment of forfeiture or ouster was given against the defendant. The procedure was regulated by statute as early as 1278 (the statute of *Quo Warranto*, 6 Edw. I. c. 1). After a time the cumbrousness and inconvenience of the ancient practice led to its being superseded by the modern form of an information in the nature of a *quo warranto*, exhibited in the Queen's Bench Division either by the attorney general *ex officio* or by the queen's coroner and attorney at the instance of a private person called the *relator*. The information will not be issued except by leave of the court on proper cause being shown. It does not lie where there has been no user or where the office has determined. Nor does it lie for the usurpation of every kind of office. But it lies where the office is of a public nature and created by statute, even though it is not an encroachment upon the prerogative of the crown. Where the usurpation is of a municipal office the information is regulated by 9 Anne c. 20, under which the defendant may be fined and judgment of ouster given against him, and costs may be granted for or against the relator. Such an information must, in the case of boroughs within the Municipal Corporations Act, 1882, be brought within twelve months after disqualification (45 & 46 Vict. c. 50, § 225); in the case of other boroughs, within six years after the defendant first took upon himself the office (32 Geo. III. c. 58, § 2). The information in the nature of a *quo warranto*, though nominally a criminal, has long been really a civil proceeding, and has recently been expressly declared to be so (47 & 48 Vict. c. 61, § 15). In cases not falling within 9 Anne c. 20, judgment of ouster is not usually given. The most famous historical instance of *quo warranto* was the action taken against the corporation of London by Charles II. in 1684. The Queen's Bench adjudged the charter and franchises of the city of London to be forfeited to the crown (*State Trials*, vol. viii., 1039). This judgment was reversed by 2 Will. & Mary, sess. 1, c. 8; and it was further enacted, in limitation of the prerogative, that the franchises of the city should never be seized or forejudged on pretence of any forfeiture or misdemeanor.

In the United States the right to a public office is tried by *quo warranto* or analogous procedure, regulated by the State laws. Proceedings by *quo warranto* lie in a United States court for the removal of persons holding office contrary to Art. xiv. § 3 of the Amendments to the Constitution, Act of May 31, 1870, c. 14.

R

R was written in Greek originally as P, following the Phœnician form; sometimes, however, a triangle takes the place of the semicircle; not unfrequently also a short stroke appears where we have the lower limb on the right hand; the reason of this addition is not plain: it can hardly have been a diacritical mark to distinguish R from P (as G from C at Rome) because the latter symbol in Greece always kept its two vertical lines (Γ), the curved line (P) appearing first in the Roman alphabet.

The sounds denoted by the same symbol *r* differ considerably. First, there is the true consonantal *r*—our English *r* in *reed*, &c.—produced by raising the tip only of the tongue towards the front palate; the voice escapes by this aperture, the side passages between the tongue and the palate being closed; the mechanism, therefore, is just the opposite to that which produces *l* (see letter L). Secondly, there is the vowel *r*; this is due to the space between the tip of the tongue and the palate being sufficiently great to allow the voice to escape without any friction; the difference between this and consonantal *r* is parallel to that between *u* and *w*, or between *i* and *y*. This vowel-sound, though not heard regularly in any modern language, is not unfrequent in several in certain combinations; for example, it is quite possible to articulate "father" as "fath-r," where the *r* alone forms a syllable and is therefore vocalic. This vowel-sound was a regular sound in Sanskrit, and was probably also heard in the parent language; but in the derived languages (except Sanskrit) it became consonantal *r* with an independent vowel preceding or following; thus a presumed original "kṛd" (=heart), where *ṛ* denotes the vocalic *r*, gave in Sanskrit "hṛd," in Greek *κραδ-ίη*, in Latin "cor(d)." Thirdly, *r* may denote a trill,—that is to say, a sound produced by the vibration of the tongue when laid loosely against the palate and set in motion by a strong current of breath or voice. When the point of the tongue is laid loosely in this way against the palate just behind the gums and made to trill as voice passes over it, we hear the Scotch and the French *r*, each of which is a trill, not a consonantal *r*. The same sound, but unvoiced, is heard in the French "théâtre," &c., and is also the Welsh *rh*. A similar trill at the back part of the palate gives the Northumbrian "burr."

RAAB (Hungarian *Györ*), the capital of a Hungarian province of the same name, lies at the influx of the Raab into a branch of the Danube, 70 miles to the south-east of Vienna. It is a well-built town, with a pleasant promenade laid out on the site of the old fortifications, and is the seat of a Roman Catholic bishop. The cathedral dates from the 12th century, but has recently been modernized; the bishop's palace is an imposing castellated edifice, with dungeons constructed by the Turks. The town possesses several other churches, two of which belong to the Protestants and one to the Greek Church, besides convents, schools, and an academy of jurisprudence. The theatre, on an island formed by the Danube and the Raab, is also a handsome building. The inhabitants, who numbered 20,980 in 1880, manufacture cloth and tobacco and carry on a considerable trade in grain and horses.

Raab occupies the site of the Roman *Arabona*, and by the 10th century had become a place of some importance. In 1594 it fell into the hands of the Turks, who, however, retained possession of it for four years only. In 1809 the forces of the insurgent Hungarian noblesse were easily defeated here by Napoleon's veterans; and the attempts made to maintain the town against the Austrians in 1848-49 were also fruitless. About 10 miles to the south-east of Raab is St Martinsberg, the oldest and wealthiest abbey in Hungary.

RAB, RABBI, RABBAN, RABBONI, RABBENU, Jewish titles of honour. *Rab* (רב), "lord," "master," "teacher," is the title prefixed to the name of such a Babylonian teacher of the Law or expounder of the Mishnah as, though authorized to "judge" and to decide other religious questions, has not been ordained, or fully ordained, in Palestine.[1] *Rabbi* (רבי, *ῥαββεί*, Matt. xxiii. 7, &c.), "my teacher," is the title of a teacher fully ordained in Palestine. *Rabbān*, "our teacher" or "our lord," but also "their," *i.e.*, all Israel's, teacher (רַבָּן, later form of רַבָּם), was the title of the prince (president of the synedrium) from the time of Gamliel I. (the Gamaliel of St Paul) and onward. If a prince-president sprang from any other house than Hillel's, who was a descendant of David through the female line (as, for example, R. El'azar b. 'Azaryah), he was not called by this highest title of honour. The only exception to this rule was Rabbān Yoḥanan b. Zakkai, to whom Jewish traditional lore owes so much,—nay, its very existence. For he not merely had a distinguished circle of pupils of his own (*Aboth*, ii. 8, 9), but he saved the lives of the members of the synedrium and secured its free activity. Vespasian, who knew him to have been friendly to the cause of Rome, granted him "Yamnia and its sages" at his request (T. B., *Gittin*, 56b). In Babylonia, again, *Rabbana* (Rabbono) was the title of the Rēsh Gāluthā, or "head of the captivity." He who bore it was always the reigning descendant of the house of David in the male line. The only person on whom this title was bestowed, though he was not Rēsh Gāluthā, was Rab Ashe (T. B., *Kethuboth*, 22a), the principal editor of the Babylonian Talmud, who is reported to have united in his person riches, learning, and virtues such as no man had possessed since the time of "Rabbi," the principal editor of the Mishnah (T. B., *Gittin*, 59a).

RAB, when the title is not followed by an individual name, denotes *par excellence* Abbā Arēkhā (Arikha), so called either from the place Arēkhā in Babylonia, or because of his high stature, or his eminence as a man and scholar. Abbā Arēkhā was the most successful teacher of the Law and interpreter of the Mishnah in Babylonia, having brought the latter with him from Palestine, where he had received it orally and directly from Rabbi Yehudah Hannasi; he taught it to more than 1200 pupils, whom he is related to have housed, fed, and clothed (T. B., *Kethuboth*, 106a). He introduced many religious and moral reforms, notably in connexion with marriage, which are law among the Jews of all countries to this day. His Hebrew prose approaches the sublimity of the Old Testament poetry, as may be seen from the tripartite "additional service" recited by all Rabbinic Jews on the two days of the "New Year." He is also in Babylonia the sole representative of the sublime Palestinian Agadōth, which so closely resemble the words of the Founder of Christianity. In patience with others, and especially with his shrewish wife, he surpassed Job himself. He died as the first head of the academy of Sūrā (somewhat later identified with Māthā Mehasyā) in 247 A.D., more than eighty years old.

RABBI, when the title is not followed by a proper name, denotes *par excellence* Rabbi Yehudah Hannasi, the principal editor of the Mishnah (see vol. xvi. p. 504).

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[1] An old pronunciation of this title is *Rib*, as in Biribbi (ביר ריבי), of which the only true explanation is "son of the greatest doctor of the age," applied to R. Yose b. Ḥalaphta (T. B., *Pesaḥim*, 100a), R. Shime'on, son of the editor of the Mishnah (*Bābā Bathrā*, 16b), and others. Hence the Talmudic explanation of Exod. xxiii. 2, "thou shalt not gainsay a scholar greater than thyself" (T. B., *Synhedrin*, 18b).

The Hellenistic Rabboni (ῥαββουνεί, John xx. 16) is the Aramaic *ribboni* used by a slave of his master, a son of his father, a wife of her husband, a worshipper of his God. (Compare the similar variation of the vowel in pisḥo = πάσχα.)

Rabbenu signifies "our teacher" *par excellence*, and means in Palestine R. Yehudah Hannasi, and in Babylonia Rab (*i.e.*, Abbā Arēkhā).

Rabbāh (רבה), also Rubbo and Rubboh, a title placed in the Palestinian Talmud and Midrashim after the names of certain teachers (T. Y., *Berakhoth*, i. 1; *Kilayim*, ix. 3, and elsewhere), corresponds to the Hebrew הגדול in the same connexion in the Babylonian Talmud (*Berakhoth*, 6a, and elsewhere), and does not, as has hitherto been supposed, mean "the great" but simply "the elder." Thus many questionable Talmudic magnitudes disappear. (S. M. S.-S.)

RĀBĀ (Rōbō)—*i.e.*, Rab Ābā b. Yoseph b. Ḥāmā (Ḥōmō)—was, like his teacher Rabbāh and his fellow-pupil Abayye, a scion of the house of Eli, on whom rested the double curse of poverty and that none of them should reach old age (1 Sam. ii. 31-36). According to T. B., *Rosh Hasshanah*, 18a,[1] he sought to remove this curse, if not by sacrifices and offering then by the study of the Law, while Abayye also practised works of charity. Rābā was rabbi and judge of the congregation and head of the school (*methibtā*) of Maḥūzā. He lived in the middle of the 4th Christian century, and became on the death of his fellow-pupil Abayye head of the famous academy of Pumbadithā, which was only closed in 1040. He was noted, like his predecessor, for his genius; and the discussions between them (and similar ones of others) are known in the Babylonian Talmud as the *Havayoth de-Abayye ve-Rābā* (*Sukkah*, 28a). Rābā was also noted for the liberality of his religious decisions (T. B., *Berakhoth*, 22b; *Pesahim*, 30a, and elsewhere). Being a man of considerable wealth, he showed, in accordance with Scriptural truth (Prov. xviii. 23), his independence in every way. Thus he hesitated not to include the exquisites of the congregation of Maḥūzā, who were noted for their luxurious style of living, among the candidates for Gehenna, whose faces would one day become as dark as the sides and the bottom of a saucepan (T. B., *Rosh Hasshanah*, 17a), whilst he most ungallantly applied to their idle wives the passage of Amos iv. 1 (T. B., *Shabbath*, 32b). Rābā was in fact the Abraham a Sancta Clara of his day minus the cloister life of the latter. He was married to one of the beautiful, accomplished, and amiable daughters of his teacher, R. Ḥisdā, whom he so dearly loved that he was ready to forgive Bar Hadyā (an interpreter of dreams who had much vexed him by his adverse interpretations) everything except the interpretation of a dream foreboding her death. Rābā, relying on Gen. xli. 12, 13, believed that the fulfilment of dreams within certain limits was influenced by the interpretation given to them (T. B., *Berakhoth*, 55b). (S. M. S.-S.)

RABAD (ראב״ד). Under this abbreviation five Jewish scholars are known, all of whom, singularly enough, lived during the 12th century.

I. Rab Ab-Beth-Din, *i.e.*, the chief rabbi *par excellence*. His real name was R. Abraham b. Yisḥak of Narbonne. He was the teacher of the most distinguished rabbis of Provence, including his famous son-in-law (Rabad III.) and Rabbenu Zeraḥyah Hallevi, the author of the *Maor*. It has always been known that a great deal of literature on the Talmud belonging to him is mixed up with the works of others, notably with those of Rabad (see III. below). In 1867-69, however, Dr B. H. Auerbach, rabbi of Halberstadt, edited for the first time Rabad's chief work, *The Eshkol*, in three parts, 4to.

II. R. Abraham b. David (Daud, ראב״ד) Hallevi of Toledo, the historiographer, who suffered martyrdom in 1180. His chief work has been printed innumerable times, and repeatedly with historical additions from earlier sources. Some of the parts of this "Tradition" and of these additions have been translated into Latin, English, and German. (1) His historical work, ספר הקבלה, is a chronicle down to 1161, preceded by Seder 'Olam and Megillath Ta'anith (Mantua, 1513, 4to); cheap editions are to be got in Poland. (2) His philosophico-theological work (composed in Arabic, translated into Hebrew by R. Shelomoh Ibn Labi—14th century—and into German by Weil) came out at Frankfort in 1852, 8vo.

III. R. Abraham b. David, disciple and son-in-law of Rabad I. This is the "great Rabbi of Posquières," the only opponent whom Maimonides thought a match for himself. He died in 1198. His works are:—(1) Commentary on the Mishnic treatise *'Eduyyoth* (see Mishnah, vol. xvi. p. 506), which accompanies some early and all later editions of the Babylonian Talmud (that on *Tamid*, ascribed to him, is not his). (2) Commentary on *Siphrọ* (see vol. xvi. p. 507). (3) Much of *Temim De'im*, part of the collection *Tummath Yesharim*, on various Rabbinic matters, Venice, 1622, fol. (4) *Ba'ale Hannephesh*, on laws relating to women (first independent edition, Prague, 1811, 4to). (5) *Hassagoth*, or Strictures on the *Mishneh Torah* of Maimonides (*q.v.*). These accompany most early and all later editions of the *Mishneh Torah*.

IV. R. Abraham b. David, author of the commentary on the *Sepher Yeṣirah*.[2] His commentary has been printed innumerable times with the work itself, the *editio princeps* at Mantua in 1562, 4to. Part of its preface was done in Latin by Rittangelius (Amsterdam, 1642, 4to).

V. R. Abraham b. David. He wrote Strictures (*Hassagoth*) on Rashi on the Pentateuch. This little and most interesting book was either written by a Sepharadi or Provençal, and lies in MS. (Add., 377, 3, 1) in the Cambridge University Library. No other copy is known. (S. M. S.-S.)

RĀBĀN (ראב״ן)—*i.e.*, Rabbenu Eli'ezer b. Nathan of Mainz—was one of the most famous Halakhic teachers of the 12th century. He lived at Mainz and corresponded with Rashi's son-in-law, Rabbenu Meïr b. Shemuel, and his three distinguished sons, Rashbam (*q.v.*), Ribam (R. Yisḥaḳ b. Meïr, who died young and left seven orphans), and Rabbenu Tham (R. Ya'aḳob). His great Halakhic work, צפנת פענח, or אבן העזר, is commonly called by the combination of the author's initials which heads this article, the Book of Rābān, and was printed at Prague in 1610 fol.[3] Other Halakhic literature by him is to be found in *Kol Bo*, § 123 (without place or date, but probably Naples, towards the end of the 15th century), and its reprints. More lies in MS. in libraries; thus the *Eben Haroshah*, of which no other copy is known, is preserved in the Cambridge University Library (Add., 498). R. Eli'ezer was also a fine liturgical poet, vying both in sentiment and elegance with the poets of the Sepharadic school, as appears, for example, from the Ophan and other pieces designed for a Sabbath when there is a circumcision. Rabbenu Eli'ezer died in the 12th century. The date 5007 (= 1247) which appears in the formulas of a bill of divorcement and a deed of manumission of a slave is most assuredly due to a scribe of the 13th century, who in transcribing Rābān's book conformed the date to his own time—a practice often to be met with.

Dr A. Jellinek of Vienna has published a *History of the First Crusade* (קונטרס גזרות תתנ״ו, Leipsic, 1854, 8vo)—a little book interesting in more than one way—which bears the name of Rābān. It cannot, however, be by the subject of this article, as one can see by comparing with his genuine work the questionable poetic stuff which forms part of the *Ḳonṭeres*. The author is no doubt Rābān of Cologne. Nor does the commentary on אל אלהים (for Pentecost eve) under the title of מאמר השכל, which has been often printed, and of which the Cambridge Library has an old MS. (Add., 493, 1), belong to this Rābān, though it has been ascribed to him for 600 years. Its writer was undoubtedly a Provençal. (S. M. S.-S.)

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[1] See *Rashi*, catchword אביי ורבא; *Ḥullin*, 133a, catchwords בדק לן and זכי לי מתנתא. The *Tosaphoth* and printed editions (*ll.cc.*) put Rabbāh (*q.v.*) for Rābā; but Rashi's traditional reading (כך שמעתי) must be right. For, in the first place, it would have been on the part of the Talmud superfluous to state that Rabbāh and Abayye were of the house of Eli, seeing that the latter was the son of the brother of the former. And secondly, the story goes (*Rosh Hasshanah*, *l.c.*) that he who only studied the Law died at the age of forty (Abayye living to sixty), whereas the synchronisms of Rabbāh's life show that he must have lived to a much greater age.

[2] The idea that R. Yoseph Arukh—Μακρός (a Greek) or Longus (a Roman)—was the author of this commentary must be given up. On the other hand, it is not quite impossible that this commentator and the writer of the Strictures on Rashi are one and the same person.

[3] The thanks of the writer of these lines are due to the curators and librarian of the Bodleian for the loan of this book.

RABANUS MAURUS. See Hrabanus Maurus.

RABÁT (Ribát), Rbát, or Arbát, also known as New Sallee, a city of Morocco, on the coast of the Atlantic, 130 miles south of Cape Spartel at the mouth of the Bú Rakrak, which separates it from Sallee proper on the northern bank. It is a commercial town of about 26,000 to 30,000 inhabitants, occupying a rocky plateau and surrounded by massive but dilapidated walls, strengthened by three forts on the seaward side. The old citadel, overhanging the mouth of the river, is still, though partially in ruins. an imposing building, with huge arched gateways, square towers, and masses of rich red-brown masonry; and to the south of the town lies a modern palace defended by earthworks after the European fashion. The conspicuous feature in the view from the sea is the Hasan tower, a beautiful square-built minaret 180 feet high, which stands at an elevation of about 65 feet above the sea to the west of the walled town, and in the midst of gardens and orchards whose vegetation partly hides the ruined columns of the ancient mosque to which it was attached. It is constructed of soft reddish-brown stone, and each side is adorned with a different design. At one time the Bú Rakrak afforded a much better harbour than it does now: the roadstead is quite unprotected, and there is a dangerous bar at the mouth of the river. Rabát trades with Fez and the interior of Morocco, with the neighbouring coast-towns and Gibraltar, and with Marseilles, Manchester, and London. The principal articles of export are wool, hides, and wax, and the products of that local manufacture of leather, carpets, mats, woollen and cotton stuffs, pottery, and circular brass trays which makes Rabát the greatest industrial centre in Morocco Cotton goods and loaf-sugar are first among the imports. The average value of the exports in the ten years 1872 to 1881 was £47,236, and of the imports £73,945. In 1883 the figures were £39,596 and £50,222 respectively.

Sallee (Salá), on the north side of the river, is also enclosed with walls. Much of the interior, however, is vacant and the houses are mean; and, unlike their neighbours of Rabát, the inhabitants (about 30,000) down to quite recent times distinguished themselves by particular hostility to Christians, who were thus prevented from entering their gates. To the north a ruined aqueduct extends for miles.

Rabát was founded by Yak'ub al-Manṣúr (ob. 1306); but Sallee was then an ancient city, and on the scarped hills to the west of Rabát stand the ruins of Sala, a Roman colony. Shella, as the place is now called, was the seat of the mausoleum of the Beni-Merín dynasty.

RABBA, a town of Nupi or Nufi, on the bank of the Kworra (Niger), opposite the island of Zagozhi, in 9° 6′ N. lat., and 200 miles above the confluence of the Kworra and the Binue. At the time of Lander's visit in 1830 it was a place of 40,000 inhabitants and one of the most important markets in the country. In 1851 Dr Barth reported it "in ruins," and in 1867 Rohlfs found it with only 500 inhabitants. A mission station, established there in 1857 by the Church Missionary Society, was afterwards withdrawn. The town has latterly somewhat recovered its position.

RABBĀH—*i.e.*, Rab Abbah bar Nahmani—was of the house of Eli, on whom the curse rested that none of them should reach a high age (1 Sam. ii. 33). Like Rābā, he tried to remove this curse (T. B., *Rosh Hasshanah*, 18a; see Rābā). He was twenty-two years head of the academy of Pumbadithā, from which he fled in the year 330, pursued by a troop of the Persian king (Shápúr II.), and perished miserably in a jungle (T. B., *Bobo Mets'io*, leaf 86a).

Rabbāh, owing to his great dialectic powers, to which no difficulty seemed difficult, was called 'Oker Harim, "uprooter of mountains."[1] This title was applied to him when the selection as "head" lay between him and his friend, fellow-pupil, and successor, Rab Yoseph, "the Blind," to whom is commonly, but by mistake, ascribed the authorship of certain Targumim. This latter doctor was, owing to his vast but mere reproductive powers, called Sinai, the mountain from which the letter of the Law was given (T. B., *Berakhoth*, 64a). (S. M. S.-S.)

RABBI. See Rab.

RABBIT. This animal, one of the best known and most frequently seen of all wild British mammals, is, with the hare, a member of the Rodent genus *Lepus*, which contains about twenty-five other species spread over the greater part of the world, and whose more important characters have already been referred to (see Hare, vol. xi. p. 476, and Mammalia, vol. xv. p. 421).

The rabbit (*Lepus cuniculus*), speaking for the present of the wild race only, is distinguished from the hare externally by its smaller size, shorter ears and feet, by the absence or reduction of the black patch at the tip of the ears so characteristic of the hare, and by its greyer colour. The skull is very similar to that of the hare (see Mammalia, fig. 99), but is smaller and lighter, and has a slenderer muzzle and a longer and narrower palate. Besides these characters, however, the rabbit is sharply separated from the hare by the fact that it brings forth its young naked, blind, and helpless; to compensate for this, it digs a deep burrow in the earth in which they are born and reared, while the young of the hare are born fully clothed with fur, and able to take care of themselves in the mere shallow depression or "form" in which they are born. The weight of the rabbit is from 2½ to 3 ℔, although individuals perfectly wild have been recorded up to more than 5. Its general habits are too well known to need a detailed description here. It breeds from four to eight times a year, bringing forth each time from three to eight young. Its period of gestation is about thirty days, and it is able to bear when six months old. It attains to an age of about seven or eight years.

Rabbit.

The geographical distribution of the rabbit presents many most interesting peculiarities. It is believed to be originally a native of the western half of the Mediterranean basin only, and still abounds in Spain, Sardinia, southern Italy and Sicily, Greece, Tunis, and Algeria, and many of the islands adjoining these countries are quite overrun with it. Thence it has spread, partly by man's agency, northwards throughout temperate western Europe, increasing rapidly wherever it gains a footing; and this extension is still going on, as is shown by the case of Scotland, in which sixty years ago rabbits were little known, while they are now found in all suitable localities up to the extreme north. It has also gained admittance into Ireland, and now abounds there as much as in England. Out of Europe the same extension of range has been going on. In New Zealand and Australia rabbits, introduced either for profit or sport, have increased to such an extent as to form one of the most serious pests that the farmers have to contend against, as the climate and soil seem to suit them perfectly and their natural enemies are too few and too lowly organized to keep their numbers within reasonable bounds. In other cases rabbits introduced into islands have become or remained more or less distinct from their parent stock; thus the rabbits both of the Falkland Islands and of Jamaica still show traces of their descent from domesticated varieties, and have never reverted to the ordinary brownish-grey type. And again, as was pointed out by Mr Darwin,[1] the rabbits in the island of Porto Santo, near Madeira, whose ancestors were introduced from Spain in 1418 or 1419, have formed quite a distinct diminutive race, barely half the bulk or weight of English rabbits, and differing in certain slight details of colour and habits.

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[1] See for a similar expression Matt. xvii. 20.

The rabbit has been domesticated by man from a very early period. No doubt exists amongst naturalists that all the varieties of the domestic animal are descended from the *Lepus cuniculus*. The variations which have been perpetuated and intensified by artificial selection are, with the exception of those of the dog, greater than have been induced in any other species of mammal. For not only has the weight been more than quadrupled in some of the larger breeds, and the structure of the skull and other parts of the skeleton greatly altered, but the proportionate size of the brain has been considerably reduced and the colour and texture of the fur altered in the most remarkable manner. The establishment of these extreme variations is dependent on the highly artificial conditions under which the animals are kept, their great prolificacy, and the rapidity with which the generations succeed each other, which enable the process of artificial selection by the preservation of those most suited to the purposes of the breeder to be carried into effect with facility.

The *Lop-eared* breed is the oldest English fancy variety; it has been cultivated carefully for about a century, the aim of the breeder being chiefly directed to the development of the size of the ears, and with such success that they sometimes measure more than 23 inches from tip to tip and exceed 6 inches in width. This development, which is accompanied by great changes in the structure of the skull, that have been carefully described by Darwin in his *Variation of Animals*, &c., depends on breeding the animals in warm damp hutches, without which the best developed parents fail to produce the desired offspring. In colour the lop-eared rabbits vary greatly.

The *Belgian hare* is a large variety of a hardy and prolific character, which closely resembles the common hare in colour, and is not unlike it in form. Some few years since many of these animals were sold as leporides or hybrids, produced by the union of the hare and the rabbit; but the most careful experimenters have failed to obtain any such hybrid, and the naked immature condition in which young rabbits are born as compared with the clothed and highly developed young hares renders it exceedingly unlikely that hybrids could be produced. Nor does the flesh of the Belgian rabbit resemble that of the hare in colour or flavour. A closely allied variety, though of even larger size, is known by the absurd name of *Patagonian* rabbit; it has no relation to the country after which it is called.

The *Angora* rabbit is characterized by the extreme elongation and fineness of the fur, which in good specimens reaches 6 or 7 inches in length, requiring great care and frequent combing to prevent it from becoming matted. The Angoras most valued are albinos, with pure white fur and pink eyes; in some parts of the Continent they are kept by the peasants and clipped regularly.

Amongst the breeds which are valued for the distribution of colour on the fur are the *Himalayan* and the *Dutch*. The former is white, but the whole of the extremities—viz., the nose, the ears, tail, and feet—are black or very dark in colour. This very pretty breed has no connexion with the mountain chain from whence it has taken its name, but is a variety produced by careful breeding and selection as fully described by Darwin (*op. cit.*). Though but recently produced by crossing, it now generally breeds true to colour, at times throwing back, however, to the silver greys from which it was derived. The rabbits known in Great Britain as Dutch are of small size, and are valued for the disposition of the colour and markings. The entire body behind the shoulder-blades is uniformly coloured, with the exception of the feet, the anterior part of the body, including the fore legs, neck, and jaws, is white, the cheeks and ears being coloured. In some strains the coloured portion extends in front of the fore legs, leaving only a ring of white round the neck. The more accurately the coloured portion is defined the higher is the animal esteemed.

The *Silver grey* is a uniform coloured variety, the fur of which is a rich chinchilla grey, varying in depth of colour in the different strains. From the greater value of the fur silver greys have been frequently employed to stock warrens, as they breed true to colour in the open if the ordinary wild rabbits are rigorously excluded. Other colours known, as *Silver cream* and *Silver brown*, are closely allied varieties.

As an article of food the domesticated rabbit is of considerable importance. From 100 to 200 tons are imported into London from Ostend every week during the colder months of the year, having been reared in hutches by the Belgian peasants. They are forwarded without their skins, which are half the value of the flesh. A plan has been recently devised by Major Morant, which is known as "hutch-farming in the open." The animals are kept in large hutches with projecting roofs, floored with coarse galvanized iron netting, through which the grass projects to be eaten by the rabbits. The hutches are shifted twice or thrice a day, so that the animals are constantly on clean ground and have fresh food. The young, when old enough to leave the mother, are reared in somewhat larger hutches of a similar description and killed for market under three months of age.

RABELAIS, François (*c.* 1490-1553), the greatest of French humourists and one of the few great humourists of the world, was born at Chinon on the Vienne in the province of Touraine. The date of his birth is wholly uncertain: it has been put by tradition and by authorities long subsequent to his death as 1483, 1490, and 1495. There is nothing in the positive facts of his life which would not suit tolerably well with any of these dates; most 17th-century authorities give the earliest, and this also accords best with the age of the eldest of the Du Bellay brothers, with whom Rabelais was at school. In favour of the latest it is urged that if Rabelais was born in 1483 he must have been forty-seven when he entered at Montpellier, and proportionately and unexpectedly old at other known periods of his life. In favour of the middle date, which has, as far as recent authorities are concerned, the weight of consent in its favour, the testimony of Guy Patin, a witness of some merit and not too far removed in point of time, is invoked, though perhaps the fact of its being a *via media* has really had most to do with the adoption. The only contribution which need be made here to the controversy is to point out that if Rabelais was born in 1483 he must have been an old man when he died, and that scarcely even tradition speaks of him as such. And since this tradition is mentioned it may as well be observed at once that all the anecdotes of Rabelais without exception, and most of the accounts of the facts of his life, date from a period long posterior to his death and are utterly unworthy of credence. Colletet nearly a hundred years later, Antoine Leroy a full hundred, and Bernier nearly a hundred and fifty collected or invented stories which, as far as any actual authority goes, must be regarded as worthless. Bishop Huet's researches were made nearly as late as Bernier's. Throughout this article, therefore, when tradition or any similar word is used without further precision it will be understood that the statements have in themselves only conjectural validity.

With regard to his birth, parentage, youth, and education everything depends upon tradition, and it is not until he was according to one extreme hypothesis thirty-six, according to the other extreme twenty-four, that we have solid testimony respecting him. In the year 1519, on the 5th of April, the François Rabelais of history emerges. The monks of Fontenay le Comte bought some property (half an inn in the town), and among their signatures to the deed of purchase is that of François Rabelais. Before this all is cloudland. It is said that he had four brothers and no sisters, that his father had a country property called La Devinière, and was either an apothecary or a tavern-keeper. Half a century after his death De Thou mentions that the house in which he was born had become a tavern. It still stands at the corner of a street called the Rue de la Lamproie, and the tradition may be correct. An indistinct allusion of his own has been taken to mean that he was tonsured in childhood at seven or nine years old; and tradition says that he was sent to the convent of Seuilly, though of course he could then have taken no definite vows, and there is no evidence whatever that the passage in question, which simply condemns the practice referred to, has any personal reference. From Seuilly at an unknown date tradition takes him either to the university of Angers or to the convent school of La Baumette or La Basmette, founded by good King René in the neighbourhood of the Angevin capital. Here he is supposed to have been at school with the brothers Du Bellay, with Geoffroy d'Estissac and others. The next stage in this (as far as evidence goes, purely imaginary) career is the monastery of Fontenay le Comte, where, as has been seen, he is certainly found in 1519 holding a position sufficiently senior to sign deeds for the community, where he, as will be seen, certainly, though at an unknown date, took priest's orders, and where he also pursued, again certainly, the study of letters, and especially of Greek, with ardour. From this date, therefore, he becomes historically visible. The next certain intelligence which we have of Rabelais is somewhat more directly biographical than this bare entry of his name. The letters of the well-known Greek scholar Budæus, two of which are addressed to Rabelais himself and several more to his friend and fellow-monk Pierre Amy, together with some notices by André Tiraqueau, a learned jurist, to whom Rabelais rather than his own learning has secured immortality, show beyond doubt what manner of life the future author of *Gargantua* led in his convent. These letters are partly written in Greek and partly in Latin. In Tiraqueau's book *De Legibus Connubialibus*, which excited a controversy with another jurist of the west, Bouchard, also a friend of Rabelais, the latter is described as "a man most learned in both languages and all kinds of scholarship above his age, and beyond the wont and, if I may say so, the excessive scrupulousness of his order." The excessive scrupulousness of the order showed itself before long in reference to Amy and Rabelais, the latter of whom had, as this sentence of Tiraqueau's also informs us, translated the first book of Herodotus. The letters of Budæus show that an attempt was made by the heads of the convent or the order to check the studious ardour of these Franciscans; but it failed, and there is no positive evidence of anything like actual persecution, the phrases in the letters of Budæus being merely the usual exaggerated Ciceronianism of the Renaissance. Some books and papers were seized as suspicious, then given back as innocent; but Rabelais was in all probability disgusted with the cloister,—indeed his great work shows this beyond doubt. In 1524, the year of the publication of Tiraqueau's book above cited, his friend Geoffroy d'Estissac procured from Clement VII. an indult, licensing a change of order and of abode for Rabelais. From a Franciscan he became a Benedictine, and from Fontenay he moved to Maillezais, of which Geoffroy d'Estissac was bishop. He seems indeed to have been constantly in the company of the bishop and to have made many new literary acquaintances, notably Jean Bouchet, the poet. To him he wrote an epistle in French verse, still extant, which proves that Rabelais, much more truly than Swift, never could have been a poet. The title of this epistle is, however, noteworthy, inasmuch as the author is described in the original (a collection of Bouchet's works published in 1545) as a man of great literary knowledge in Greek and Latin, and as a great orator in Greek, Latin, and French. But even this learned and hospitable retreat did not apparently satisfy Rabelais. In or before 1530 he left Maillezais, abandoned his Benedictine garb for that of a secular priest, and, as he himself puts it in his subsequent *Supplicatio pro Apostasia* to Pope Paul III., "per seculum diu vagatus fuit." He is met at Montpellier in the year just mentioned. He entered the faculty of medicine there on the 16th of September and became bachelor on the 1st of November, a remarkably short interval, which shows what was thought of his acquirements. Early in 1531 he lectured publicly on Galen and Hippocrates, while his more serious pursuits seem to have been chequered by acting in a *morale comédie*, then a very frequent university amusement. Visits to the Îles d'Hières, and the composition of a fish sauce in imitation of the ancient *garum*, which he sent to his friend Dolet, are associated, not very certainly, with his stay at Montpellier, which, lasting rather more than a year at first, was renewed at intervals for several years.

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[1] *Variation of Animals and Plants*, 2d ed., i. p. 119.

In 1532, however, and probably rather early than late in that year, he had moved from Montpellier to Lyons. Here he plunged into manifold work, literary and professional. He was appointed before the beginning of November physician to the hôtel dieu, with a salary of forty livres per annum. He edited for Sebastian Gryphius, in the single year 1532, the medical *Epistles* of Giovanni Manardi, the *Aphorisms* of Hippocrates, with the *Ars Parva* of Galen, and an edition of two supposed Latin documents, which, however, happened unluckily to be forgeries. These three works were dedicated in order to his three chief friends of Touraine and Poitou, André Tiraqueau, the bishop of Maillezais, and Bouchard. We also have a Latin letter written on 1st December 1532 to a certain Bernard de Salignac, otherwise unknown.

It is certain that at this time Lyons was the centre and to a great extent the headquarters of an unusually enlightened society, and indirectly it is clear that Rabelais became intimate with this society. A manuscript distich, which was found in the Toulouse library, on the death of an infant named Theodule, whose country was Lyons and his father Rabelais, would seem to show that he here entered into other connexions than those of friendship. Absolutely nothing, however, is known about the child and its mother; it is enough to say that the existence of the former would have been by the manners and morals of the time very easily condoned. But what makes the Lyons sojourn of the greatest real importance is that at this time probably appeared the beginnings of the work which was to make Rabelais immortal. It is necessary to say "probably," because the strange uncertainty which rests on so much of his life and writings exists here also. There is no doubt that both Gargantua and Pantagruel were popular names of giants in the Middle Ages, though, curiously enough, no mention of the former in French literature much before Rabelais's time has been traced. In 1526, however, Charles de Bordigné, in a satiric work of no great merit, entitled *La Légende de Pierre Faifeu*, has the name Gargantua with an allusion, and in 1532 (if not earlier) there appeared at Lyons *Les Grandes et Inestimables Chroniques du Grand et Énorme Géant Gargantua.* This is a short book on the plan of the later burlesques and romances of the Round Table. Arthur and Merlin appear with Grantgosier, as he is here spelt, Galemelle (Gargalelle), Gargantua himself, and the terrible mare. But there is no trace of the action or other characters of *Gargantua* that was to be, nor is the manner of the piece in the least worthy of Rabelais. No one supposes that he wrote it, though it has been supposed that he edited it and that in reality it is older than 1532, and may be the direct subject of Berdigne's allusion six years earlier. What does, however, seem probable is that the first book of *Pantagruel* (the second of the whole work) was composed with a definite view to this chap book and not to the existing first book of *Gargantua*, which was written afterwards when Rabelais discovered the popularity of his work and felt that it ought to have some worthier starting-point than the *Grandes Chroniques*. The earliest known and dated edition of *Pantagruel* is of 1533, of *Gargantua* 1535, though this would not be of itself conclusive, especially as we actually possess editions of both which, though undated, seem to be earlier. But the definite description of Gargantua in the title as "Père de Pantagruel," the omission of the words "second livre" in the title of the first book of *Pantagruel* while the second and third are duly entitled "tiers" and "quart," the remarkable fact that one of the most important personages, Friar John, is absent from book ii., the first of *Pantagruel*, though he appears in book i. (*Gargantua*), and many other proofs show the order of publication clearly enough. There is also in existence a letter of Calvin, dated 1533, in which he speaks of *Pantagruel*, but not of *Gargantua*, as having been condemned as an obscene book. Besides this, 1533 saw the publication of an almanac, the first of a long series which exists only in titles and fragments, and of the amusing *Prognostication Pantagrueline* (still, be it observed, Pantagrueline, not Gargantuine). Both this and *Pantagruel* itself were published under the anagrammatic pseudonym of "Alcofribas Nasier," shortened to the first word only in the case of the *Prognostication*.

This busy and interesting period of Rabelais's life was brought to a close apparently by his introduction or reintroduction to Jean du Bellay. They had been, it has been said, schoolfellows, but Bellay does not appear among the list of Rabelais's friends in the first years of his emancipation. From 1534, however, he and the other members of his family appear as Rabelais's chief and constant patrons during the remainder of his life. It was just before Christmas that Jean du Bellay, passing through Lyons on an embassy to Rome, engaged Rabelais as physician. The visit did not last very long, but it left literary results in an edition of a description of Rome by Marliani, which Rabelais published in September 1534. It is also thought that the first edition of *Gargantua* may have appeared this year.

In the spring of 1535 the authorities of the Lyons hospital, considering that Rabelais had twice absented himself without leave, elected Pierre de Castel in his room; but the documents which exist do not seem to infer that any blame was thought due to him, and the appointment of his successor was once definitely postponed in case he should return. An epigram of Dolet shows that at least once and probably about this time he performed a public dissection. At the end of 1535 Rabelais once more accompanied Jean du Bellay, now a cardinal, to Rome and stayed there till April in the next year. This stay furnishes some biographical documents of importance in the shape of letters to Geoffroy d'Estissac, of the already-mentioned *Supplicatio pro Apostasia*, and of the bull of absolution which was the reply to it. This bull not only freed Rabelais from ecclesiastical censure but gave him the right to return to the order of St Benedict when he chose, and to practise medicine. He took advantage of this bull and became a canon of St Maur. The monastery having but recently become collegiate, there seems to have been some technical difficulty which necessitated a new supplication. In the next year (1537) we find Rabelais present at a dinner where the friends of Étienne Dolet met to congratulate him on his pardon for the homicide of Compaing. The luckless printer has left a poem on the occasion, and two other writers, Salmon Macrin and Nicholas Bourbon, have also left poems of this date expressing the regard in which Rabelais was generally held. Now, too, he took his doctor's degree at Montpellier, lectured on the Greek text of Hippocrates, and next year made a public anatomical demonstration. During these two years he seems to have resided either at Montpellier or at Lyons. But in 1539 he entered the service of Guillaume du Bellay-Langey, elder brother of Jean, and would appear to have been with him (he was governor of Piedmont) till his death on 9th January 1543. Rabelais wrote a panegyrical memoir of Guillaume, which is lost, and the year before saw the publication of an edition of *Gargantua* and *Pantagruel*, book i., together (both had been repeatedly reprinted separately), in which some dangerous expressions were cut away. Nothing at all is known of his life, whereabouts, or occupations till the publication of the third book, which appeared in 1546, "avec privilége du roi," which had been given in September 1545.

Up to this time Rabelais, despite the condemnation of the Sorbonne referred to above, had experienced nothing like persecution or difficulty. Even the spiteful or treacherous act of Dolet, who in 1542 reprinted the earlier form of the books which Rabelais had just slightly modified, seems to have done him no harm. But the storm of persecution which towards the end of the reign of Francis I. was fatal to Dolet himself and to Despériers, while it exiled and virtually killed Marot, did not leave Rabelais scatheless. There is no positive evidence of any measures taken or threatened against him; but it is certain that he passed nearly the whole of 1546 and part of 1547 at Metz in Lorraine as physician to the town at the salary of 120 livres, that Sturm speaks of him as having been "cast out of France by the times" (with the exclamation φεῦ τῶν χρόνων) in a contemporary letter, and that he himself in a letter, also contemporary, though it is not clear whether it is of 1546 or the next year, gives a doleful account of his pecuniary affairs and asks for assistance. At Francis's death on 31st March 1547 Du Bellay went to Rome, and at some time not certain Rabelais joined him. He was certainly there in February 1549, when he dates from Du Bellay's palace a little account of the festivals given at Rome to celebrate the birth of the second son of Henry II. and Catherine de' Medici. This account, the *Sciomachie* as it is called, is extant. In the same year a monk of Fontevrault, Gabriel du Puits-Herbault, made in a book called *Theotimus* the first of the many attacks on Rabelais. It is, however, as vague as it is violent, and it does not seem to have had any effect. Rabelais had indeed again made for himself protectors whom no clerical or Sorbonist jealousy could touch. The *Sciomachie* was written to the cardinal of Guise, whose family were all-powerful at court, and Rabelais dedicated his next book to Odet de Chatillon, afterwards cardinal, a man of great influence. Thus Rabelais was able to return to France, and was presented to the livings of Meudon and St Christophe de Jambet. It may, however, surprise those who have been accustomed to hear him spoken of as "curé de Meudon" and who have read lives of him founded on legend to find that there is very little ground for believing that he ever officiated or resided there. He certainly held the living but two years, resigning it in January 1552 along with his other benefice, and it is noteworthy that at the episcopal visitation of 1551 he was not present. To this supposed residence at Meudon and to the previous stay at Rome, however, are attached two of the most mischievous items of the legend, though fortunately two of the most easily refutable. It is said that Rabelais met and quarrelled with Joachim du Bellay the poet at Rome, and with Ronsard at Meudon and elsewhere, that this caused a breach between him and the Pléiade, that he satirized its classicizing tendencies in the episode of the Limousin scholar, and that Ronsard after his death avenged himself by a libellous epitaph. The facts are these. Nothing is heard of the quarrel with Du Bellay or of any meeting with him, nothing of the meetings and bickerings with Ronsard, till 1699, when Bernier tells the story without any authority. The supposed allusions to the Pléiade date from a time when Ronsard was a small boy, and are mainly borrowed from an earlier writer still, Geoffroy Tory. Lastly, the epitaph read impartially is not libellous at all but simply takes up the vein of the opening scenes of *Gargantua* in reference to Gargantua's author. There is indeed no reason to suppose that either Ronsard or Du Bellay was a fervent admirer of Rabelais, for they belonged to a very different literary school; but there is absolutely no evidence of any enmity between them or even of any acquaintanceship which could have given rise to enmity.

Some chapters of Rabelais's fourth book had been published in 1548, but the whole did not appear till 1552. The Sorbonne censured it and the parliament suspended the sale, taking advantage of the king's absence from Paris. But it was soon relieved of the suspension. This is the last fact we know about Rabelais. It is supposed that he died in 1553, but actual history is quite silent, and the legends about his deathbed utterances—"La farce est jouée," "Je vais chercher un grand peut-être," &c.—are altogether apocryphal. The same may be said of the numerous silly stories told of his life, such as that of his procuring a free passage to Paris by inscribing packets "Poison for the king," and so forth.

Ten years after the publication of the fourth book and nine after the supposed date of the author's death there appeared at Lyons sixteen chapters entitled *L'Île Sonnante par Maistre François Rabelais*, and two years later the entire fifth book was printed as such. In 1567 it took place with the others, and has ever since appeared with them. But from the beginning of the 17th century there have never been wanting disbelievers in its authenticity. The controversy is one of some intricacy, but as it is also one of capital importance in literary history the heads of it at least must be given here. The opponents of the book rely (1) on the testimony of a certain Louis Guyon, who in 1604 declared that the fifth book was made long after Rabelais's death by an author whom he knew, and who was not a doctor, and on the assertion of the bibliographer Du Verdier, about the same time, that it was written by an "écolier de Valence"; (2) on the fact that the anti-monastic and even anti-Catholic polemic is much more accentuated in it; (3) that parts are apparently replicas or rough drafts of passages already appearing in the four earlier books; (4) that some allusions are manifestly posterior to even the farthest date which can be assigned for the reputed author's decease. On the other hand, it is urged that, though Guyon and Du Verdier were in a sense contemporaries, they wrote long after the events, and that the testimony of the former is vitiated, not merely by its extreme vagueness but by the fact that it occurs in a *plaidoyer*, tending to exculpate physicians from the charge of unorthodoxy; that Du Verdier in another place assigns the *Pantagrueline Prognostication* to this same unknown student of Valence, and had therefore probably confused and hearsay notions on the subject; that the rasher and fiercer tone, as well as the apparent repetitions, are sufficiently accounted for on the supposition that Rabelais never finally revised the book, which indeed dates show that he could not have done, as the fourth was not finally settled till just before his death; and that it is perfectly probable, and indeed almost certain, that it was prepared from his papers by another hand, which is responsible for the anachronous allusions above referred to. But the strongest argument, and one which has never been attacked by authorities really competent to judge, is that the "griffe de l'aigle" is on the book, and that no known author of the time except Rabelais was capable of writing the passage about the *Chats fourrés*, the better part of the history of Queen Whims (La Quinte) and her court, and the conclusion giving the Oracle of the Bottle. To this argument we believe that the more competent a critic is, both by general faculty of appreciation and by acquaintance with contemporary French literature, the more positive will be the assent that he yields.

Gargantua and *Pantagruel*, notwithstanding their high literary standing and the frequency with which certain passages from them are cited, are, owing partly to their archaism of language and partly to the extreme licence which their author has allowed himself, so little read that no notice of them or of him could be complete without some sketch of their contents. The first book, *Gargantua*, describes the birth of that hero (a giant and the son of gigantic parents), whose nativity is ushered in by the account of a tremendous feast. In this the burlesque exaggeration of the pleasures of eating and drinking, which is one of the chief exterior notes of the whole work, is pushed to an extreme,—an extreme which has attracted natural but perhaps undue attention. Very early, however, the author becomes serious in contrasting the early education of his hero—a satire on the degraded schools of the Middle Ages—with its subsequent and reformed stage, in the account of which all the best and noblest ideas of the humanist Renaissance in reference to pedagogy are put with exceptional force Gargantua is recalled from Paris, whither he had been sent to finish his education, owing to a war between his father, Grandcosier, and the neighbouring king, Picrochole. This war is described at great length, the chief hero of it being the monk, Friar John, a very unclerical cleric, in whom Rabelais greatly delights. Picrochole defeated and peace made, Gargantua establishes the abbey of Thelema in another of Rabelais's most elaborate literary passages, where all the points most obnoxious to him in monastic life are indicated by the assignment of their exact opposites to this model convent. The second book, which introduces the principal hero of the whole, Pantagruel, Gargantua's son, is, on any other hypothesis but that already suggested of its prior composition, very difficult to explain, but in itself it is intelligible enough. Pantagruel goes through something like a second edition (really a first) of the educational experiences of his father. Like him, he goes to Paris, and there meets with Panurge, the principal triumph of Rabelaisian character-drawing, and the most original as well as puzzling figure of the book. Panurge has almost all intellectual accomplishments, but is totally devoid of morality: he is a coward, a drunkard, a lecher, a spiteful trickster, a spendthrift, but all the while infinitely amusing This book, like the other, has a war in its latter part; Gargantua scarcely appears in it and Friar John not at all. It is not till the opening of the third book that the most important action begins. This arises from Panurge's determination to marry—a determination, however, which is very half-hearted, and which leads him to consult a vast number of authorities, each giving occasion for satire of a more or less complicated kind. At last it is determined that Pantagruel and his followers (Friar John has reappeared in the suite of the prince) shall set sail to consult the Oracle of the *Dive Bouteille.* The book ends with the obscurest passage of the whole, an elaborate eulogy of the "herb pantagruelion," which appears to be, if it is anything, hemp. Only two probable explanations of this have been offered, the one seeing in it an anticipation of Joseph de Maistre's glorification of the executioner, the other a eulogy of work, hemp being on the whole the most serviceable of vegetable products for that purpose. The fourth and fifth books are entirely taken up with a description of the voyage. Many strange places with stranger names are visited, some of them offering obvious satire on human institutions, others, except by the most far-fetched explanations, resolvable into nothing but sheer extravaganza. At last the Land of Lanterns, borrowed from Lucian, is reached, and the Oracle of the Bottle is consulted. This yields the single word "Trinq," which the attendant priestess declares to be the most gracious and intelligible she has ever heard from it. Panurge takes this as a sanction of his marriage and the book ends abruptly. This singular romance is diversified by or, to speak more properly, it is the vehicle of the most bewildering abundance of digression, burlesque amplification, covert satire on things political, social, and religious, miscellaneous erudition of the literary and scientific kind. Everywhere the author lays stress on the excellence of "Pantagruelism," and the reader who is himself a Pantagruelist (it is perfectly idle for any other to attempt the book) soon discovers what this means. It is, in plain English, humour. The definition of humour is a generally acknowledged *crux*, and till it is defined the definition of Pantagruelism will be in the same position. But that it consists in the extension of a wide sympathy to all human affairs together with a comprehension of their vanity may be said as safely as anything else. Moroseness and dogmatism are as far from the Pantagruelism of Rabelais as maudlin sentimentality or dilettantism. Perhaps the chief things lacking in his attitude are, in the first place, reverence, of which, however, from a few passages, it is clear he was by no means totally devoid, and an appreciation of passion and poetry. Here and there there are touches of the latter, as in the portrait of Quintessence, but passion is everywhere absent—an absence for which the comic structure and plan of the book does not by any means supply a complete explanation.

For a general estimate of Rabelais's literary character and influence the reader may be referred to the article FRANCE (vol. ix. p. 652). But some detailed remarks must be given here. The life and works of Rabelais, despite the considerable number of publications of which they have been the subject, have hitherto been less fully and satisfactorily treated than the life and works of any author who occupies an equally important place. As will have been seen from the foregoing attempt to give the actual facts, a whole legend has grown up round the scanty details recorded of him, and many, if not all, of the particulars of that legend can be shown to be false. But no one hitherto has undertaken in a satisfactory fashion the construction of a rigorously critical life. In the same way there are many questions in reference to his main work which have never been thoroughly and finally sifted by a critical intelligence equal to the task. Limits of space, to say no more, prevent any such attempt being made here; but there are three questions without the discussion of which this notice of one of the foremost writers of the world would not be worthy of its present place. These are —What is the general drift and purpose of *Gargantua* and *Pantagruel*, supposing there to be any? What defence can be offered, if any defence is needed, for the extraordinary licence of language and imagery which the author has permitted himself? What was his attitude towards the great questions of religion, philosophy, and politics? These questions succeed each other in the order of reason, and the answer to each assists the resolution of the next.

There have been few more remarkable instances of the *lues commentatoria* than the work of the editors of Rabelais. Almost every one appears to have started with a Rabelais ready made in his head, and to have, so to speak, read that Rabelais into the book. Those who have not done this, like Le Duchat, Motteux, and Esmangart, have generally committed the error of tormenting themselves and their author to find individual explanations of personages and events. The extravagance of the last-named commentator takes the form of seeing elaborate allegories; that of some others devotes itself chiefly to identifying the characters of the romance with more or less famous historical persons. But the first blunder, that of forming a general hypothetical conception of Rabelais and then adjusting interpretation of the work to it, is the commoner. This conception, however, has singularly varied. According to some expositors, among whom the latest and not the least respectable is M. Fleury, Rabelais is a sober reformer, an apostle of earnest work, of sound education, of rational if not dogmatic religion, who wraps up his morals in a farcical envelope partly to make them go down with the vulgar and partly to shield himself from the consequences of his reforming zeal. According to others, of whom we have had in England a distinguished example in Mr Besant, Rabelais is all this but with a difference. He is not religious at all; he is more or less anti-religious; and his book is more or less of a general protest against any attempt to explain supernaturally the riddle of the earth. According to a third class, the most distinguished recent representative of which was M. Paul Lacroix, the Rabelaisian legend does not so much err in principle as it invents in fact. Rabelais is the incarnation of the "esprit Gaulois," a jovial careless soul, not destitute of common sense or even acute intellectual power, but first of all a good fellow, rather preferring a broad jest to a fine-pointed one, and rollicking through life like a good-natured undergraduate. Of all these views it may be said that those who hold them are obliged to shut their eyes to many things in the book and to see in it many which are not there. The religious part of the matter will be dealt with presently; but it is impossible to think that any unbiassed judge reading Rabelais can hold the grave philosopher view or the reckless good fellow view without modifications and allowances which practically deprive either of any value as a sufficient explanation of the book and its writer. Those who, as it has been happily put, identify Rabelais with Pantagruel, strive in vain on any view intellectually consistent or morally respectable to account for the vast ocean of pure or impure laughter and foolery which surrounds the few solid islets of sense and reason and devotion. Those who in the same way identify Rabelais with Panurge can never explain the education scheme, the solemn apparition of Gargantua among the farcical and fantastic variations on Panurge's wedding, and many other passages; while, on the other hand, those who insist on a definite propaganda of any kind must justify themselves by their own power of seeing things invisible to plain men. But these vagaries are not only unjustifiable; they are entirely unnecessary. No one reading Rabelais without *parti pris*, but with a good knowledge of the history and literature of his own times and the times which preceded him, can have much difficulty in appreciating his book. He had evidently during his long and studious sojourn in the cloister (a sojourn which was certainly not less than five-and-twenty years, while it may have been five-and-thirty, and of which the studiousness rests not on legend but on documentary evidence) acquired a vast stock of learning. He was, it is clear, thoroughly penetrated with the instincts, the hopes, and the ideas of the Renaissance in the form which it took in France, in England, and in Germany,—a form, that is to say, not merely humanist but full of aspirations for social and political improvement, and above all for a joyous, varied, and non-ascetic life. He had thoroughly convinced himself of the abuses to which monachism lent itself. Lastly, he had the spirit of lively satire and of willingness *desipere in loco* which frequently goes with the love of books. It is in the highest degree improbable that in beginning his great work he had any definite purpose or intention. The habit of burlesquing the *romans d'aventures* was no new one, and the form lent itself easily to the two literary exercises to which he was most disposed,—apt and quaint citation from and variation on the classics and satirical criticism of the life he saw around him. The immense popularity of the first two parts induced him to continue them, and by degrees (the genuineness of the fifth book at any rate in substance is here assumed) the possibility of giving the whole something like a consistent form and a regular conclusion presented itself to him. The voyage in particular allowed the widest licence of satirical allusion, and he availed himself of that licence in the widest sense. Here and there persons are glanced at, while the whole scenery of his birthplace and its neighbourhood is curiously worked in; but for the most part the satire is typical rather than individual, and it is on the whole a rather negative satire. In only two points can Rabelais be said to be definitely polemic. He certainly hated the monkish system in the debased form in which it existed in his time; he as certainly hated the brutish ignorance into which the earlier systems of education had suffered too many of their teachers and scholars to drop. At these two things he was never tired of striking, but elsewhere, even in the grim satire of the *Chats fourrés*, he is the satirist proper rather than the reformer. It is in the very absence of any cramping or limiting purpose that the great merit and value of the book consist. It holds up an almost perfectly level and spotless mirror to the temper of the earlier Renaissance. The author has no universal medicine of his own (except Pantagruelism) to offer, nor has he anybody else's universal medicine to attack. He ranges freely about the world, touching the laughable sides of things with kindly laughter, and every now and then dropping the *risibile* and taking to the *rationale*. It is not indeed possible to deny that in the Oracle of the Bottle, besides its merely jocular and fantastic sense, there is a certain "echo," as it has been called, "of the conclusion of the preacher," a certain acknowledgment of the vanity of things. But in such a book such a note could hardly be wanting unless the writer had been a fanatic, which he was not, or a mere voluptuary, which he was not, or a dullard, which he was least of all. It is, after all, little more than a suggestion, and is certainly not strengthened by anything in the body of the work. Rabelais is, in short, if he be read without prejudice, a humourist pure and simple, feeling often in earnest, thinking almost always in jest. He is distinguished from the two men who alone can be compared to him in character of work and force of genius combined—Lucian and Swift—by very marked characteristics. He is much less of a mere mocker than Lucian, and he is entirely destitute, even when he deals with monks or pedants, of the ferocity of Swift. He neither sneers nor rages; the *rire immense* which distinguishes him is altogether good-natured; but he is nearer to Lucian than to Swift, and Lucian is perhaps the author whom it is most necessary to know in order to understand him rightly.

If this general view is correct (and it may at least claim to be founded on nothing but the reading of Rabelais himself without prejudice and with a tolerable apparatus) it will probably condition to some extent the answer to be given to the two minor questions stated above. The first is connected with the great blemish of *Gargantua* and *Pantagruel*,—their extreme coarseness of language and imagery. It is somewhat curious that some of those who claim Rabelais as an enemy of the supernatural in general have been the loudest to condemn this blemish, and that some of them have made the exceedingly lame excuse for him that it was a means of wrapping up his propaganda and keeping it and himself safe from the notice of the powers that were. This is not complimentary to Rabelais, and, except in some very small degree, it is not likely to be true. For as a matter of fact obscenity no less than impiety was charged against him by his ultra-orthodox enemies, and the obscenity no less than the supposed impiety gave them a handle against him before such bodies as the Sorbonne and the parliaments. As for the extreme theory of the anti-Rabelaisians, that Rabelais was a "dirty old blackguard" who liked filth and wallowed in it from choice, that hardly needs comment. His errors in this way are of course, looked at from an absolute standard, unpardonable. But judged relatively there are several, we shall not say excuses, but explanations of them. In the first place, the comparative indecency of Rabelais has been much exaggerated by persons unfamiliar with early French literature. The form of his book was above all things popular, and the popular French literature of the Middle Ages as distinguished from the courtly and literary literature, which was singularly pure, can hardly be exceeded in point of coarseness. The *fabliaux*, the early burlesque romances of the *Audigier* class, the farces of the 15th century, equal (the grotesque iteration and amplification which is the note of *Gargantua* and *Pantagruel* being allowed for, and sometimes without that allowance) the coarsest passages of Rabelais. His coarseness, moreover, disgusting as it is, has nothing of the corruption of refined voluptuousness about it, and nothing of the sniggering indecency which disgraces men like Pope, like Voltaire, and like Sterne. It shows in its author a want of reverence, a want of decency in the proper sense, a too great readiness to condescend to the easiest kind of ludicrous ideas and the kind most acceptable at that time to the common run of mankind. The general taste having been considerably refined since, Rabelais has in parts become nearly unreadable,—the worst and most appropriate punishment for his faults. As for those who have tried to make his indecency an argument for his laxity in religious principle, that argument, like another mentioned previously, hardly needs discussion. It is notoriously false as a matter of experience. Rabelais could not have written as he has written in this respect and in others if he had been an earnestly pious person, taking heed to every act and word, and studious equally not to offend and not to cause offence. But no one in his senses would dream of claiming any such character for him.

This brings us to the last point—what his religious opinions were. He has been claimed as a freethinker of all shades, from undogmatic theism to atheism, and as a concealed Protestant. The last of these claims has now been very generally given up, and indeed Erasmus might quite as reasonably be claimed for the Reformation as Rabelais. Both disliked and attacked the more crying abuses of their church, and both at the time and since have been disliked and attacked by the more imprudent partisans of that church. But Rabelais, in his own way, held off from the Reformation even more distinctly than Erasmus did. The accusation of freethinking, if not of directly anti-Christian thinking, has always been more common and has recently found much favour. It is, however, remarkable that those who hold this opinion never give chapter and verse for it, and it may be said confidently that chapter and verse cannot be given. The sayings attributed to Rabelais which colour the idea (such as the famous "Je vais chercher un grand peut-être," said to have been uttered on his death-bed) are, as has been said, purely apocryphal. In the book itself nothing of the kind is to be found. Perhaps the nearest approach to it is a jest at the Sorbonne couched in the Pauline phrase about "the evidence of things not seen," which the author removed from the later editions. But irreverences of this kind, as well as the frequent burlesque citations of the Bible, whether commendable or not, had been, were, have since been, and are common in writers whose orthodoxy is unquestioned; and it must be remembered that the later Middle Age, which in many respects Rabelais represents almost more than he does the Renaissance, was, with all its unquestioning faith, singularly reckless and, to our fancy, irreverent in its use of the sacred words and images, which were to it the most familiar of all images and words. On the other hand, there are in the book, in the description of Gargantua's and Pantagruel's education, in the sketch of the abbey of Thelema, in several passages relating to Pantagruel, expressions which either signify a sincere and unfeigned piety of a simple kind or else are inventions of the most detestable hypocrisy. For these passages are not, like many to be found from the Renaissance to the end of the 18th century, obvious flags of truce to cover attacks,—mere bowings in the house of Rimmon to prevent evil consequences. There is absolutely no sign of the tongue in the cheek. They are always written in the author's highest style, a style perfectly eloquent and unaffected; they can only be interpreted (on the freethinking hypothesis) as allegorical with the greatest difficulty and obscurity, and it is pretty certain that no one reading the book without a thesis to prove would dream of taking them in a non-natural sense. It is not, indeed, to be contended that Rabelais was a man with whom religion was in detail a constant thought, that he had a very tender conscience or a very scrupulous orthodoxy. His form of religious sentiment was not evangelical or mystical, any more than it was ascetic or ceremonial or dogmatic. As regards one of the accepted doctrines of his own church, the excellence of the celibate life, of poverty, and of elaborate obedience to a rule, he no doubt was a strong dissident; but the evidence that, as a Christian, he was unorthodox, that he was even an heretical or latitudinarian thinker in regard to those doctrines which the various Christian churches have in common, is not merely weak, it is practically non-existent. The counter testimony is, indeed, not very strong and still less detailed. But that is not the point. It is sufficient to say that there is absolutely nothing within the covers of Rabelais's works incompatible with an orthodoxy which would be recognized as sufficient by Christendom at large, leaving out of the question those points of doctrine and practice on which Christians differ. Beyond this no wise man will go, and short of it hardly any unprejudiced man will stop.

The dates of the original editions of Rabelais's works have been given where possible already. The earlier books were repeatedly reissued during the author's life, and always with some correction. What may be called the first complete edition appeared in 1567 at Lyons, published by Jean Martin. It is computed that no less than sixty editions were printed before the close of the 16th century. A very considerable time, however, elapsed before the works were, properly speaking, edited. Huet devoted much pains to them, but his results were not made public. The first edition which calls for notice, except in a complete bibliography, is that of Le Duchat (Amsterdam, 1711). Le Duchat was a very careful student, and on the whole a very efficient editor, being perhaps, of the group of students of old French at the beginning of the 18th century, which included La Monnoye and others, the most sober, critical, and accomplished. But at that time the knowledge of the period was scarcely far enough advanced. The next important date in the bibliography of Rabelais is 1823, in which year appeared the most elaborate edition of his work yet published, that of Esmangart and Johanneau (9 vols.), including for the first time the "Songes Drolatiques," a spurious but early and not uninteresting collection of grotesque figure-drawings illustrating *Gargantua* and *Pantagruel*, and the second edition of M. de l'Aulnaye, containing a bad text but a useful glossary. From this time the editions have been very numerous. Among them may be mentioned those illustrated by Gustave Doré, first on a small scale (1854), afterwards more elaborately (1870); that of the Collection Didot by Burgaud des Marets and Rathery (1859, second edition 1870); the Bibliothèque Elzévirienne edition by MM. Lacour and A. de Montaiglon; that of the Nouvelle Collection Jannet (seven small volumes, 1867-74), completed by M. Moland; and lastly, the edition of M. Marty-Laveaux in the Collection Lemerre (1868-81), which is unfortunately not yet completed, but which when finished will undoubtedly be the handsomest, the most accurate, and the most complete in the scholarly sense yet published. At present the most really useful edition which combines a handsome form with cheapness is that of the Nouvelle Collection Jannet, though that of MM. Burgaud des Marets and Rathery is not to be despised. Commentaries on Rabelais, independent of editions, have been especially numerous of late years; the work of MM. Reville, Noel, Mayrargues, and Gebhart may be mentioned. But the best recent book on the subject in French is that of M. J. Fleury (2 vols., Paris, 1876), which, though deficient in exactitude as to many points of detail, and sacrificing something to a desire of presenting Rabelais as a great social philosopher, is, on the whole, very sensible and complete.

Rabelais was very early popular in England. There are possible allusions to him in Shakespeare, and the current clerical notion of him is very unjustly adopted by Marston in the words "wicked Rabelais"; but Bacon described him better as the great jester of France, and a Scot, Sir Thomas Urquhart, translated the earlier books in 1653. This was not worthily completed till the luckless Motteux, or, as his compatriots call him, Le Motteux, finished it with an extensive commentary. Criticism of a scattered kind on Rabelais in English is abundant, that of Coleridge being the most important, while the constant evidence of his influence in Southey's *Doctor* is also noteworthy. But he was hardly treated as a whole before Mr Besant's book on the subject in the *Foreign Classics for English Readers* (1879), which the author has since followed up with *Readings from Rabelais* (1883). Mr Besant has too readily adopted (probably from Michelet) the apocryphal scandals as to the difference between Rabelais and the poets of the Pléiade, and is committed (it is not quite clear why) to a view of Rabelais as a non-Christian thinker and preacher for which it is impossible to discover solid justification. But otherwise his books form the best introduction possible for a modern English reader to this great author. (G. SA.)

RABENER, GOTTLIEB WILHELM (1714-1771), German satirist, was born in 1714 near Leipsic, and after studying law at that city entered the civil service, in which he continued for many years. He died on 22d March 1771. The papers which he published in the *Bremer Beiträge* were subsequently collected into a *Sammlung satirischer Schriften* (2 vols., 1751), to which two volumes were afterwards added. The work passed through numerous editions. Rabener's *Freundschaftliche Briefe* were published posthumously by C. F. Weisse with a biography. (See GERMANY, vol. x. p. 533.)

RABIES, a virulent disease, developed primarily in and peculiar to the canine species. Its occurrence in the same manner in other carnivorous animals, as the fox, wolf, hyæna, jackal, raccoon, badger, and skunk, has been asserted; but there is every probability that it is originally a disease of the dog. It is communicated by inoculation to nearly all, if not all, warm-blooded creatures. The transmission from one animal to another only certainly takes place through inoculation with viruliferous matters. The malady is generally characterized at a certain stage by an irrepressible desire in the animal to act offensively with its natural weapons,—dogs and other carnivora attacking with their teeth, herbivora with their hoofs or horns, and birds with their beaks, when excited ever so slightly. In the absence of excitement the malady may run its course without any fit of fury or madness. Transmission of the disease to man produces HYDROPHOBIA (*q.v.*) or dread of water, but in animals this symptom is rarely, if ever, observed. Rabies has been known from the very earliest times, and serious outbreaks have been recorded as occurring among dogs, wolves, and foxes in different parts of the world, particularly in western Europe and in North and South America. It is very frequent in Europe and appears to be on the increase. France, Germany, upper Italy, and Holland evidently suffer more than other Continental countries. England is becoming more frequently visited than before, though Scotland and Ireland are much less troubled than England. Spain is also sometimes severely scourged by it; but it is rare in Portugal. On the American continent it is well known, though on the eastern side of the Andes it is rarely if ever seen; and it has never been heard of in Quito. In the West Indies—in Hispaniola, Jamaica, Domingo, Havana, Guadaloupe, and Hayti—as well as in Ceylon, it is frequently witnessed, and in 1813 it was introduced into Mauritius. It exists in North and South China, and has been reported in Cochin China and the kingdom of Anam. It is frequent and fatal in India; and it is by no means rare in Syria, Palestine, and Turkey. It has been observed in the Ḥijáz in Arabia, and in North Africa and Egypt. Hydrophobia has been reported in Algeria; but Rohlfs asserts that it is unknown in Morocco. Gibraltar and Malta have been seriously invaded at times, and in Sweden, Denmark, Norway, Russia, and Lapland it has been frequently seen in an epizootic form; but it is not yet positively decided whether it exists in the Arctic regions. Steller and Erman assert that it is unknown in Kamchatka and Greenland; but Hayes (*The Open Polar Sea*) gives us the particulars of an outbreak of disease in South Greenland, which persisted for several years, caused him the loss of his sledge-dogs in 1870, and in 1872 extended from Smith's Sound to Jakobshavn, threatening the utter extinction of the species, and with it the disappearance of the Eskimo. In most of its features it appeared to be rabies. The scourge is unknown, according to reliable evidence, in Australia and New Zealand, Tasmania, the Azores, and St Helena, as well as the island of Madeira; it has not been seen at Sumatra, nor in East, South, and West Africa, nor in the island of Réunion.

Rabies (hydrophobia) is almost invariably fatal in man, and in the dog it nearly always terminates in death, though instances of recovery are recorded; and it is extremely probable that in those cases in which people have been bitten by dogs and subsequently perished from hydrophobia, without the animals themselves offering any marked indications of illness either at the time or afterwards, these have been suffering from a mild form of the disease. It is also fatal to horses, cows, pigs, goats, and cats, but not to fowls, many of these recovering from accidental or experimental inoculation. Indeed rabies varies considerably in intensity and in the character of its symptoms in different species of creatures. Pasteur has shown that, if it is transmitted from the diseased dog to the monkey and ultimately from monkey to monkey, at each transmission it becomes more attenuated in virulence, and remains so attenuated when passed again to the dog, rabbit, or guinea-pig, nor will it any longer produce the disease in dogs by hypodermic inoculations. Even inoculation by trepanning the cranium, which is so infallible in conveying rabies, may produce no result, the dog thenceforward being protected, and no longer capable of receiving the disease. On the other hand, the rabific virus is intensified when passed from rabbit to rabbit, or from guinea-pig to guinea-pig; and after several transmissions through the bodies of these animals it regains the maximum virulence which it possessed before it was enfeebled by being passed through the monkey. And the same thing holds with respect to the virulence of the ordinary rabid dog: when virus which is far from having reached its maximum intensity is conveyed to the rabbit, it requires to be passed through several of these animals before it reaches its maximum. It may be mentioned that the disease is not readily conveyed from man to animals, either accidentally or experimentally. The virus appears to exist in greatest intensity in the salivary glands and their secretion, in the brain and spinal cord, and perhaps to a lesser degree in the blood; doubtless it exists also in other fluids and tissues of the diseased animal. The principal alterations found in the bodies of rabid animals after death are located in the spinal cord, especially its upper portion, the medulla oblongata, certain parts of the brain, and the salivary glands, more particularly the submaxillary and sublingual,—less in the parotid. The stomach, kidneys, and other organs also present alterations which are more or less significant, especially the former, in which foreign bodies, as hair, wood, stones, earth, pieces of cloth, &c., are very frequently found. But the nature of the lesions, as well as the symptomatology, shows that the action of the poison is more especially exerted on the brain or spinal cord, though the eighth pair of nerves, and branches of the fifth and seventh pairs, are not involved in animals, as in man.

The period in which the symptoms of the disease become manifest, especially after accidental inoculations, as bites, varies extremely; indeed there is no disease in which the period of latency or incubation is more variable or protracted, this being sometimes limited to a few days or weeks and extending in rare cases to more than twelve months. In experimental inoculations the period is greatly shortened and the results more certain,—all the more so if the virus is introduced into the cranial cavity by trepanning, or into the blood-stream by intravenous inoculation. In accidental inoculations, as in wounds from rabid dogs, a certain but varying percentage escape. This immunity may be due to natural non-receptivity, to the wound not having been inflicted in a very vascular part, or to the saliva having been expended from frequent bites on other animals, or intercepted by clothing, hair, wool, &c.

Symptoms.—The disease has been divided into three stages or periods, and has also been described as appearing in at least two forms, according to the peculiarities of the symptoms. But, as a rule, one period of the disease does not pass suddenly into another, the transition being almost imperceptible; and the forms do not differ essentially from each other, but appear merely to constitute varieties of the same disease, due to the natural disposition of the animal, or other modifying circumstances. These forms have been designated *true* or *furious rabies* (Fr. *rage vrai*; Germ. *rasende Wuth*) and *dumb rabies* (Fr. *rage mue*; Germ. *stille Wuth*).

The malady does not commence with fury and madness, but in a strange and anomalous change in the habits of the dog: it becomes dull, gloomy, and taciturn, and seeks to isolate itself in out-of-the-way places, retiring beneath chairs and to odd corners. But in its retirement it cannot rest; it is uneasy and fidgety, and no sooner has it lain down than suddenly it jumps up in an agitated manner, walks backwards and forwards several times, again lies down and assumes a sleeping attitude, but has only maintained it for a few minutes when it is once more moving about. Again it retires to its corner, to the farthest recess it can find, and huddles itself up into a heap, with its head concealed beneath its chest and fore-paws. This state of continual agitation and inquietude is in striking contrast with its ordinary habits, and should therefore receive attention. Not unfrequently there are a few moments when the creature appears more lively than usual, and displays an extraordinary amount of affection. Sometimes there is a disposition to gather up straw, thread, bits of wood, &c., which are industriously carried away; a tendency to lick anything cold, as iron, stones, &c., is also observed in many instances; and there is also a desire evinced to lick other animals. Sexual excitement is also frequently an early symptom. At this period no disposition to bite is observed; the animal is docile with its master and obeys his voice, though not so readily as before, nor with the same pleased countenance. There is something strange in the expression of its face, and the voice of its owner is scarcely able to make it change from a sudden gloominess to its usual animated aspect. These symptoms gradually become more marked: the restlessness and agitation increase. If on straw the dog scatters and pulls it about with its paws, and if in a room it scratches and tumbles the cushions or rugs on which it usually lies. It is incessantly on the move, rambling about, scratching the ground, sniffing in corners and at the doors, as if on the scent or seeking for something. It indulges in strange movements, as if affected by some mental influences, or a prey to hallucinations. When not excited by any external influence it will remain for a brief period perfectly still and attentive, as if watching something, or following the movements of some creature on the wall; then it will suddenly dart forward and snap at the vacant air, as if pursuing an annoying object, or endeavouring to seize a fly. At another time it throws itself, yelling and furious, against the wall, as if it heard threatening voices on the other side, or was bent on attacking an enemy. Nevertheless, the animal is still docile and submissive, for its master's voice will bring it out of its frenzy. But the saliva is already virulent, and the excessive affection which it evinces at intervals, by licking the hands or face of those it loves, renders the danger very great should there be a wound or abrasion. Until a late period in the disease the master's voice has a powerful influence over the animal. When it has escaped from all control and wanders erratically abroad, ferocious and restless, and haunted by horrid phantoms, the familiar voice yet exerts its influence, and it is rare indeed that it attacks its master.

There is no dread of water in the rabid dog; the animal is generally thirsty, and if water be offered will lap it with avidity, and swallow it at the commencement of the disease. And, when, at a later period, the constriction about the throat—symptomatic of the disease—renders swallowing difficult, the dog will none the less endeavour to drink, and the lappings are as frequent and prolonged when deglutition becomes impossible. So little dread has the rabid dog of water that it will ford streams and swim rivers; and when in the ferocious stage it will even do this in order to attack other creatures on the opposite side. The evidence on this head is overwhelming.

At the commencement of the disease the dog does not usually refuse to eat, and some animals are voracious to an unusual degree. But in a short time it becomes fastidious, only eating what it usually has a special predilection for. Soon, however, this gives place to a most characteristic symptom—either the taste becomes extremely depraved or the dog has a fatal and imperious desire to bite and ingest everything. The litter of its kennel, wool from cushions, carpets, stockings, slippers, wood, grass, earth, stones, glass, horse-dung, even its own fæces and urine, or whatever else may come in its way, are devoured. On examination of the body of a dog which has died of rabies it is so common to find in the stomach a quantity of dissimilar and strange matters on which the teeth have been exercised that, if there was nothing known of the animal's history, there would be strong evidence of its having been affected with the disease. When a dog, then, is observed to gnaw and eat suchlike matters, though it exhibits no tendency to bite, it should be suspected.

The mad dog does not usually foam at the mouth to any great extent at first. The mucus of the mouth is not much increased in quantity, but it soon becomes thicker, viscid, and glutinous, and adheres to the angles of the mouth, fauces, and teeth. It is at this period that the thirst is most ardent, and the dog sometimes furiously attempts to detach the saliva with its paws; and, if after a while it loses its balance in these attempts and tumbles over, there can no longer be any doubt as to the nature of the malady. There is another symptom connected with the mouth in that form of the disease named "dumb madness" which has frequently proved deceptive. The lower jaw drops in consequence of paralysis of its muscles, and the mouth remains open. The interior is dry from the air passing continually over it, and assumes a deep red tint, somewhat masked by patches of dust or earth, which more especially adhere to the upper surface of the tongue and to the lips. The strange alteration produced in the dog's physiognomy by its constantly open mouth and the dark colour of the interior is rendered still more characteristic by the dull, sad, or dead expression of the animal's eyes. In this condition the creature is not very dangerous, because generally it could not bite if it tried,—indeed there does not appear to be much desire to bite in dumb madness; but the saliva is none the less virulent, and accidental inoculations with it, through imprudent handling, will prove as fatal as in the furious form. The mouth should not be touched,—numerous deaths having occurred through people thinking the dog had some foreign substance lodged in its throat, and thrusting their fingers down to remove it. The sensation of tightness which seems to exist at the throat causes the dog to act as if a bone were fixed between its teeth or towards the back of its mouth, and to employ its fore-paws as if to dislodge it. This is a very deceptive symptom, and may prove equally dangerous if caution be not observed. Vomiting of blood or a chocolate-coloured fluid is witnessed in some cases, and has been supposed to be due to the foreign substances in the stomach, which abrade the lining membrane; this, however, is not correct, as it has been observed in man.

The voice of the rabid dog is very peculiar, and so characteristic that to those acquainted with it nothing more is needed to prove the presence of the disease. Those who have heard it once or twice never forget its signification. Owing to the alterations taking place in the larynx the voice becomes hoarse, cracked, and stridulous, like that of a child affected with croup,—the "voix du coq," as the French have it. A preliminary bark is made in a somewhat elevated tone and with open mouth; this is immediately succeeded by five, six, or eight decreasing howls, emitted when the animal is sitting or standing, and always with the nose elevated, which seem to come from the depths of the throat, the jaws not coming together and closing the mouth during such emission, as in the healthy bark. This alteration in the voice is frequently the first observable indication of the malady, and should at once attract attention. In dumb madness the voice is frequently lost from the very commencement,—hence the designation.

The sensibility of the mad dog appears to be considerably diminished, and the animal appears to have lost the faculty of expressing the sensations it experiences: it is mute under the infliction of pain, though there can be no doubt that it still has peripheral sensation to some extent. Burning, beating, and wounding produce much less effect than in health, and the animal will even mutilate itself with its teeth. Suspicion, therefore, should always strongly attach to a dog which does not manifest a certain susceptibility to painful impressions and receives punishment without any cry or complaint. There is also reason for apprehension when a dog bites itself persistently in any part of its body. A rabid dog is usually stirred to fury at the sight of one of its own species; this test has been resorted to by Bouley to dissipate doubts as to the existence of the disease when the diagnosis is otherwise uncertain. As soon as the suspected animal, if it is really rabid, finds itself in the presence of another of its species it at once assumes the aggressive, and, if allowed, will bite furiously. All rabid animals indeed become excited, exasperated, and furious at the sight of a dog, and attack it with their natural weapons, even the timid sheep when rabid butts furiously at the enemy before which in health it would have fled in terror. This inversion of sentiment is sometimes valuable in diagnosing the malady; it is so common that it may be said to be present in every case of rabies. When, therefore, a dog, contrary to its habits and natural inclination, becomes suddenly aggressive to other dogs, it is time to take precautions.

In the large majority of instances the dog is inoffensive in the early period of the disease to those to whom it is familiar. It then flies from its home and either dies, is killed as "mad," or returns in a miserable plight, and in an advanced stage of the malady, when the desire to bite is irresistible. It is in the early stage that sequestration and suppressive measures are most valuable. The dogs which propagate the disease are usually those that have escaped from their owners. After two or three days, frequently in about twelve hours, more serious and alarming symptoms appear, ferocious instincts are developed, and the desire to do injury is irrepressible. The animal has an indefinable expression of sombre melancholy and cruelty. The eyes have their pupils dilated, and emit flashes of light when they are not dull and heavy; they always appear so fierce as to produce terror in the beholder; they are red and their sensibility to light is increased; and wrinkles, which sometimes appear on the forehead, add to the repulsive aspect of the animal. If caged it flies at the spectator, emitting its characteristic howl or bark, and seizing the iron bars with its teeth, and if a stick be thrust before it this is grasped and gnawed. This fury is soon succeeded by lassitude, when the animal remains insensible to every excitement. Then all at once it rouses up again, and another paroxysm of fury commences. The first paroxysm is usually the most intense, and the fits vary in duration from some hours to a day, and even longer; they are ordinarily briefer in trained and pet dogs than in those which are less domesticated, but in all the remission is so complete after the first paroxysm that the animals appear to be almost well, if not in perfect health. During the paroxysms respiration is hurried and laboured, but tranquil during the remissions. There is an increase of temperature and the pulse is quick and hard. When the animal is kept in a dark place and not excited, the fits of fury are not observed. Sometimes it is agitated and restless in the manner already described. It never becomes really furious or aggressive unless excited by external objects,—the most potent of these, as has been said, being another dog, which, however, if it be admitted to its cage, it may not at once attack. The attacked animal rarely retaliates, but usually responds to the bites by acute yells, which contrast strangely with the silent anger of the aggressor, and tries to hide its head with its paws or beneath the straw. These repeated paroxysms hurry the course of the disease. The secretion and flowing of a large quantity of saliva from the mouth are usually only witnessed in cases in which swallowing has become impossible, the mouth being generally dry. At times the tongue, nose, and whole head appear swollen. Other dogs frequently shun one which is rabid, as if aware of their danger.

The rabid dog, if lodged in a room or kept in a house, is continually endeavouring to escape; and when it makes its escape it goes freely forward, as if impelled by some irresistible force. It travels considerable distances in a short time, perhaps attacking every living creature it meets,—preferring dogs, however, to other animals, and these to mankind; cats, sheep, cattle, and horses are particularly liable to be injured. It attacks in silence, and never utters a snarl or a cry of anger; should it chance to be hurt in return it emits no cry or howl of pain. The degree of ferocity appears to be related to natural disposition and training. Some dogs, for instance, will only snap or give a slight bite in passing, while others will bite furiously, tearing the objects presented to them, or which they meet in their way, and sometimes with such violence as to injure their mouth and break their teeth, or even their jaws. If chained, they will in some cases gnaw the chain until their teeth are worn away and the bones laid bare. The rabid dog does not continue its progress very long. Exhausted by fatigue and the paroxysms of madness excited in it by the objects it meets, as well as by hunger, thirst, and also, no doubt, by the malady, its limbs soon become feeble; the rate of travelling is lessened and the walk is unsteady, while its drooping tail, head inclined towards the ground, open mouth, and protruded tongue (of a leaden colour or covered with dust) give the distressed creature a very striking and characteristic physiognomy. In this condition, however, it is much less to be dreaded than in its early fits of fury, since it is no longer capable or desirous of altering its course or going out of its way to attack an animal or a man not immediately in the path. It is very probable that its fast-failing vision, deadened scent, and generally diminished perception prevent its being so readily impressed or excited by surrounding objects as it previously was. To each paroxysm, which is always of short duration, there succeeds a degree of exhaustion as great as the fits have been violent and oft repeated. This compels the animal to stop; then it shelters itself in obscure places—frequently in ditches by the roadside—and lies there in a somnolescent state for perhaps hours. There is great danger, nevertheless, in disturbing the dog at this period, for when roused from its torpor it has sometimes sufficient strength to inflict a bite. This period, which may be termed the second stage, is as variable in its duration as the first, but it rarely exceeds three or four days. The above-described phenomena gradually merge into those of the third or last period, when symptoms of paralysis appear, which are speedily followed by death. During the remission in the paroxysms these paralytic symptoms are more particularly manifested in the hind limbs, which appear as if unable to support the animal's weight, and cause it to stagger about; or the lower jaw becomes more or less drooping, leaving the parched mouth partially open. Emaciation rapidly sets in, and the paroxysms diminish in intensity, while the remissions become less marked. The physiognomy assumes a still more sinister and repulsive aspect; the hair is dull and erect; the flanks are retracted; the eyes lose their lustre and are buried in the orbits, the pupil being dilated, and the cornea dull and semi-opaque; very often, even at an early period, the eyes squint, and this adds still more to the terrifying appearance of the poor dog. The voice, if at all heard, is husky, the breathing laborious, and the pulse hurried and irregular. Gradually the paralysis increases, and the posterior extremities are dragged as if the animal's back were broken, until at length it becomes general; it is then the prelude to death. Or the dog remains lying in a state of stupor, and can only raise itself with difficulty on the fore-limbs when greatly excited. In this condition it may yet endeavour to bite at objects within its reach. At times convulsions of a tetanic character appear in certain muscles; at other times these are general. A comatose condition ensues, and the rabid dog, if permitted to die naturally, perishes, in the great majority of cases, from paralysis and asphyxia.

In dumb madness there is paralysis of the lower jaw, which imparts a curious and very characteristic physiognomy to the dog; the voice is also lost, and the animal can neither eat nor drink. In this condition the creature remains with its jaw pendent and the mouth consequently wide open, showing the flaccid or swollen tongue covered with brownish matter, and a stringy gelatinous-looking saliva lying between it and the lower lip and coating the fauces, which sometimes appear to be inflamed. Though the animal is unable to swallow fluids, the desire to drink is nevertheless intense; for the creature will thrust its face into the vessel of water in futile attempts to obtain relief, even until the approach of death. Water may be poured down its throat without inducing a paroxysm. The general physiognomy and demeanour of the poor creature inspire the beholder with pity rather than fear. The symptoms due to cerebral excitement are less marked than in the furious form of the disease; the agitation is not so considerable, and the restlessness, tendency to run away, and desire to bite are nearly absent; generally the animal is quite passive. Not unfrequently one or both eyes squint, and it is only when very much excited that the dog may contrive to close its mouth. Sometimes there is swelling about the pharynx and the neck; when the tongue shares in this complication it hangs out of the mouth. In certain cases there is a catarrhal condition of the membrane lining the nasal cavities, larynx, and bronchi; sometimes the animal testifies to the existence of abdominal pain, and the fæces are then soft or fluid. The other symptoms—such as the rapid exhaustion and emaciation, paralysis of the posterior limbs towards the termination of the disease, as well as the rapidity with which it runs its course—are the same as in the furious form.

The simultaneous occurrence of furious and dumb madness is frequently observed in packs of fox-hounds. Dumb madness differs, then, from the furious type in the paralysis of the lower jaw, which hinders the dog from biting, save in very exceptional circumstances; the ferocious instincts are also in abeyance; and there is no tendency to aggression. It has been calculated that from 15 to 20 per cent. of rabid dogs have this particular form of the disease. Puppies and young dogs chiefly have furious rabies.

These are the symptoms of rabies in the dog; but it is not likely, nor is it necessary, that they will all be present in every case. In other species the symptoms differ more or less from those manifested by the dog, but they are generally marked by a change in the manner and habits of the creatures affected, with strong indications of nervous disturbance, in the majority of species amounting to ferociousness and a desire to injure, timid creatures becoming bold and aggressive. (See Fleming, *Rabies and Hydrophobia.*)

In order to prevent injury from this disease in countries in which it is prevalent owners of dogs should be well acquainted with its symptoms, especially the premonitory ones; of these a change in the demeanour and habits of the animal—unusual irritability, depraved appetite, restlessness, and a tendency to wander from home—are the most marked. One of the chief police measures is diminution in the number of useless dogs. This is best enforced by the imposition of a dog-tax or licence, which may be large or small in proportion to the number of dogs or the urgency of the case. On the licence-paper the chief symptoms of the malady should be described so as to warn dog-owners. Every dog should wear a collar with a brass plate, on which are inscribed the name and address of the owner as well as a police register-number stamped thereon, or some particular mark affixed by the police or inland revenue authorities, for purposes of identification; all stray dogs without a collar of this description ought to be captured, and sold or destroyed after three or more days if not claimed. Blunting the canine and incisor teeth of dogs has also been proposed as a precautionary measure. All dogs suspected of rabies should be captured and, when the existence of the disease is confirmed, destroyed. Rabid dogs should be destroyed at once. It is also well as a precautionary measure to kill dogs or cats which have been bitten or "worried" by rabid animals. During an outbreak of rabies all dogs should be securely muzzled and if possible led. It is a great mistake to destroy immediately suspected dogs which have bitten people; they should be kept until their condition is ascertained, as, if they are found to be healthy, this will greatly relieve the mind of those who have been bitten. Suspected dogs should be carefully kept under observation and frequently inspected by a veterinary surgeon or other competent person. All wounds inflicted by strange or suspected dogs should be immediately attended to and treated by suction, washing, and expression, until proper surgical treatment can be adopted. In those countries in which the disease has not yet appeared, in order to prevent its admission, the importation of dogs should be forbidden or an extended period of quarantine imposed.

We may here allude to the results of Pasteur's experiments in rabies. By passing modified virus into the bodies of dogs he has discovered that they are protected from an attack of the disease—are, in fact, rendered refractory to rabies. For instance, rabific virus is obtained from a rabbit which has died after inoculation by trepanning, and after a period of incubation longer by some days than the shortest period in these animals, which is invariably between seven and eight days subsequent to inoculation with the most active virus. The virus of the rabbit in the period of long incubation is inoculated by trepanning into a second rabbit, the virus of this into a third; and on each occasion the virus, which becomes more and more potent, is inoculated into a dog. The latter at last becomes capable of supporting what would be to other dogs a deadly virus, and is entirely proof against rabies either by intravenous inoculation, by trepanning, or by the virus of a rabid animal. By using the blood of rabid animals in certain determinate conditions Pasteur has been able to greatly simplify the operations of inoculation, and to render dogs most decidedly refractory to the malady. There is great importance attached to the suggestion that now, and until rabies has been extinguished altogether by inoculation, it may be possible to prevent development of the disease after bites from rabid dogs, owing to the long duration of the incubative period. Admitting that rabies is produced by the bite of rabid animals only, and that Pasteur's inoculations are really protective, it is suggested that a law compelling all dogs to be so protected would in the end extirpate the disease. But certain important points have yet to be decided before any definite conclusion can be arrived at. (G. FL.)

RABUTIN, ROGER DE, COMTE DE BUSSY (1618-1693), commonly known as BUSSY-RABUTIN (and for shortness BUSSY), is perhaps the most characteristic figure among the lesser noblesse of France in the 17th century, as La Rochefoucauld is among the greater. Bussy, however, except in point of gallantry and literary power, chiefly illustrated the evil sides of the character. He represented a family of distinction and age in Burgundy (see SÉVIGNÉ, Madame de), and his father was Léonor de Rabutin, a soldier of merit and a man of position, holding the lieutenant-generalship of the province of Nivernais. Bussy-Rabutin (it is perhaps advisable to add the family name to distinguish him from the hardly less famous Bussy d'Amboise) was born in 1618. He was the third son, but by the death of his elder brothers became the representative of the family. He entered the army when he was only sixteen and fought through several campaigns, succeeding his father in the office of "mestre de camp." But he very early distinguished himself in other ways than that of military service, and in 1641 was sent to the Bastille by Richelieu for some months as a punishment for neglect of his duties in running after his ladyloves. In 1643 he married a cousin, Gabrielle de Toulongeon, who seems to have been fond of him, and for a short time he left the army. But in 1644 he again bought a commission and for some years was closely connected with the great Condé. His wife died, and he became more famous, or at least more notorious, than ever by an attempt to abduct Madame de Miramion, a rich widow. This affair was with some difficulty made up and Bussy afterwards married Louise de Rouville. When the Fronde broke out he, like others, went from party to party, but finally passed to the royal side. He fought with some distinction both in the civil war and on foreign service, and in 1655 he went to serve under Turenne in Flanders. He served there for several campaigns and distinguished himself at the battle of the Dunes and elsewhere; but he did not get on well with his general, and his quarrelsome disposition, his overweening vanity, and his habit of composing libellous *chansons* by degrees made him the enemy of most persons of position both in the army and at court. In the year 1659 he fell into disgrace for having taken part in an orgy or series of orgies at Roissy near Paris during Holy Week, which caused great scandal, and shortly afterwards he began to compose for the amusement of his mistress, Madame de Montglas, his famous *Histoire Amoureuse des Gaules.* This book—a series of sketches of the chief ladies of the court, not without wit, but much less remarkable for wit than for ill nature and licence—circulated freely in manuscript and had numerous spurious sequels. One of these stung the king, and Bussy was in 1665 sent to the Bastille, where he remained for more than a year, and from which he was only liberated on condition of retiring to his estates. Here he abode in what was then called exile for seventeen years. He was then restored to a modified degree of royal favour, but never received any great mark of it, and died in 1693.

Although a man of considerable abilities, Bussy had very little in his character that was either amiable or estimable. Despite his extravagant pride of birth and rank, there is much reason for acquiescing in the verdict pronounced on him (by an anonymous contemporary apparently), that he was "a coxcomb, who never, either at court or in camp, lost the taste for bad company and the air of a rustic"; his bravery was undoubted, but he seems to have much overrated his own military ability. He libelled friends and foes alike, and any toleration which might be extended to his innumerable gallantries is lessened by his incorrigible habit of telling tales and his spiteful scandal-mongering against women who had left him or whom he had left. He was, however, possessed of much literary power. The *Histoire Amoureuse* is in its most striking passages merely adapted from Petronius, and, except in a few portraits, its attractions are chiefly those of the scandalous chronicle. But his *Mémoires*, published after his death, are extremely lively and characteristic, and his voluminous correspondence yields in variety and interest to few collections of the kind, except Madame de Sévigné's, who indeed is represented in it to a great extent, and whose letters first appeared in it. The literary and historical student, therefore, owes Bussy some thanks. But it is impossible not to see that he united some of the worst characteristics of an aristocracy on the way to decadence—relaxed morals, a glaring indifference to duty and to all motives but self-interest, insolence in prosperity, servility in adverse circumstances, jealousy of others more favoured than himself.

The best edition of the *Histoire Amoureuse des Gaules* is that of Boiteau and Livet in the Bibliothèque Elzévirienne (4 vols., Paris, 1856-76), of the *Mémoires* and *Correspondance* that of Lalanne (8 vols., Paris, 1857-59). Bussy wrote other things, of which the most important, his *Genealogy of the Rabutin Family*, remained in MS. till 1867.

RACCOON. This name,[1] familiar to all readers of works on American natural history, is borne by a small carnivore belonging to that section of the order which contains the bears, weasels, badgers, &c (see MAMMALIA, vol. xv. p. 440). The raccoon resembles in many respects a diminutive bear, both in its general build and in the proportions of its skull and teeth, which last are broad, blunt, and rounded, and more suited for a semi-vegetarian than for an exclusively animal diet. Its other more important zoological characters, with an account of its systematic position, have been already noted in the article just referred to. The common North-American raccoon (*Procyon lotor*) is a clumsy thickly-built animal about the size of a badger, with a coat of long coarse greyish brown hairs, short ears, and a bushy black and white ringed tail. Its range extends over the whole of the United States, and stretches on the west northwards to Alaska and southwards well into Central America, where it attains its maximum size. The following notes on the habits of the raccoon are extracted from Dr C. Hart Merriam's charming work on the mammals of the Adirondacks (N. E. New York).

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[1] A corruption of the North-American Indian "arrathkune" or "arathcone." The French *raton* or *raton laveur*, German *Waschbär*, and other European names are derived from a curious habit the raccoon has of dipping or washing its food in water before eating it.

Raccoon.

> "Raccoons are omnivorous beasts and feed upon mice, small birds, birds' eggs, turtles and their eggs, frogs, fish, crayfish, molluscs, insects, nuts, fruits, maize, and sometimes poultry. Excepting alone the bats and flying-squirrels, they are the most strictly nocturnal of all our mammals, and yet I have several times seen them abroad on cloudy days. They haunt the banks of ponds and streams, and find much of their food in these places, such as crayfish, mussels, and fish, although they are unable to dive and pursue the latter under water, like the otter and mink. They are good swimmers and do not hesitate to cross rivers that lie in their path. . . . The raccoon hibernates during the severest part of the winter, retiring to its nest rather early, and appearing again in February or March, according to the earliness or lateness of the season. It makes its home high up in the hollow of some large tree, preferring a dead limb to the trunk itself. It does little in the way of constructing a nest, and from four to six young are commonly born at a time, generally early in April in this region. The young remain with the mother about a year."

The South-American species, *Procyon cancrivorus*, the crab-eating raccoon, is very similar to *P. lotor*, but differs by its much shorter fur, larger size, proportionally more powerful teeth, and other minor characters. It extends over the whole of South America, as far south as the Rio Negro, and is very common in all suitable localities. Its habits are similar to those of the North-American species.

RACHEL (1820 or 1821-1858), the stage name of a French actress, whose true name was ELIZABETH FÉLIX, and who was the daughter of Jacob Félix and Esther Haya, Alsatian Jews, who travelled on foot through France as pedlars. She was born according to one account on 24th March 1820, according to another on 28th February of the following year, in a small inn in Mumpf in the canton of Aargau, Switzerland. At Rheims she and her eldest sister Sophia, afterwards known as Sarah, joined a troupe of Italian children who made their living by singing in the cafés, Sarah taking part in the singing and Elizabeth, then only four years of age, collecting the coppers. In 1830 they came to Paris, where they sang in the streets, Rachel giving such patriotic songs as the *Parisienne* and the *Marseillaise* with a rude but precocious energy which evoked special admiration and an abundant shower of coppers. Choron, a famous teacher of singing, was so impressed with the talents of the two sisters that he undertook to give them gratuitous instruction, and after his death in 1833 they were received into the Conservatoire. Sophia gained a medal for singing, but Rachel at an early period gave her chief attention to elocution and acting. Her voice, though deep and powerful, was at first hard and inflexible; and her thin and meagre appearance conveyed an impression of insignificance, which her plain features and generally impassive manner tended to confirm. It was only her remarkable intelligence that encouraged her instructors to persevere; but even they did not recognize her talents as exceptional. She made her first appearance at the Gymnase in the *Vendéenne* in 1837 with only mediocre success. On 12th June of the following year she succeeded, after great difficulty, in making a début at the Théâtre Français, appearing as Camille in *Les Horaces*, when, attention having been directed to her remarkable genius by Jules Janin in the *Débats* and Madame de Girardin in the *Presse*, it at once received universal recognition. Her range of characters was limited, but within this range she was unsurpassable. It was especially in the tragedies of Racine and Corneille that she excelled, and more particularly in the impersonation of evil or malignant passion. By careful training her originally hard and harsh voice had become flexible and melodious, and its low and muffled notes under the influence of passion possessed a thrilling and penetrating quality that was irresistible. When excited her plain features became transfigured by the glow of genius, and in her impersonations of evil and malignant emotions there was a majesty and dignity which fascinated whilst it repelled. Her facial elocution was unsurpassable in variety and expressiveness, whilst the grace of her gestures and the marvellous skill with which she varied her tones with every shade of thought and emotion were completely beyond criticism. It was, however, the predominance of intellect and will rather than the perfection of her art that most specially characterized her impersonations and conferred on them their unique excellence. She appeared successively as Émilie in *Cinna*, Hermione in *Andromaque*, Ériphile in *Iphigénie*, Monime in *Mithridate*, and Aménaïde in *Tancrède*; but it was in *Phèdre*, which she first played on 21st January 1843, that her peculiar gifts were most strikingly manifested. In modern plays she created the characters of Judith and Cleopatra in the tragedies of Madame de Girardin, but her most successful appearance was in 1849 in *Adrienne Lecouvreur*. In 1840 she visited London, where her interpretations of Corneille and Racine were the sensation of the season. She also played successively in the principal capitals of Europe. In 1855 she made a tour in the United States with comparatively small success. This was, however, after her powers through continued ill-health had begun to deteriorate. She died of consumption at Cannet, near Cannes, on 4th January 1858.

RACINE, a city of the United States, the county seat of Racine county, Wisconsin, lies 23 miles by rail south of Milwaukee, and occupies a plateau projecting for about 6 miles into Lake Michigan, 40 feet above its level. The town is the seat of extensive manufacturing industries—producing carriages, waggons, ploughs, threshing-machines, portable steam-engines, fanning-mills, leather, blinds and sashes, school furniture, wire, linseed oil, baskets, &c.—is engaged in the lumber trade and general commerce, and contains two city hospitals, an orphan asylum, Racine (Episcopalian) college founded in 1852, and a Roman Catholic academy. The harbour is open to vessels drawing 15 feet. Racine, first settled in 1834, was incorporated in 1848, four years after the first steamer had entered the port. The population was 7822 in 1860, 9880 in 1870, and 16,031 in 1880.

RACINE, JEAN (1639-1699), the most equal and accomplished, if not the greatest, tragic dramatist of France, was born at La Ferté Milon in the old duchy of Valois in the month of December 1639. The 20th and the two following days of the month are variously given as his birthday; all that is certain is that he was christened on the 22d. The ceremony was at that time often, though not invariably, performed on the day of birth. Racine belonged to a family of the upper bourgeoisie, which had indeed been technically ennobled some generations earlier and bore the punning arms of a rat and a swan (*rat*, *cygne*). The poet himself subsequently dropped the rat. His family were connected with others of the same or a slightly higher station in La Ferté and its neighbourhood,—the Des Moulins, the Sconins, the Vitarts, all of whom appear in Racine's life. His mother was Jeanne Sconin. His father, of the same name as himself, was only four-and-twenty at the time of the poet's birth. He seems to have been a solicitor (*procureur*) by profession, and held, as his father, the grandfather of the dramatist, had done, the office of *controleur au grenier à sel*. Racine was the eldest child of his parents. Little more than a year afterwards his sister Marie was born and his mother died. Jean Racine the elder married again, but three months later he himself died and the stepmother is never heard of in connexion with the poet or his sister. They were left without any provision, but their grandparents, Jean Racine the eldest and Marie des Moulins, were still living, and took charge of them. These grandparents had a daughter, Agnes, who figures in Racine's history. She was a nun of Port Royal under the style of Mère de Sainte Thècle, and the whole family had strong Jansenist leanings. Jean Racine the eldest died in 1649, and, apparently as a consequence of this, the poet was sent to the Collége de Beauvais. This (which was the grammar-school of the town of that name, and not the famous Collége de Beauvais at Paris) was intimately connected with Port Royal, and to this latter place Racine was transferred in November 1655. His special masters there were Nicole and Le Maître. The latter, in an extant letter written to his pupil during one of the gusts of persecution which Port Royal constantly suffered, speaks of himself as "votre papa"; the manner in which Racine repaid this affection will be seen shortly. It is evident from documents that he was a very diligent student both at Beauvais and Port Royal. He wrote verse both in Latin and French, and his Port Royal odes, which it has been the fashion with the more fanatical admirers of his later poetry to ridicule, are far from despicable. They show the somewhat garrulous nature-worship of the Pléiade tempered by the example of the earlier school of Malherbe. He seems also to have made at least a first draft of his version of the breviary hymns; some, if not most, of a considerable mass of translations from the classics and annotations on them must also date from this time. Racine stayed at Port Royal for three years, and left it, aged nearly nineteen, in October 1658. He was then entered at the Collége d'Harcourt and boarded with his second cousin, Nicolas Vitart, steward of the duke of Luynes. Later, if not at first, he lived in the Hôtel de Luynes itself. It is to be observed that his Jansenist surroundings continued with him here, for the duke of Luynes was a severe Port Royalist. It is, however, clear from Racine's correspondence, which as we have it begins in 1660 and is for some years very abundant and interesting, that he was not at all of an austere disposition at this time. His chief correspondent is a certain young abbé Le Vasseur, who seems to have been by no means seriously given. The letters are full of verse-making and of other diversions; a certain Mademoiselle Lucrèce, who seems to have been both amiable and literary, is very frequently mentioned, neither is she the only one of her sex who appears. Occasionally the liveliness of the letters passes the bounds of strict decency, though there is nothing very shocking in them. Those to Madame (or, as the habit of the time called her, Mademoiselle) Vitart are free from anything of this kind, while they are very lively and pleasant. It does not appear that Racine read much philosophy, as he should have done, but he occasionally did some business in superintending building operations at Chevreuse, the duke's country house. He would seem, however, to have been already given up irrevocably to literature. This by no means suited the views of his devout relations at Port Royal, and he complains in one of his letters that an unlucky sonnet on Mazarin had brought down on him "excommunications sur excommunications." But he had much more important works in hand than sonnets. The marriage of Louis XIV. was the occasion of an ambitious ode, "La Nymphe de la Seine," which was submitted before publication to Chapelain, the too famous author of the *Pucelle*. Chapelain's fault was not ill-nature, and he made many suggestions (including the very pertinent one that Tritons were not usually found in rivers), which Racine duly adopted. Nor did the ode bound his ambitions, for he finished one piece, *Amasie*, and undertook another, *Les Amours d'Ovide*, for the theatre. The first, however, was rejected by the actors of the Marais, and it is not certain that the other was ever finished or offered to those of the Hôtel de Bourgogne. Racine's letters show that he was intimate with more than one actress at this time; he also made acquaintance with La Fontaine, and the foundations at any rate of the legendary "society of four" (Boileau, La Fontaine, Molière, and Racine) were thus laid.

His relations were pretty certainly alarmed by this very pardonable worldliness, though a severe expostulation with him for keeping company with the abominable actors is perhaps later in date. Allusions in a letter to his sister leave little doubt of this. Racine was accordingly disturbed in his easy-going life at Paris. In November 1661 he went to Uzès in Languedoc to live with his uncle the Père Sconin, vicar-general of that diocese, where it was hoped that Sconin would be able to secure a benefice for his nephew. It is certain that he was not slack in endeavouring to do this, but his attempts were in vain, and perhaps the church did not lose as much as the stage gained. Racine was at Uzès for an uncertain time. All that is known is that he was back in Paris before the end of 1663. His letters from Uzès to La Fontaine, to Le Vasseur, and others are in much the same strain as before, but there is here and there a marked tone of cynicism in them. One passage in particular, in which he tells how he was disenchanted with a damsel of Uzès, has an unpleasantly Swiftian touch about it. Once back in Paris, he gave himself up entirely to letters with a little courtiership. An ode on the recovery of Louis XIV. from a slight illness probably secured him the promise of a pension, of which he speaks to his sister in the summer of 1664, and on 22d August he actually received it. It is uncertain whether this pension is identical with "gratifications" which we know that Racine for some years received and which were sometimes eight and sometimes six hundred livres. It would seem not, as one of these gratifications had been allotted to him the year before he so wrote to his sister. All this shows that he had already acquired some repute as a promising novice in letters, though he had as yet done nothing substantive. The ode in which he thanked the king for his presents, "La Renommée," is said to have introduced him to Boileau, to whose censorship there is no doubt that he owed much, if not everything; and from this date, November 1663, the familiarity of "the four" undoubtedly existed in full force. Racine was at the time the least distinguished, but he rapidly equalled, if not the merit, the reputation of his friends. Unfortunately it is precisely at this date that his correspondence ceases, and it is not renewed till after the close of his brief but brilliant career as a dramatist (*Esther* and *Athalie* excepted). This is the more to be regretted in that the most disputable events of Racine's life as well as the greater part of his literary work fall within this silent period. His strange behaviour to Molière, his virulent attack on his masters and friends of Port Royal, and the sudden change by which, after the failure of *Phèdre* and for no clearly expressed cause, a man of pleasure and an active literary worker became a sober domestic character of almost ostentatiously religious habits, and abstained from almost all but official work, are unilluminated by any words of his own. From this time forward the gossip of the period and the *Life* by his son Louis are the chief sources of information. Unfortunately Louis Racine, though a man of some ability and of unimpeached character, was only six years old when his father died, and had no direct knowledge. Still his account represents family papers and traditions and seems to have been carefully, as it is certainly in the main impartially, written. From other sources—notably Boileau, Brossette, and Valincourt—a good deal of pretty certainly authentic information is obtainable, and there exists a considerable body of correspondence between Boileau and the poet during the last ten years of Racine's life.

The first but the least characteristic of the dramas by which Racine is known, *La Thébaide*, was finished by the end of 1663, and on Friday 20th June 1664 it was played by Molière's company at the Palais Royal theatre. Some editors assert that Molière himself acted in it, but the earliest account of the cast we have, and that is sixty years after date, omits his name, though those of Madeleine Béjard and Mademoiselle de Brie occur. There is a tradition, supported by very little evidence, that Molière suggested the subject; on the other hand, Louis Racine distinctly says that his father wrote most of the play at Uzès before he knew Molière. Racine's own letters, which cover the period of composition, though not that of representation, give little help in deciding this not very important question, except that it appears from them that the play was designed for the rival theatre, and that "La Déhanchée," Racine's familiar name for Mademoiselle de Beauchâteau, with whom he was intimate, was to play Antigone. The play itself is by far the weakest of Racine's works. He has borrowed much from Euripides and not a little from Rotrou; and in his general style and plan he has as yet struck out no great variation from Corneille. We have very little intelligence about the reception of the piece. It was acted twelve times during the first month, which was for the period a very fair success, and was occasionally revived during the year following.

This is apparently the date of the pleasant picture of the four friends which La Fontaine draws in his *Psyche*, Racine figuring as Acante, "qui aimait extrêmement les jardins, les fleurs, les ombrages." Various stories, more or less mythical, also belong to this period; the best authenticated of them contributes to the documents for Racine's unamiable temper. He had absolutely no reason to complain of Chapelain, who had helped him with criticism, obtained royal gifts for him, and, in a fashion, started him in the literary career, yet he helped in composing the lampoon of *Chapelain décoiffé*. The sin would not be unpardonable if it stood alone, but unluckily a much graver one followed.

We have no definite details as to Racine's doings during the year 1664, but in February 1665 he read at the Hôtel de Nevers before La Rochefoucauld, Madame de la Fayette, Madame de Sévigné, and other scarcely less redoubtable judges the greater part of his second acted play, *Alexandre le Grand*, or, as Pomponne (who tells the fact) calls it, *Porus*. This was a frequent kind of preliminary advertisement at the time, and it seems, as we find from the rhymed gazettes, to have been successful. It was anxiously expected by the public, and Molière's company played it on 4th December,—Monsieur, his wife Henrietta of England, and many other distinguished persons being present. The gazetteer Subligny vouches for its success, and the still more certain testimony of the accounts of the theatre shows that the receipts were good and, what is more, steady. But a fortnight afterwards *Alexandre* was played, "de complot avec M. Racine," says La Grange, by the rival actors (who had four days before performed it in private) at the Hôtel de Bourgogne. A vast amount of ink has been spilt on this question, but no one has produced any valid justification for Racine. That the piece failed at the Palais Royal is demonstrably false, and as this is stated in the earliest attempt to excuse Racine, and the only one made in his lifetime, it is pretty clear that his case was very weak. His son simply says that he was "mécontent des acteurs," which indeed is self-evident. It is certain that Molière and he ceased to be friends in consequence of this proceeding; and that Molière was in fault no one who has studied the character of the two men, no one even who considers the probabilities of the case, will easily believe. If, however, *Alexandre* was the occasion of showing the defects of Racine's character as a man, it raised him vastly in public estimation as a poet. He was now for the first time proposed as a serious rival to Corneille. There is a story, which a credible witness vouches for as Racine's own, that he read the piece to the author of the *Cid* and asked his verdict. Corneille praised the piece highly, but not as a drama, "Il l'assurait qu'il n'était pas propre a la poésie dramatique." There is no reason for disbelieving this, for the character of Alexander could not fail to shock Corneille, and he was notorious for not mincing his words. Nor can it be denied that Racine might have been justly hurt, though with a man of more amiable temper the slight would hardly have caused the settled antagonism to Corneille which he displayed. The contrast between the two even at this early period was accurately apprehended and put by Saint Evremond in his masterly *Dissertation sur l'Alexandre*, but this was not published for a year or two. To this day it is the best criticism of the faults of Racine, though not, it may be, of the merits, which had not yet been fully seen. It may be added that in the preface of the printed play the poet showed the extreme sensitiveness to criticism which perhaps excuses, and which certainly often accompanies, a tendency to criticize others. These defects of character showed themselves still more fully in another matter. The Port Royalists, as has been said, detested the theatre, and in January 1666 Nicole, their chief writer, spoke in one of his *Lettres sur Visionnaires* of dramatic poets as "empoisonneurs publics." There was absolutely no reason why Racine should fit this cap on his own head; but he did so, and published immediately a letter to the author. It is very smartly written, and if Racine had contented himself with protesting against the absurd exaggeration of the decriers of the stage there would have been little harm done. But he filled the piece with personalities, telling an absurd story of Mère Angelique Arnauld's supposed intolerance, drawing a ridiculous picture of Le Maître (a dead man and his own special teacher and friend), and sneering savagely at Nicole himself. The latter made no reply, but two lay adherents of Port Royal took up the quarrel with more zeal than discretion or ability. Racine wrote a second pamphlet as bitter and personal as the first, but less amusing, and was about to publish it when fortunately Boileau, who had been absent from Paris, returned and protested against the publication. It remained accordingly unprinted till after the author's death, as well as a preface to both which he had prepared with a view to publishing them together. In this respect Boileau was certainly Racine's good angel, for no one has ventured to excuse the tone of these letters. The best excuse for them is that they represent the accumulated resentment arising from a long course of "excommunications."

After this disagreeable episode Racine's life for ten years and more becomes simply the history of his plays, if we except his liaisons with the actresses Mademoiselle du Parc and Mademoiselle de Champmeslé (which are undoubted, though there is not much to be said about them) and his election to the Academy on 17th July 1673. Mademoiselle du Parc (Marquise de Gorla) was no very great actress, but was very beautiful, and she had previously captivated Molière. Racine induced her to leave the Palais Royal company and join the Hôtel. She died in 1668, and long afterwards the infamous Voisin accused Racine of having poisoned her. Mademoiselle de Champmeslé was plain and stupid, but an admirable actress and apparently very attractive in some way, for not merely Racine but Charles de Sévigné and many others adored her. She was cruel to none, but for five years before his marriage Racine seems to have been her *amant en titre*. Long afterwards, just before his own death, he heard of her mortal illness and speaks of her to his son without a flash of tenderness.

The series of his dramatic triumphs began with *Andromaque*, and this play may perhaps dispute with *Phèdre* and *Athalie* the title of his masterpiece. It is much more uniformly good than *Phèdre*, and the character of Hermione is the most personally interesting on the French tragic stage. It is said that the first representation of *Andromaque* was on 10th November 1667, in public and by the actors of the Hôtel de Bourgogne, but the first contemporary mention of it by the gazettes, prose and verse, is on the 17th, as performed in the queen's apartment. Perrault, by no means a friendly critic as far as Racine is concerned, says that it made as much noise as the *Cid*, and so it ought to have done. Whatever may be thought of the *tragédie pathétique* (a less favourable criticism might call it the "sentimental tragedy"), it could hardly be better exemplified than in this admirable play. A ferocious epigram of Racine's own (an epigram not unworthy of Martial, and as difficult to comment on to modern ears polite as some of Martial's own) tells us that some critics thought Pyrrhus too fond of his mistress, and Andromache too fond of her husband, which is not likely to be the present verdict. In the contemporary depreciations is to be found the avowal of its real merit. The interest was too varied, the pathos too close to human nature to content Boileau, and the partisans of Corneille still found Racine unequal to the heroic height of their master's grandeur. A just criticism will probably hold that these two objections neutralize each other. Both parties agreed in saying that much of the success was due to the actors, another censure which is equivalent to praise. It so happens, too, that, though the four main parts were played by accomplished artists, two at least of them were such as to try those artists severely. Pyrrhus was taken by Floridor, the best tragic actor by common consent of his time, and Orestes by Montfleury, also an accomplished player. But Mademoiselle du Parc, who played Andromache, had generally been thought below, not above, her parts, and Mademoiselle des Oeillets, who played the difficult rôle of Hermione, was old and had few physical advantages. No one who reads *Andromaque* without prejudice is likely to mistake the secret of its success, which is, in few words, the application of the most delicate art to the conception of really tragic passion. Before leaving the play it may be mentioned that it is said to have been in the part of Hermione, three years later, that Mademoiselle de Champmeslé captivated the author. *Andromaque* was succeeded, at the distance of not more than a year, by a play which, taken in conjunction with his others, is perhaps the best proof of the theatrical talent of Racine,—the charming comedietta of *Les Plaideurs*. We do not know exactly when it was played, but it was printed on 5th December 1668, and it had succeeded so badly that doubtless no long time passed between its appearance on the stage and in print. For the printing at that time both in France and England made the play *publica materies*, and therefore in the case of very successful pieces it was put off as long as possible. Many anecdotes are told about the origin and composition of *Les Plaideurs*. The *Wasps* of Aristophanes and the known fact that Racine originally destined it, not for a French company, but for the Italian troupe which was then playing the *Commedia dell' Arte* in Paris dispense us from enumerating them. The result is a piece admirably dramatic, but sufficiently literary to shock the *profanum vulgus*, which too frequently gives the tone at theatres. It failed completely, the chief favouring voice being, according to a story sufficiently well attested and worthy of belief even without attestation, that of the man who was best qualified to praise and who might have been most tempted to blame of any man then living. Molière, says Valincourt, the special friend of Racine, said in leaving the house, "Que ceux qui se moquoient de cette pièce meritoient qu'on se moquoient d'eux." But the piece was suddenly played at court a month later; the king laughed, and its fortunes were restored. The truth probably was that the legal profession, which was very powerful in the city of Paris, did not fancy the most severe satire on its ways which had been made public since the *or ça* of the fifth book of Rabelais. It need only be added that, if Louis XIV. admired *Les Plaideurs*, Napoleon did not, and excluded it from his travelling library. It was followed by a very different work, *Britannicus*, which appeared on 13th December 1669. It was much less successful than *Andromaque*, and, whether or not the cabals, of which Racine constantly complains, and which he certainly did nothing to disarm, had anything to do with this, it seems to have held its own but a very few nights. Afterwards it became very popular, and even from the first the exquisite versification was not denied. But there is no doubt that in *Britannicus* the defects of Racine, which in his first two plays were excusable on the score of apprenticeship, and in the next two hardly appeared at all, display themselves pretty clearly to any competent critic. The complete nullity of Britannicus and Junie and the insufficient attempt to display the complex and dangerous character of Nero are not redeemed by Agrippina, who is really good, and Burrhus, who is solidly painted as a secondary character. Voltaire calls it "la pièce des connaisseurs," and the description is—not quite in the sense in which the critic meant it—a very pregnant one. *Britannicus* is eminently the piece in which persons of a dilettante turn are seduced by the beauties which do exist to discover those which do not. The next play of Racine has, except *Phèdre*, the most curious history of all. "*Bérénice*," says Fontenelle succinctly, "fut un duel," and he acknowledges that his uncle was not the conqueror. Henrietta of Orleans proposed (it is said without letting them know the double commission) the subject to Corneille and Racine at the same time, and rumour gives no very creditable reasons for her choice of the subject. Her death, famous for its disputed causes and for Bossuet's sermon, preceded the performance of the two plays, both of which, but especially Racine's, were successful. There is no doubt that it is the better of the two, but Chapelle's not unfriendly criticism in quoting the two lines of an old song—

"Marion pleure, Marion crie,
Marion veut qu'on la marie"—

is said to have annoyed Racine very much, and it has a most malicious appropriateness. *Bajazet*, which was first played on 4th January 1672 (for Racine punctually produced his piece a year), is perhaps better. As a play, technically speaking, it has great merit, but the reproach commonly brought against its author was urged specially and with great force against this by Corneille. It is impossible to imagine anything less Oriental than the atmosphere of *Bajazet*; the whole thing is not only French but ephemerally French—French of the day and hour: and its ingenious scenario and admirable style scarcely save it. This charge is equally applicable with the same reservations to *Mithridate*, which appears to have been produced on 13th January 1673, the day after the author's reception at the Academy. It was extremely popular and, as far as style and perfection in a disputable kind go, Racine could hardly have lodged a more triumphant diploma piece. His next attempt, *Iphigénie*, was a long step backwards and upwards in the direction of *Andromaque*. It is not that the characters are eminently Greek, but that Greek tragedy gave Racine examples which prevented him from flying in the face of the propriety of character as he had done in *Bérénice*, *Bajazet*, and *Mithridate*, and that he here called in, as in *Andromaque*, other passions to the aid of the mere sighing and crying which form the sole appeal of these three tragedies. Achilles is a rather pitiful personage, and the grand story of the sacrifice is softened very tamely to suit French tastes; but the parental agonies of Clytemnestra and Agamemnon are truly drawn, and the whole play is full of pathos. It succeeded brilliantly and deservedly, but, oddly enough, the date of its appearance is very uncertain. It was assuredly acted at court in the late summer of 1674, but it does not seem to have been given to the public till the early spring of 1675, the usual time at which Racine produced his work.

The last and finest of the series of tragedies proper was the most unlucky. *Phèdre* was represented for the first time on New-Year's Day 1677 at the Hôtel de Bourgogne. Within a week the opposition company or "troupe du roi" launched an opposition *Phèdre* by Pradon. This singular competition, which had momentous results for Racine, and in which he to some extent paid the penalty of the *lex talionis* for his own rivalry with Corneille, had long been foreseen. It has been hinted that Racine had from the first been bitterly opposed by a clique, whom his great success irritated, while his personal character did nothing to conciliate them. His enemies at this time had the powerful support of the duchess of Bouillon, one of Mazarin's nieces, a woman of considerable talents and imperious temper, together with her brother the duke of Nevers and divers other personages of high position. These persons of quality, guided, it is said, by Madame Deshoulières, a poetess of merit whom Boileau unjustly depreciated, selected Pradon, a dramatist of little talent but of much facility, to compose a *Phèdre* in competition with that which it was known that Racine had been elaborating with unusual care. Pradon, perhaps assisted, was equal to the occasion, and it is said that the partisans on both sides did not neglect means for correcting fortune. On her side the duchess of Bouillon is accused of having bought up the front places in both theatres for the first six nights; on his part Racine is said to have repeated an old trick of his and prevailed on the best actresses of the company that played Pradon's piece to refuse the title part. There is even some ground for believing that Racine endeavoured to prevent the opposition play from being played at all, and that an express order from the king had to be obtained for it. It was of no value, but the measures of the cabal had been so well taken that the finest tragedy of the French classical school was all but driven from the stage, while Pradon's was a positive success. A war of sonnets and epigrams followed, during which it is said that the duke of Nevers menaced Racine and Boileau with the same treatment which Dryden and Voltaire actually received, and was only deterred by the protection which Condé extended to them.

The unjust cabal against his piece and the various annoyances to which it gave rise no doubt made a deep impression on Racine. But in the absence of accurate contemporary information it is impossible to decide exactly how much influence they had on the subsequent change in his life. For thirteen years he had been constantly employed on a series of brilliant dramas. He now broke off his dramatic work entirely and in the remaining twenty years of his life wrote but two more plays, and those under special circumstances and of quite a different kind. He had been during his early manhood a libertine in morals and religion; he now married, became irreproachably domestic, and almost ostentatiously devout. No authentic account of this change exists; for that of Louis Racine, which attributes the whole to a sudden religious impulse, is manifestly little more than the theory of a son pious in both senses of the word. Probably all the motives which friends and foes have attributed—weariness of dissipated life, jealousy of his numerous rivals in Mademoiselle de Champmeslé's favour, pique at Pradon's success, fear of losing still further the position of greatest tragic poet which after Corneille's *Surena* was indisputably his, religious sentiment, and so forth—entered more or less into his action. At any rate what is certain is that he reconciled himself with Arnauld and Port Royal generally, and on 1st June married Catherine de Romanet and definitely settled down to a quiet domestic life, alternated with the duties of a courtier. For his repentance was by no means a repentance in sackcloth and ashes. The drama was not then very profitable to dramatists, but Louis Racine tells us that his father had been able to furnish a house, collect a library of some value, and save 6000 livres. His wife had money, and he had possessed for some time (it is not certain how long) the honourable and valuable post of treasurer of France at Moulins. His annual "gratification" had been increased from 800 to 1500 livres, then to 2000, and in the October of the year of his marriage he and Boileau were made historiographers-royal with a salary of 2000 crowns. Besides all this he had, though a layman, one or two benefices. It would have been pleasanter if Louis Racine had not told us that his father regarded His Majesty's choice as "an act of the grace of God to detach him entirely from poetry." Even after allowing for Louis Racine's religiosity and the conventional language of all times, there is a flavour of hypocrisy about this which is disagreeable, and has shocked even Racine's most uncompromising admirers. For the historiographer of Louis XIV. was simply his chief flatterer. Before going further it may be observed that very little came of this historiography. The joint incumbents of the office made some campaigns with the king, sketched plans of histories, and left a certain number of materials and memoirs; but they executed no substantive work. Racine, whether this be set down to his credit or not, was certainly a fortunate and apparently an adroit courtier. His very relapse into Jansenism coincided with his rise at court, where Jansenism was in no favour, and the fact that he had been in the good graces of Madame de Montespan did not deprive him of those of Madame de Maintenon. Neither in *Esther* did he hesitate to reflect upon his former patroness. But a reported sneer of the king, who was sharp-eyed enough, "Cavoie avec Racine se croit bel esprit; Racine avec Cavoie se croit courtisan," makes it appear that his comparatively low birth was not forgotten at Versailles.

Racine's first campaign was at the siege of Ypres in 1678, where some practical jokes are said to have been played on the two civilians who acted this early and peculiar variety of the part of special correspondent. Again in 1683, in 1687, and in each year from 1691 to 1693 Racine accompanied the king on similar expeditions. The literary results of these have been spoken of. His labours brought him, in addition to his other gains, frequent special presents from the king, one of which was as much as 1000 pistoles. In 1690 he further received the office of "gentilhomme ordinaire du roi," which afterwards passed to his son. Thus during the later years of his life he was more prosperous than is usual with poets. His domestic life appears to have been a happy one. Louis Racine tells us that his mother "did not know what a verse was," but Racine certainly knew enough about verses for both. They had seven children. The eldest, Jean Baptiste, was born in 1678; the youngest, Louis, in 1692. It has been said that he was thus too young to have many personal memories of his father, but he tells one or two stories which show Racine to have been at any rate a man of strong family affection, as, moreover, his letters prove. Between the two sons came five daughters, Marie, Anne, Elizabeth, Françoise, and Madeleine. The eldest, after showing "vocation," married in 1699, Anne and Elizabeth took the veil, the youngest two remained single but did not enter the cloister. To complete the notice of family matters—much of Racine's later correspondence is addressed to his sister Marie, Madame Rivière.

The almost complete silence in the literary sphere which Racine imposed on himself after the comparative failure, shameful not for himself but for his adversaries, of *Phèdre* was broken once or twice even before the appearance of the two exquisite tragedies in which under singular circumstances he took leave of the stage. The most honourable of these was the reception of Thomas Corneille on 2d January 1685 at the Academy in the room of his brother. The discourse which Racine then pronounced turned almost entirely on his great rival, of whom he spoke even more than becomingly. But it was an odd conjunction of the two reigning passions of the latter part of his life—devoutness and obsequiousness to the court—which made him once more a dramatist. Madame de Maintenon had established an institution, first called the Maison Saint Louis, and afterwards (from the place to which it was transferred) the Maison de Saint Cyr, for the education of poor girls of noble family. The tradition of including acting in education was not obsolete. At first the governess, Madame de Grinon, composed pieces for representation, but, says Madame de Caylus, a witness at first hand and a good judge, they were "detestable." Then recourse was had to chosen plays of Corneille and Racine, but here there were obvious objections. The favourite herself wrote to Racine that "nos petites filles" had played *Andromaque* "a great deal too well." She asked the poet for a new play suited to the circumstances, and, though Boileau advised him against it, it is not wonderful that he yielded. The result was the masterpiece of *Esther*, with music by Moreau, the court composer and organist of Saint Cyr. Although played by schoolgirls and in a dormitory, it had an enormous success, in which it may be charitably hoped that the transparent comparison of the patroness to the heroine had not too much to do. Printed shortly afterwards, it had to suffer a certain reaction, or perhaps a certain vengeance, from those who had not been admitted to the private stage. But no competent judge could hesitate. Racine probably had read and to some extent followed the *Aman* of Montchrestien, but he made of it only the use which a proved master in literature has a perfect right to make of his forerunners. The beauty of the chorus, which Racine had restored more probably from a study of the Pléiade tragedy than from classical suggestions, the perfection of the characters, and the wonderful art of the whole piece need no praise. Almost immediately the poet was at work on another and a still finer piece of the same kind, and he had probably finished *Athalie* before the end of 1690. The fate of the play, however, was very different from that of *Esther*. Some fuss had been made about the worldliness of great court fêtes at Saint Cyr, and the new play, with settings as before by Moreau, was acted both at Versailles and at Saint Cyr with much less pomp and ceremony than *Esther*. It was printed in March 1691 and the public cared very little for it. The truth is that the last five-and-twenty years of the reign of Louis XIV. were marked by one of the lowest tides of literary accomplishment and appreciation in the history of France. The just judgment of posterity has ranked *Athalie*, if not as Racine's best work (and there are good grounds for considering it to be this), at any rate as equal to his best. Thenceforward Racine was practically silent, except for four *cantiques spirituelles*, in the style and with much of the merit of the choruses of *Esther* and *Athalie*. The general literary sentiment led by Fontenelle (who inherited the wrongs of Corneille, his uncle, and whom Racine had taken care to estrange further) was against the arrogant critic and the irritable poet, and they made their case worse by espousing the cause of La Bruyère, whose personalities in his *Caractères* had made him one of the best hated men in France, and by engaging in the ancient and modern battle with Perrault. Racine, moreover, was a constant and spiteful epigrammatist, and the unlucky habit of preferring his joke to his friend stuck by him to the last. A savage epigram on the *Sesostris* of Longepierre, who had done him no harm and was his familiar acquaintance, dates as late as 1695. Still the king maintained him in favour, and so long as this continued he could afford to laugh at Grub Street and the successors of the Hôtel de Rambouillet alike. At last, however, there seems (for the matter is not too clear) to have come a change. Some say that he disobliged Madame de Maintenon, some (and this would be much to his honour, but not exactly in accord with anything else known of him) that, like Vauban and Fénelon, he urged the growing misery of the people. But there seems to be little doubt of the fact of the royal displeasure, and it is even probable that it had some effect on his health. Disease of the liver appears to have been the immediate cause of his death, which took place on 12th April 1699. The king seems to have, at any rate, forgiven him after his death, and he gave the family a pension of 2000 livres. Racine was buried at Port Royal, but even this transaction was not the last of his relations with that famous home of religion and learning. After the destruction of the abbey in 1711 his body was exhumed and transferred to Saint Étienne du Mont, his gravestone being left behind and only restored to his ashes a hundred years later, in 1818. His eldest son was never married; his eldest daughter and Louis Racine have left descendants to the present day.

A critical biography of Racine is, in more ways than one, an exceptionally difficult undertaking,—not in regard to the facts, which, as will have been seen, are fairly abundant, but as to the construction to be placed on them. The admirers of Racine's literary genius have made it a kind of religion to defend his character; and strictures on his character, it seems to be thought, imply a desire to depreciate his literary worth. The reader of the above sketch of his life must judge for himself whether Racine is or is not to be ranked with those great men of letters, fortunately the greater number, whose personality is attractive and their foibles at worst excusable. There is no doubt that the general impression given, not merely by the flying anecdotes of the time, but by ascertained facts, is somewhat unfavourable. Racine's affection for his family and his unbroken friendship for Boileau are the sole points of his life which are entirely creditable to him. His conduct to Molière and to Nicole cannot be excused; his attitude towards his critics and his rivals was querulous and spiteful; his relation to Corneille contrasts strikingly with the graceful position which young men of letters, sometimes by no means his inferiors, have often taken up towards the surviving glories of a past generation; his "conversion," though there is no just cause for branding it as hypocritical, appears to have been a singularly accommodating one, enabling him to tolerate adultery, to libel his friends in secret, and to flatter greatness unhesitatingly. None of these things perhaps are very heinous crimes, but they are all of the class of misdoing which, fairly or unfairly, mankind are apt to regard with greater dislike than positive misdeeds of a more glaring but less unheroic character.

The personality of an author is, however, by all the laws of the saner criticism, entirely independent of the rank to be assigned to his work, and, as in other cases, the strongest dislike for the character of Racine is compatible with the most unbounded admiration of his powers as a writer. But here again his injudicious admirers have interposed a difficulty. There is a theory common in France, and sometimes adopted out of it, that only a Frenchman, and not every Frenchman, can properly appreciate Racine. The charm of his verse and of his dramatic presentation is so esoteric and delicate that foreigners cannot hope to taste it. This is of course absurd, and if it were true it would be fatal to Racine's claims as a poet of the highest rank. Such poets, such writers, are not parochial or provincial, and even the greatest nations are but provinces or parishes in the realm of literature. Homer, Shakespeare, Dante, even Molière, Rabelais, Goethe, are not afraid to challenge the approval of the whole world, and the whole world is not found incompetent or unwilling to give it. Nor need Racine in reality avail himself of this unwise pretension. Judged by the common tests of literature he is a consummate artist, but he is scarcely a great poet, for his art, though unsurpassed in its kind, is narrow in range and his poetry is neither of the highest nor of the most genuine.

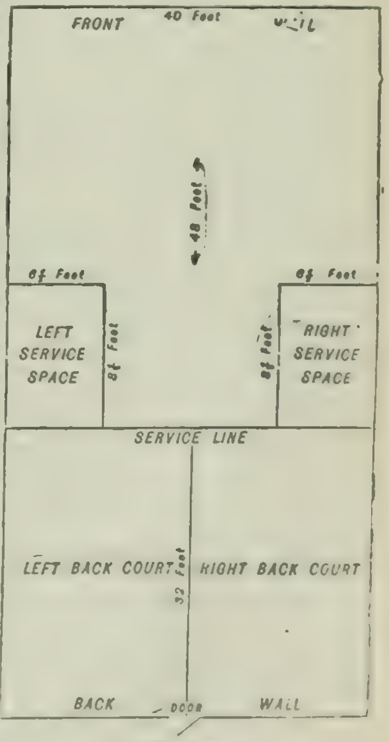
He may be considered from two very different points of view,—(1) as a playwright and poetical artificer, and (2) as a dramatist and a poet. From the first point of view there is hardly any praise too high for him. He did not invent the form he practised, and those who, from want of attention to the historical facts, assume that he did are unskilful as well as ignorant. When he came upon the scene the form of French plays was settled, partly by the energetic efforts of the Pléiade and their successors, partly by the reluctant acquiescence of Corneille. It is barely possible that the latter might, if he had chosen, have altered the course of French tragedy; it is nearly certain that Racine could not. But Corneille, though he was himself more responsible than any one else for the acceptance of the single-situation tragedy, never frankly gave himself up to it, and the inequality of his work is due to this. His heart was, though not to his knowledge, elsewhere, and with Shakespeare. Racine, in whom the craftsman dominated the man of genius, worked with a will and without any misgivings. Every advantage which the Senecan tragedy adapted to modern times was capable of he gave it. He perfected its versification; he subordinated its scheme entirely to the one motive which could have free play in it,—the display of a conventionally intense passion; he set himself to produce in verse a kind of Ciceronian correctness. The grammar criticisms of Vaugelas and the taste criticisms of Boileau produced in him no feeling of revolt, but only a determination to play the game according to these new rules with triumphant accuracy. And he did so play it. He had supremely the same faculty which enabled the rhétoriqueurs of the 15th century to execute apparently impossible tours de force in ballades couronnées, and similar tricks. He had besides a real and saving vein of truth to nature, which preserved him from tricks pure and simple. He would be and he was as much a poet as prevalent taste would let him be. The result is that such plays as *Phèdre* and *Andromaque* are supreme in their own way. If the critic will only abstain from thrusting in tierce, when according to the particular rules he ought to thrust in quart, Racine is sure to beat him.

But there is a higher game of criticism than this, and this game Racine does not attempt to play. He does not even attempt the highest poetry at all. His greatest achievements in pure passion—the foiled desires of Hermione and the jealous frenzy of Phèdre—are cold, not merely beside the crossed love of Ophelia and the remorse of Lady Macbeth, but beside the sincerer if less perfectly expressed passion of Corneille's Cléopâtre and Camille. In men's parts he fails still more completely. As the decency of his stage would not allow him to make his heroes frankly heroic, so it would not allow him to make them utterly passionate. He had, moreover, cut away from himself by the adoption of the Senecan model all the opportunities which would have been offered to his remarkably varied talent on a freer stage. It is indeed tolerably certain that he never could have achieved the purely poetical comedy of *As You Like It* or the *Vida es Sueno*, but the admirable success of *Les Plaideurs* makes it at least probable that he might have done something in a lower and a more conventional style. From all this, however, he deliberately cut himself off. Of the whole world which is subject to the poet he took only a narrow, artificial, and conventional fraction. Within these narrow bounds he did work which no admirer of literary craftsmanship can regard without admiration. But at the same time no one speaking with competence can deny that the bounds are narrow. It would be unnecessary to contrast his performances with his limitations so sharply if those limitations had not been denied. But they have been and are still denied by persons whose sentence carries weight, and therefore it is still necessary to point out the fact of their existence.

Nearly all Racine's works are mentioned in the above notice. There is here no room for a bibliographical account of their separate appearances. The first collected edition was in 1675-76, and contained the nine tragedies which had then appeared. The last and most complete which appeared in the poet's lifetime (1697) was revised by him, and contains the poems and a few miscellaneous works. Like the *editio princeps*, it is in 2 vols. 12mo. The posthumous editions are innumerable and gradually became more and more complete. The most noteworthy are the Amsterdam edition of 1722; that by Abbé d'Olivet, also at Amsterdam, 1743; the Paris quarto of 1760; the edition of Luneau de Boisjermain, Paris and London, 1768; the magnificent illustrated folios of 1805 (Paris); the edition of Germain Garnier with La Harpe's commentary, 1807; Geoffroy's of the next year; Aimé Martin's of 1820; and lastly, the *grands écrivains* edition of Paul Mesnard (Paris, 1865-73). This last contains almost all that is necessary for the study of the poet, and has been chiefly used in preparing the above notice. Louis Racine's *Life* was first published in 1747. Translations and imitations of Racine are innumerable. In English the *Distressed Mother* of Philips and the *Phaedra and Hippolytus* of Smith, both composed more or less under Addison's influence, are the most noteworthy. (G. SA.)

RACKETS. Like tennis, this game of ball is of French origin, and its name is derived from "raquette," the French term for the bat used in the pastime. In the United Kingdom it is not so universally pursued as cricket and football, and is essentially an indoor game, which is played only in prepared and covered courts. Such buildings have been erected at many of the large public schools, at the universities, and in garrison towns, where will be found the chief exponents of rackets, a game which requires active running powers, quick eyesight, and dexterity of hand.

The old "open" courts, which merely consisted of a plain wall without any side walls, are now almost obsolete and need not be further mentioned. The usual dimensions of a "close" court are 80 feet by 40 feet for four-handed matches, whilst 60 feet by 30 feet are sufficient for a single match. Sometimes courts are built of an intermediate size so as to be available for either single or double matches. The front wall of a court should be 40 feet high, the back one 14 feet, the space over the latter being utilized by a gallery for spectators, umpire, and marker. The side walls are 40 feet high throughout, in order to support the roof. This must be well lit with skylights carried on light iron girders and protected inside with wire-work in order to ward off damage from the balls. Bricks make the best walls, which must be plastered inside with Portland cement or plaster of Paris, set to a perfectly level surface in order that the balls may rebound evenly. In the military officers' courts in India this plaster is painted white by the use of



Racket court.

coolness, and black balls are in vogue. In England black paint and white balls are used. In cool climates asphalt makes the best flooring. In the tropics stone paving, perfectly evenly set, or some similar material, must be used. Gutta-percha soles to the shoes of the players are indispensable, to prevent slipping and to preserve the evenness of the flooring. The narrow entrance door, made of very hard wood, is situated in the centre of the back wall and must be perfectly flush with the same on the inside. The bottom of the front wall is covered with hollow deal sounding boarding up to a height of 2 feet 2 inches, where is the "line." The sound betrays a ball striking the boarding below the line, which throws it out of play. At 7 feet 9 inches above the level of the floor comes another white line across the front wall, termed the "cut line," because the in-player, when serving, must first make the ball rebound from the front wall above this line. Across the floor, varying in position according to the length of the court, is the "short line," so called because an out-player is not bound to take any ball served which falls between it and the front wall. The space between here and the back wall is divided into two equal-sized parallelograms by a line drawn down to the doorway. As the front wall is faced, these are called "right" and "left" courts. An in-player serving from one side must make the ball fall in the other court after rebounding from the front wall. The "service spaces," in which an in-player stands when serving, are 8 feet 6 inches deep from the short line and 6 feet 6 inches wide from each side wall.

The game is played with no other implements but bats and balls. The striking portion of the former is oval-shaped and strung tightly across with catgut. The handle is of pliant ash covered with leather in order to give the hand a tight grip. The balls are about 1¼ inches in diameter, and very hard in order to rebound evenly and quickly.

In a four-handed game we will suppose A and B to be playing against C and D and that the former couple have won the choice of first innings. A accordingly commences serving from the right service space into the left court, that being the most difficult one to return the ball from. B stands behind A to return any balls for his side in the back portion of the court. C stands where he likes ready to take the ball about to be served by A, whilst C's partner, D, places himself between A and B to take the fore court play for his side. For A's service to be good his ball must first strike the front wall above the cut line, and secondly rebound from the floor of the left-hand court, though whether it strike the side or back walls or not after rebounding from the front wall is immaterial. If these rules are complied with, C is bound to return the ball, at its first bound off the floor, on to the front wall above the sounding-board. If he does not succeed A and B score one ace in their favour. If C achieves his purpose the game is continued by one of either side returning the ball alternately, till a player either strikes the sounding board, skies it into the roof or gallery, or strikes it later than the first bound off the floor. If A or B makes the first failure A is out. If it is C or D, the in-side scores an ace, and A continues serving alternately from each service space. The out-player may take a faulty service at his own option. If he does, the ace is played out in the usual way. When A is put out C goes in, then D, and lastly A s partner B, and so on in the same rotation. B is not allowed to follow A's first hand, as the latter has the advantage of possibly scoring the first ace. The player who gains the last ace of a game continues serving for the next. The mode of procedure in a single-handed match is precisely the same, each player going in alternately, but having no partner to aid him. It often happens that both sides go in and out several times running without scoring. The most difficult kind of services to take are the sharp "cut," which strikes the front wall just above the cut line and rebounds with great velocity, and the "nick" into the back corner of the court served into. Other strokes are the "drop," which places the ball only just above the wooden board, making it fall almost dead; the "volley," in which the ball is struck in the full before touching the floor; and lastly, the "cut," by which the ball acquires a twisting or rotatory spin as well as a forward motion caused by a descending diagonal stroke with the bat. The following are the rules of rackets as drawn up and used at Prince's Club, London, the leading racket club of the United Kingdom.

1. The game to be 15 up. At 13 all, the out-players may set it to 5, and at 14 all, to 3, provided this be done before another ball is struck.

2. The going in first, whether odds be given or not, to be decided by lot but one hand only then is to be taken.

3. The ball to be served alternately from right and left, beginning whichever side the server pleases.

4. In serving, the server must have one foot in the space marked off for that purpose. The out-player to whom he serves may stand where he pleases, but his partner and the server's partner must both stand behind the server till the ball is served.

5. The ball must be served above, and not touching the line on the front wall, and it must strike the floor, before it bounds, within and not touching the lines enclosing the court on the side opposite to that in which the server stands.

6. A ball served below the line, or to the wrong side, is a fault, but it may be taken, and then the ace must be played out, and counts.

7. In serving, if the ball strikes anywhere before it reaches the front wall, it is a hand out.

8. In serving, if a ball touches the server or his partner before it has bounded twice it is a hand out, whether it was properly served or not.

9. It is a fault—
   a. If the server is not in his proper place.
   b. If the ball is not served over the line.
   c. If it does not fall in the proper court.
   d. If it touches the roof.
   e. If it touches the gallery-netting, posts, or cushions.

The out-player may take a fault if he pleases, but if he fails in putting the ball up it counts against him.

10. Two consecutive faults put a hand out.

11. An out-player may not take a ball served to his partner.

12. The out-players may change their courts once only in each game.

13. If a player designedly stops a ball before the second bound it counts against him.

14. If a ball hits the striker's adversary above or on the knee, it is a let; if below the knee, or if it hits the striker's partner or himself, it counts against the striker.

15. Till a ball has been touched, or has bounded twice, the player or his partner may strike it as often as they please.

16. Every player should get out of the way as much as possible. If he cannot, the marker is to decide whether it is a let or not.

17. After the service, a ball going out of the court or hitting the roof is an ace; a ball hitting the gallery-netting, posts, or cushions, in returning from the front wall, is a let; but if it hits the roof before reaching the front wall it counts against the striker.

18. The marker's decision is final. If he has any doubt, he should ask advice; but, if he cannot decide positively, the ace is to be played over again. (H. F. W.)

RADAUTZ, a town in the Austrian duchy of Bukowina, is situated on the Suczava, about 15 miles from the frontier of Moldavia. It was formerly the seat of a Greek bishopric, removed to Czernowitz in 1786, and possesses a cathedral with the tombs of several Moldavian princes. It contains a Government stud, and manufactures paper, glass, machinery, beer, and brandy. In 1880 Radautz had 11,162 inhabitants.

RADBERTUS, head of the Benedictine abbey of Corbie, near Amiens, from 844 to 851, and one of the most prominent theological writers of his age, was born at or near Soissons towards the close of the 8th century, and became a monk of Corbie in 814, when he assumed the cloister name of PASCHASIUS. He soon gained recognition as a learned and successful teacher, and Adalhard, St Anskar the apostle of Sweden, Odo bishop of Beauvais, and Warinus abbot of Corvey in Saxony may be mentioned among the more distinguished of his pupils. In 844 he was chosen abbot, but as a disciplinarian he was more energetic than successful, and in 867 he resigned the office. In his official capacity he took part in the synod of Chiersy which condemned Gottschalk. Of the closing period of his life nothing is known, except that it was one of great literary activity.

His works include an *Expositio in Matthæum*, in twelve books, a favourable specimen of the exegesis of that period, and the *Liber de Corpore et Sanguine Christi*, a pious and popularly written treatise, designed to prove that the elements in the sacrament are completely changed. The latter work, originally composed in 831, elicited a reply by Ratramnus, a brother monk of Corbie, who maintained that the body and blood of Christ were present in the Eucharist only "spiritaliter et secundum potentiam." The *De Partu Virginis* of Radbertus (845) was also taken exception to by Ratramnus for its Docetic teaching as to the manner of Christ's birth "utero clauso."

RADCLIFFE, a town of Lancashire, is situated on the river Irwell, crossed by a bridge of two arches, and on the Lancashire and Yorkshire Railway, 7 miles north-west of Manchester and 2 south-west of Bury. The church of St Bartholomew dates from the time of Henry IV.; some of the Norman portions of the building still remain. The tower was rebuilt in 1665; the north transept added in 1846, and the whole building restored in 1870-73. It possesses some good windows and several ancient monu ments. Radcliffe Tower, dating from the 13th century, and formerly an extensive manorial residence, is now a complete ruin. Cotton-weaving, calico-printing, and bleaching are the principal industries, and there are extensive collieries in the neighbourhood. The town is governed by a local board of health established in 1866. The area of the urban sanitary district is 2453 acres, with a population in 1871 of 11,446, and in 1881 of 16,267.

Radcliffe is so called from a cliff of red rock on the south side of the Irwell opposite the town. The manor was held by Edward the Confessor, and was conferred on Roger de Poictou, but was forfeited by him soon after the Domesday survey. In the reign of Stephen it was granted to Ranulph de Gernons, earl of Chester.

RADCLIFFE, ANN WARD (1764-1823), novelist, was born in London on 9th July 1764. She was the author of three novels unsurpassed of their kind in English literature, *The Romance of the Forest* (1791), *The Mysteries of Udolpho* (1794), *The Italian* (1797). The interval of three years between the successive publications is noticeable; works so elaborate, intricate, and closely interwoven could not be written in a hurry. The second of the three novels is the one commonly associated with Mrs Radcliffe's name, but the preference is probably due to the title; each is an improvement on its predecessor, and the last is considerably the best on the whole in style as well as in plot and character. She wrote two other novels before any of these, the *Castles of Athlin and Dunbayne* (1789) and the *Sicilian Romance* (1790), but they attracted no special attention and deserve none, although in them she works with the same romantic materials—dreadful castles, wild adventures, terrible characters. One other was written after the famous three, but not published till 1826, three years after her death—*Gaston de Blondeville*, interesting as an elaborate study of costume and scenery, and valuable as a monument of her accurate archæological learning, but comparatively tedious as a story, though not without passages in her best style. The circumstances that turned Mrs Radcliffe to literature are not recorded in the meagre memoir published under her husband's direction. Her maiden name was Ward, and her parents, who are described as "persons of great respectability, though engaged in trade," in London, had literary relations. Her husband was an Oxford graduate and proprietor and editor of the *English Chronicle*. After *The Italian* she gave up writing for publication, and was reported to have been driven mad by the horrors of her own creations. This was purely mythical. It appears that she never saw the Italian scenery which she depicts with such minuteness, and never left England but once, in the summer of 1794, after the completion of her *Udolpho*. A record of the tour was published in the following year, along with descriptions of a visit to the English Lakes, the beauties of which she was one of the first to celebrate. Of scenery, as might be judged from her novels, where the descriptions are often felt as a tedious impediment, Mrs Radcliffe was an enthusiastic amateur, and made driving tours with her husband every other summer through the English counties. She died in February 1823.

As a novelist Mrs Radcliffe deserves a much higher place than is accorded to her in general estimation. Critics familiar with her works, from Sir Walter Scott downwards, have shown themselves fully alive to the difference; but the general public confound her with puerile and extravagant imitators, who have vulgarized her favourite "properties" of rambling and ruinous old castles, dark, desperate, and cadaverous villains, secret passages, vaults, trapdoors, evidences of deeds of monstrous crime, sights and sounds of mysterious horror. She deserves at least the credit of originality, but apart from this there are three respects in which none of her numerous imitators approach her,—ingenuity of plot, fertility of incident, and skill in devising apparently supernatural occurrences capable of explanation by human agency and natural coincidence. Except in her last and posthumously published work she never introduces the really supernatural, and, whether or not we agree with Sir Walter Scott that this limitation was a mistake in art, it must at least be acknowledged to impose a heavier burden on the author's ingenuity. Her imitators found it easier to follow Horace Walpole in this point. Some of the tragic situations in *The Italian* are worked out with a vivid power of imagination which it would be hard to parallel in English literature outside the ranks of the Elizabethan drama, with the minor celebrities of which Mrs Radcliffe may fairly challenge comparison.

RADETZKY, JOHANN J. W. A. F. C., COUNT OF RADETZ (1766-1858), field-marshal of Austria, was born at Trzebnitz in Bohemia in 1766, to the nobility of which province his family belonged. He entered a cavalry regiment in 1784 and served under Joseph II. and Laudon against the Turks in 1788 and 1789. In 1793 his regiment was sent to the lower Rhine, and from this time onwards Radetzky was engaged in the wars which were continued (with intermission) between Austria and France for the next twenty years. In 1796 he was adjutant to General Beaulieu, over whom Bonaparte won his first victories in Italy. In 1799, when the Austrians with Suwaroff's help reconquered Northern Italy, he distinguished himself at the battles of Novi and the Trebbia, displaying, according to the despatches of General Mélas, great presence of mind in the midst of extreme danger. After the defeat of Marengo he was removed from Italy to Germany, and there took part in the still more disastrous engagement of Hohenlinden. In 1805 Radetzky, now major-general, was back in Italy, serving under the archduke Charles in the successful campaign of Caldiero, the fruits of which were lost by Mack's capitulation at Ulm and the fall of Vienna. In 1809 he fought at Wagram. In 1813, when all the great powers of Europe combined against Napoleon, Radetzky was chief of the staff under Schwarzenberg, the Austrian commander-in-chief of the allied forces, and he now gained a reputation outside his own country. The plan of the battle of Leipsic is said to have been in great part Radetzky's work, and in this engagement he was wounded. He entered Paris with the allied sovereigns in March 1814, and returned with them to the congress of Vienna, where he appears to have acted as an intermediary between Metternich and the czar Alexander, when these great personages were not on speaking terms. During the succeeding years of peace he disappeared from the public view and narrowly escaped being pensioned off in 1829. The insurrection of the Papal Legations in 1831 brought him, however, into active service again; and on the retirement of General Frimont he was placed in command of all the Austrian forces in Italy, receiving in 1836 the dignity of field-marshal. Radetzky was now seventy years old, but twelve more years were to pass before the really historical part of his career opened. When he was eighty-two the revolution of 1848 broke out. Milan rose in insurrection against its Austrian rulers, and after a struggle of five days Radetzky was forced to evacuate the city. Unable to retain any hold on Lombardy, he concentrated his troops at Verona, the fortifications of which were to a great extent his own creation. Charles Albert, king of Sardinia, now declared war upon Austria, occupied Milan, and laid siege to Peschiera. Radetzky, after the arrival of reinforcements, moved southwards to Mantua, and attempted from that point to turn the Sardinian flank; he was, however, defeated on the Mincio, and Peschiera fell into the enemy's hands. Radetzky, nevertheless, was secure in the possession of Verona and Mantua; and, after being still further reinforced, he resumed the offensive in July, defeated the Sardinians at Custozza and in several other encounters, and advanced victoriously upon Milan, where, on 6th August, an armistice was concluded, the Sardinian army retiring behind the Ticino. During the succeeding months, while Vienna and the central provinces of the Austrian empire appeared likely to fall into anarchy, Radetzky's army remained firm in its loyalty to the old order of things, and declined to enter into relations with the democratic leaders. It was in fact at this time the mainstay of the house of Hapsburg, while everything around the central government tottered; and, when the restoration of authority began, and the young emperor Francis Joseph ascended the throne that had been vacated by his imbecile predecessor, Radetzky gave to the new monarch the prestige of a crushing victory over his Italian enemies. The armistice was denounced by Charles Albert on the 12th of March 1849. On the 20th Radetzky crossed the Ticino at Pavia, and on the 23d he annihilated the Italian army at Novara. Peace followed this brief and decisive campaign, and for the next eight years Radetzky governed upper Italy. He retired from service in 1857, and died at the age of ninety-two in the following year. Radetzky was idolized by the Austrian army, but his reputation as a general has not survived him.

RADHANPUR, a petty state of India, within the group of states under the supervision of the political superintendent of Palanpur; it is situated in the north-western corner of Gujarat, close to the Runn of Cutch, Bombay presidency, and lies between 23° 26′ and 23° 58′ N. lat. and between 71° 28′ and 72° 3′ E. long. The country is an open plain without hills and with few trees, square in shape, and about 35 miles across. Including the pergunnahs of Munjpur and Sami, it contains an area of 1150 square miles with a population (1881) of 98,129 (males 50,903, females 47,226), the majority being Hindus. Though subject to very great extremes of heat and cold, the climate is healthy. The estimated yearly revenue of the state is from £50,000 to £60,000. Its chief products are cotton, wheat, and all the common varieties of grain; the only manufacture of any importance is the preparation of a fine description of saltpetre. Radhanpur came under British protection in 1819, when the nawab applied for aid to check the raids of marauders. No tribute is exacted and its domestic relations are left entirely free.

Radhanpur, chief town of the state and the seat of the nawab, had a population of 14,722 in 1881. The nearest railway station is at Kharagoda, 40 miles distant.

RADIATA. This term was introduced by Cuvier in 1812 to denote the lowest of his four great animal groups or "embranchements." He defined them as possessing radial instead of bilateral symmetry, and as apparently destitute of nervous system and sense organs, as having the circulatory system rudimentary or absent, and the respiratory organs on or coextensive with the surface of the body; he included under this title and definition five classes,—Echinodermata, Acalepha, Entozoa, Polypi, and Infusoria. Lamarck (*Hist. nat. d. Anim. s. Vertèbres*) also used the term, as when he spoke of the Medusæ as *radiata medusaria et anomala*; but he preferred the term Radiaria, under which he included Echinodermata and Medusæ. Cuvier's term in its wide extension, however, passed into general use; but, as the anatomy of the different forms became more fully known, the difficulty of including them under the common designation made itself increasingly obvious. Milne-Edwards removed the Polyzoa; the group was soon further thinned by the exclusion of the Protozoa on the one hand and the Entozoa on the other; while in 1848 Leuckart and Frey clearly distinguished the Cœlenterata from the Echinodermata as a separate sub-kingdom, thus condemning the usage by which the term still continued to be applied to these two groups at least. In 1855, however, Owen included under Lamarck's term Radiaria the Echinodermata, Anthozoa, Acalepha, and Hydrozoa, while Agassiz also clung to the term Radiata as including Echinodermata, Acalepha, and Polypi, regarding their separation into Cœlenterata and Echinodermata as "an exaggeration of their anatomical differences" (*Essay on Classification*, London, 1859). These attempts, however, to perpetuate the usage were finally discredited by Huxley's important *Lectures on Comparative Anatomy* (1864), in which the term was finally abolished, and the "radiate mob" finally distributed among the Echinodermata, Polyzoa, Vermes (Platyhelminthes), Cœlenterata, and Protozoa. On radiate symmetry, see Morphology. Compare also Cuvier, Animal Kingdom, Echinodermata, Corals, &c.

RADIATION AND CONVECTION. 1. When a red-hot cannon ball is taken out of a furnace and suspended in the air it is observed to cool, *i.e.*, to part with heat, and it continues to do so at a gradually diminishing rate till it finally reaches the temperature of the room. But the process by which this effect is produced is a very complex one. If the hand be held at a distance of a few inches from the hot ball on either side of it or *below* it, the feeling of warmth experienced is considerable; but it becomes intolerable when the hand is held at the same distance *above* the ball. Even this rude form of experiment is sufficient to show that two processes of cooling are simultaneously at work,—one which apparently leads to the loss of heat in all directions indifferently, another which leads to a special loss in a vertical direction upwards. If the experiment is made in a dark room, into which a ray of sunlight is admitted so as to throw a shadow of the ball on a screen, we see that the column of air above the ball also casts a distinct shadow. It is, in fact, a column of air very irregularly heated by contact with the ball, and rising, in obedience to hydrostatic laws, in the colder and denser air around it. This conveyance of heat by the motion of the heated body itself is called *convection*; the process by which heat is lost indifferently in all directions is called *radiation*. These two processes are entirely different in their nature, laws, and mechanism; but we have to treat of both in the present article.

2. To illustrate how the third method by which heat can be transferred, viz., *conduction* (see Heat, vol. xi. p. 577), is involved in this process, let the cannon ball (which for this purpose should be a large one) be again heated and at once immersed in water until it just ceases to be luminous in the dark, and then be immediately hung up in the air. After a short period it again becomes red-hot all over, and the phenomenon then proceeds precisely as before, except that the surface of the ball does not become so hot as it was before being plunged in the water. This form of experiment, which requires that the interior shall be very considerably cooled before the surface ceases to be self-luminous, does not succeed nearly so well with a copper ball as with an iron one, on account of the comparatively high conductivity of copper. In fact, even when its surface is covered with lamp-black, to make the loss by radiation as great as possible, the difference of temperature between the centre and the surface of a very hot copper ball—which is only an inch or two in diameter—is inconsiderable.

3. In conduction there is passage of heat from hotter to colder parts of the same body; in convection an irregularly heated fluid becomes hydrostatically unstable, and each part carries its heat with it to its new position. In both processes heat is conveyed from place to place. But it is quite otherwise with radiation. That a body cools in consequence of radiation is certain; that other bodies which absorb the radiation are thereby heated is also certain; but it does not at all follow that what passes in the radiant form is heat. To return for a moment to the red-hot cannon ball. If, while the hand is held below it, a thick but dry plate of rock-salt is interposed between the ball and the hand there is no perceptible diminution of warmth, and the temperature of the salt is not perceptibly raised by the radiation which passes through it. When a piece

of clear ice is cut into the form of a large burning-glass it can be employed to inflame tinder by concentrating the sun's rays, and the lens does the work nearly as rapidly as if it had been made of glass. It is certainly not what we ordinarily call "heat" which can be transmitted under conditions like these. Radiation is undoubtedly a transference of energy, which was in the form commonly called heat in the radiating body, and becomes heat in a body which absorbs it; but it is transformed as it leaves the first body, and retransformed when it is absorbed by the second. Until the comparatively recent full recognition of the conservation and transformation of energy it was almost impossible to form precise ideas on matters like this; and, consequently, we find in the writings even of men like Prévost and Sir J. Leslie notions of the wildest character as to the mechanism of radiation. Leslie, strangely, regarded it as a species of "pulsation" in the air, in some respects analogous to sound, and propagated with the same speed as sound. Prévost, on the other hand, says, "Le calorique est un fluide discret; chaque élément de calorique suit constamment la même ligne droite, tant qu'aucun obstacle ne l'arrête. Dans un espace chaud, chaque point est traversé sans cesse en tout sens par des filets de calorique."

4. The more intensely the cannon ball is heated the more luminous does it become, and also the more nearly white is the light which it gives out. So well is this known that in almost all forms of civilized speech there are terms corresponding to our "red-hot," "white-hot," &c. As another instance, suppose a powerful electric current is made to pass through a stout iron wire. The wire becomes gradually hotter, up to a certain point, at which the loss by radiation and convection just balances the gain of heat by electric resistance. And as it becomes hotter the amount of its radiation increases, till at a definite temperature it becomes just visible in the dark by red rays of low refrangibility. As it becomes still hotter the whole radiation increases; the red rays formerly given off become more luminous, and are joined by others of higher refrangibility. This process goes on, the whole amount of radiation still increasing, each kind of visible light becoming more intense, and new rays of light of higher refrangibility coming in, until the whole becomes white, *i.e.*, gives off all the more efficient kinds of visible light in much the same relative proportion as that in which they exist in sunlight. When the circuit is broken, exactly the same phenomena occur in the reverse order, the various kinds of light disappearing later as their refrangibility is less. But the radiation continues, growing weaker every instant, even after the whole is dark. This simple observation irresistibly points to the conclusion that the so-called "radiant heat" is precisely the same phenomenon as "light," only the invisible rays are still less refrangible than the lowest red, and that our sense of sight is confined to rays of a certain definite range of refrangibility, while the sense of touch comes in where sight fails us. Sir W. Herschel in 1798, by placing the bulb of a thermometer in the solar spectrum formed by a flint-glass prism, found that the highest temperature was in the dark region outside the lowest visible red,—a result amply verified at the time by others, though warmly contested by Leslie.

5. This striking conclusion is not without close analogies in connexion with the other senses, especially that of hearing. Thus it has long been known that the "range of hearing" differs considerably in different individuals, some, for instance, being painfully affected by the chirp of a cricket, which is inaudible to others whose general hearing is quite as good. Extremely low notes, on the other hand, of whose existence we have ample dynamical evidence, are not heard by any one; when perceived at all they are *felt*.

6. We may now rapidly run over the principal facts characteristic of the behaviour of visible rays (see LIGHT), and point out how far each has been found to characterize that of so-called "radiant heat" under similar conditions.

(*a*) Rectilinear propagation: an opaque screen which is placed so as to intercept the sun's light intercepts its heat also, whether it be close to the observer, at a few miles from him (as a cloud or a mountain), or 240,000 miles off (as the moon in a total eclipse). (*b*) Speed of propagation: this must be of the same order of magnitude, at least, for both phenomena, *i.e.*, 186,000 miles or so per second; for the sun's heat ceases to be perceptible the moment an eclipse becomes total, and is perceived again the instant the edge of the sun's disk is visible. (*c*) Reflexion: the law must be exactly the same, for the heat-producing rays from a star are concentrated by Lord Rosse's great reflector along with its light. (*d*) Refraction: when a lens is not achromatic its principal focus for red rays is farther off than that for blue rays; that for dark heat is still farther off. Herschel's determination of the warmest region of the spectrum (§ 4 above) is another case in point. (*e*) Oblique radiation: an illuminated or a self-luminous surface appears equally bright however it is inclined to the line of sight. The radiation of heat from a hot blackened surface (through an aperture which it appears to fill) is sensibly the same however it be inclined (Leslie, Fourier, Melloni). (*f*) Intensity: when there is no absorption by the way the intensity of the light received from a luminous point-source is inversely as the square of the distance. The same is true of dark heat. But this is not a new analogy; it is a mere consequence of (*a*) rectilinear propagation. (*g*) Selective absorption: light which has been sifted by passing through one plate of blue glass passes in much greater percentage through a second plate of the same glass, and in still greater percentage through a third. The same is true of radiant heat, even when the experiment is made with uncoloured glass; for clear glass absorbs certain colours of dark heat more than others (De Laroche, Melloni). (*h*) Interference bands, whether produced by two mirrors or by gratings, characterize dark heat as well as light; only they indicate longer waves (Fizeau and Foucault). (*i*) Polarization and double refraction: with special apparatus, such as plates of mica split by heat into numerous parallel films, the polarization of dark heat is easily established. When two of these bundles are so placed as to intercept the heat, an unsplit film of mica interposed between them allows the heat to pass, or arrests it, as it is made to rotate in its own plane (Forbes). (*j*) By proper chemical adjustments photographs of a region of the solar spectrum beyond the visible red have been obtained (Abney). We might mention more, but those given above, when considered together, are conclusive. In fact (*b*) or (*i*) alone would almost settle the question.

7. But there is a superior as well as an inferior limit of visible rays. Light whose period of vibration is too small to produce any impression on the optic nerve can be degraded by fluorescence (see LIGHT) into visible rays, and can also be detected by its energetic action on various photographic chemicals. In fact photographic portraits can be taken in a room which appears absolutely dark to the keenest eyesight. By one or other of these processes the solar spectrum with its dark lines and the electric arc with its bright lines have been delineated to many times the length of their visible ranges. The electric arc especially gives (in either of these ways) a spectrum of extraordinary length; for we can examine it, as we can *not* examine sunlight, before it has suffered any sensible absorption

8. Thus radiation is one phenomenon, and (as we shall find) the spectrum of a *black body* (a conception roughly realized in the carbon poles of an electric lamp) is continuous from the longest possible wave-length to the shortest which it is hot enough to emit. These various groups of rays, however, are perceived by us in very different ways, whether by direct impressions of sense or by the different modes in which they effect physical changes or transformations. The only way as yet known to us of treating them all alike is to convert their energy into the heat-form and measure it as such. This we can do in a satisfactory manner by the thermo-electric pile and galvanometer.

9. Of the history of the gradual development of the theory of radiation we can give only the main features. The apparent concentration of cold by a concave mirror, which had been long before observed by Porta, was rediscovered by Pictet, and led to the extremely important enunciation of the Law of Exchanges by Prévost in 1791. As we have already seen, Prévost's idea of the nature of radiation was a corpuscular one, no doubt greatly influenced in this direction by the speculations of Lesage (see ATOM). But the value of his theory as a concise statement of facts and a mode of co-ordinating them is not thereby materially lessened. We give his own statements in the following close paraphrase, in which the italics are retained, from sect. ix. of his *Du Calorique Rayonnant* (Geneva, 1809).

"1. Free caloric is a radiant fluid. And because caloric becomes free at the surfaces of bodies *every point of the surface of a body is a centre, towards and from which filaments* (filets) *of caloric move in all directions.*

"2. *Heat equilibrium* between two neighbouring free spaces *consists in equality of exchange.*

"3. When equilibrium is interfered with it is re-established by inequalities of exchange. And, in a medium of constant temperature, a hotter or a colder body reaches this temperature according to the law that *difference of temperature diminishes in geometrical progression in successive equal intervals of time.*

"4. If into *a locality at uniform temperature a reflecting* or refracting *surface* is introduced, it *has no effect in the way of changing the temperature* at any point in that locality.

"5. If into a locality otherwise at uniform temperature *there is introduced a warmer or a colder body, and next a reflecting* or refracting *surface, the points on which the rays emanating from the body are thrown by these surfaces will be affected*, in the sense of being warmed if the body is warmer, and cooled if it is colder.

"6. *A reflecting body*, heated or cooled in its interior, *will acquire the surrounding temperature more slowly* than would a non-reflector.

"7. *A reflecting body*, heated or cooled in its interior, *will less affect* (in the way of heating or cooling it) another body placed at a little distance than would a non-reflecting body under the same circumstances.

"All these consequences have been verified by experiment, except that which regards the *refraction* of cold. This experiment remains to be made, and I confidently predict the result, at least if the refraction of cold can be accurately observed. This result is indicated in the fourth and fifth consequences [above], and they might thus be subjected to a new test. It is scarcely necessary to point out here the precautions requisite to guard against illusory results of all kinds in this matter."

10. There the matter rested, so far as theory is concerned, for more than half a century. Leslie and, after him, many others added fact by fact, up to the time of De la Provostaye and Desains, whose experiments pointed to a real improvement of the theory in the form of specialization. But, though such experiments indicated, on the whole, a proportionality between the radiating and absorbing powers of bodies and a diminution of both in the case of highly reflecting surfaces, the anomalies frequently met with (depending on the then unrecognized colour-differences of various radiations) prevented any grand generalization. The first real step of the general theory, in advance of what Prévost had achieved, and it was one of immense import, was made by Balfour Stewart in 1858. Before we take it up, however, we may briefly consider Prévost's statements, putting aside his erroneous views as to the nature of heat; and we must also introduce some results of the splendid investigations of Sadi Carnot (1824), which cast an entirely new light on the whole subject of heat.

11. Prévost's leading idea was that all bodies, whether cold or hot, are constantly radiating heat. This of itself was a very great step. It is distinctly enunciated in the term "exchange" which he employs. And from the way in which he introduces it it is obvious that he means (though he does not expressly say so) that the radiation from a body depends on its own nature and temperature alone, and is independent altogether of the nature and temperature of any adjacent body. This also was a step in advance, and of the utmost value. It will be seen later that Prévost was altogether wrong in his assumption of the geometrical rate of adjustment of differences of temperature,—a statement originally made by Newton, but true only approximately, and even so for very small temperature differences alone. Newton in the *Queries* to the third book of his *Optics* distinctly recognizes the propagation of heat from a hot body to a cold one by the vibrations of an intervening medium. But he says nothing as to bodies of the same temperature.

12. To Carnot we owe the proposition that *the thermal motivity of a system cannot be increased by internal actions.* A system in which all the parts are at the same temperature has no thermal motivity, for bodies at different temperatures are required in order to work a heat-engine, so as to convert part of their heat into work. Hence, if the contents of an enclosure which is impervious to heat are at any instant at one and the same temperature, no changes of temperature can take place among them. This is certainly true so far as our modes of measurement are concerned, because the particles of matter (those of a gas, for instance) are excessively small in comparison with the dimensions of any of our forms of apparatus for measuring temperatures. Something akin to this statement has often been assumed as a direct result of experiment: *a number of bodies (of any kinds) within the same impervious enclosure, which contains no source of heat, will ultimately acquire the same temperature.* This form is more general than that above, inasmuch as it involves considerations of dissipation of energy. Either of them, were it strictly true, would suffice for our present purpose. But neither statement can be considered as rigorously true. We may employ them, however, in our reasoning as true in the statistical sense; but we must not be surprised if we should find that the assumption of their rigorous truth may in some special cases lead us to theoretical results which are inconsistent with experimental facts,—*i.e.*, if we should find that deviations from an average, which are on far too minute a scale to be directly detected by any of our most delicate instruments, may be seized upon and converted into observable phenomena by some of the almost incomparably more delicate systems which we call individual particles of matter.

13. The next great advance was made by Balfour Stewart.[1] The grand novelty which he introduced, and from which all his varied results follow almost intuitively, is the idea of *the absolute uniformity* (*qualitative as well as quantitative*) of the radiation at all points, and in all directions, within an enclosure impervious to heat, when thermal equilibrium has once been arrived at. (So strongly does he insist on this point that he even states that, whatever be the nature of the bodies in the enclosure, the radiation there will, when equilibrium is established, be that of a black body at the same temperature. He does not expressly say that the proposition will still be true even if the bodies can radiate, and therefore absorb, one definite wave-length only; but this is a legitimate deduction from his state-

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[1] *Trans. R. S. E.*, 1858; see also *Phil. Mag.*, 1863, i. p. 354.

ments. To this we will recur.) His desire to escape the difficulties of surface-reflexion led him to consider the radiation inside an imperfectly transparent body in the enclosure above spoken of. He thus arrived at an immediate proof of the existence of internal radiation, which recruits the stream of radiant heat in any direction step by step precisely to the amount by which it has been weakened by absorption. Thus the radiation and absorption rigorously compensate one another, not merely in quantity but in quality also, so that a body which is specially absorptive of one particular ray is in the same proportion specially radiative of the same ray, its temperature being the same in both cases. To complete the statement, all that is necessary is to show how one ray may differ from another, viz., in intensity, wave-length, and polarization.

14. The illustrations which Stewart brought forward in support of his theory are of the two following kinds. (1) He experimentally verified the existence of internal radiation, to which his theory had led him. This he did by showing that a thick plate of rock-salt (chosen on account of its comparative transparency to heat-radiations) radiates more than a thin one at the same temperature,—surrounding bodies being in this case of course at a lower temperature, so that the effect should not be masked by transmission. The same was found true of mica and of glass. (2) He showed that each of these bodies is more opaque to radiations from a portion of its own substance than to radiation in general. Then comes his conclusion, based, it will be observed, on his fundamental assumption as to the nature of the equilibrium radiation in an enclosure. It is merely a detailed explanation that, once equilibrium has been arrived at, the consequent uniformity of radiation throughout the interior of a body requires the step-by-step compensation already mentioned. And thus he finally arrives at the statement that at any temperature a body's radiation is exactly the same both as to quality and quantity as that of its absorption from the radiation of a black body at the same temperature. In symbolical language Stewart's proposition (extended in virtue of a principle always assumed) amounts to this:—at any one temperature let R be the radiation of a black body, and eR (where e is never greater than 1) that of any other substance, both for the same definite wave-length; then the substance will, while at that temperature, absorb the fraction e of radiation of that wave-length, whatever be the source from which it comes. The last clause contains the plausible assumption already referred to. Stewart proceeds to show, in a very original and ingenious way, that his result is compatible with the known facts of reflexion, refraction, &c., and arrives at the conclusion that for internal radiation parallel to a plane the amount is (in isotropic bodies) proportional to the refractive index. Of course, when the restriction of parallelism to a plane is removed the internal radiation is found to be proportional to the square of the refractive index. This obvious completion of the statement was first given by Stewart himself at a somewhat later date.

15. So far Stewart had restricted his work to "dark heat," as it was then called; and he says that he did so expressly in order to confine himself to rays "which were universally acknowledged to produce heat by their absorption." But he soon proceeded to apply himself to luminous radiations. And here he brought forward the extremely important fact that "coloured glasses invariably lose their colour in the fire" when exactly at the temperature of the coals behind them, *i.e.*, they compensate exactly for their absorption by their radiation. But a red glass when colder than the coals behind appears red, while if it be hotter than they are it appears green. He also showed that a piece of china or earthenware with a dark pattern on a light ground appears to have a light pattern on a dark ground when it is taken out of the fire and examined in a dark room. Hence he concluded that his extension of Prévost's theory was true for luminous rays also.

16. In this part of the subject he had been anticipated, for Fraunhofer had long ago shown that the flame of a candle when examined by a prism gives bright lines (*i.e.*, maxima of intensity of radiation) in the position of the constituents of a remarkable double dark line (*i.e.*, minima of radiation) in the solar spectrum, which he called *D*. Hallows Miller had afterwards more rigorously verified the exact coincidence of these bright and dark lines. But Foucault[1] went very much farther, and proved that the electric arc, which shows these lines bright in its spectrum, not only intensifies their blackness in the spectrum of sunlight transmitted through it, but produces them as dark lines in the otherwise continuous spectrum of the light from one of the carbon points, when that light is made by reflexion to pass through the arc. Stokes about 1850 pointed out the true nature of the connexion of these phenomena, and illustrated it by a dynamical analogy drawn from sound. He stated his conclusions to Sir W. Thomson,[2] who (from 1852 at least) gave them regularly in his public lectures, always pointing out that one constituent of the solar atmosphere is certainly sodium, and that others are to be discovered by the coincidences of solar dark lines with bright lines given by terrestrial substances rendered incandescent in the state of vapour. Stokes's analogy is based on the fact of synchronism (long ago discussed by Hooke and others), viz., that a musical string is set in vibration when the note to which it is tuned is sounded in its neighbourhood. Hence we have only to imagine a space containing a great number of such strings, all tuned to the same note. Such an arrangement would form, as it were, a medium which, when agitated, would give that note, but which would be set in vibration by, and therefore diminish the intensity of, that particular note in any mixed sound which passed through it

17. Late in 1859 appeared Kirchhoff's first paper on the subject.[3] He supplied one important omission in Stewart's development of the theory by showing *why* it is necessary to use as an absorbing body one colder than the source in order to produce reversal of spectral lines. This we will presently consider. Kirchhoff's proof of the equality of radiating and absorbing powers is an elaborate but unnecessary piece of mathematics, called for in consequence of his mode of attacking the question. He chose to limit his reasoning to special wave-lengths by introducing the complex mechanism of the colours of thin plates (LIGHT, vol. xiv. p. 608), and a consequent appeal to Fourier's theorem (HARMONIC ANALYSIS, vol. xi. p. 481), instead of to the obviously permissible assumption of a substance imperfectly transparent for one special wave-length, but perfectly transparent for all others; and he did not, as Stewart had done, carry his reasoning into the interior of the body. With all its elaboration, his mode of attacking the question leads us no farther than could Stewart's. Both are ultimately based on the final equilibrium of temperature in an enclosure required by Carnot's principle, and both are, as a consequence, equally inapplicable to exceptional cases, such as the behaviour of fluorescent or phosphorescent substances. In fact (see THERMODYNAMICS) Carnot's principle is established only on a statistical basis of averages, and is not necessarily true when we are dealing with portions of space, which, though of essentially finite dimensions, are extremely small in comparison with the sentient part of even the tiniest instrument for measuring temperature.

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[1] *L'Institut*, 7th February 1849; or *Phil. Mag.*, 1860, p. 193.

[2] *Brit. Assoc.*, Presidential Address, 1871.

[3] *Pogg. Ann.*, or *Phil. Mag.*, 1860.

18. Kirchhoff's addition to Stewart's result may be given as follows. Let radiation r, of the same particular wave-length as that spoken of in § 14, fall on the substance; er of it will be absorbed, and $(1-e)r$ transmitted. This will be recruited by the radiation of the substance itself, so that the whole amount for that particular wave-length becomes $(1-e)r+eR$, or $r-e(r-R)$. Thus the radiation is weakened only when $R<r$, a condition which requires that the source (even if it be a black body) should be at a higher temperature than the absorbing substance (§ 4, above). But the converse is, of course, not necessarily true. This part of the subject, as well as the special work of Kirchhoff and of Bunsen, belongs properly to spectrum analysis (see SPECTROSCOPY).

19. From the extension of Prévost's theory, obtained in either of the ways just explained, we see at once how the constancy of the radiation in an enclosure is maintained. In the neighbourhood of and perpendicular to the surfaces of a black body it is wholly due to radiation, near a transparent body wholly to transmission. A body which reflects must to the same extent be deficient in its radiation and transmission; thus a perfect reflector can neither radiate nor transmit. And a body which polarizes by reflexion must supply by radiation what is requisite to render the whole radiation unpolarized. A body, such as a plate of tourmaline, which polarizes transmitted light, must radiate light polarized in the same plane as that which it absorbs. Kirchhoff and Stewart independently gave this beautiful application.

20. Empirical formulæ representing more or less closely the law of cooling of bodies, whether by radiation alone or by simultaneous radiation and convection, have at least an historic interest. What is called Newton's Law of Cooling was employed by Fourier in his *Théorie Analytique de la Chaleur*. Here the rate of surface-loss was taken as proportional to the excess of temperature over surrounding bodies. For small differences of temperature it is accurate enough in its applications, such as to the corrections for loss of heat in experimental determinations of specific heat, &c., but it was soon found to give results much below the truth, even when the excess of temperature was only 10° C.

21. Dulong and Petit, by carefully noting the rate of cooling of the bulb of a large thermometer enclosed in a metallic vessel with blackened walls, from which the air had been as far as possible extracted and which was maintained at a constant temperature, were led to propound the exponential formula Aa^t+B to represent the radiation from a black surface at temperature t. As this is an exponential formula, we may take t as representing absolute temperature, for the only result will be a definite change of value of the constant A. Hence if t_0 be the temperature of the enclosure, the rate of loss of heat should be $A(a^t-a^{t_0})$, or $Aa^{t_0}(a^{t-t_0}-1)$. The quantity A was found by them to depend on the nature of the radiating surface, but a was found to have the constant value 1·0077. As the approximate accuracy of this expression was verified by the experiments of De la Provostaye and Desains for temperature differences up to 200° C., it may be well to point out two of its consequences. (1) For a given difference of temperatures the radiation is an exponential function of the lower (or of the higher) temperature. (2) For a given temperature of the enclosure the radiation is as $(1{\cdot}0077)^\theta-1$, or $\theta(1+0{\cdot}0038\theta+\ldots)$, where θ is the temperature excess of the cooling body. Thus the Newtonian law gives 4 per cent. too little at 10° C. of difference.

22. Dulong and Petit have also given an empirical formula for the rate of loss by simultaneous radiation and convection. This is of a highly artificial character, the part due to radiation being as in the last section, while that due to convection is independent of it, and also of the nature of the surface of the cooling body. It is found to be proportional to a power of the pressure of the surrounding gas (the power depending on the nature of the gas), and also to a definite power of the temperature excess. The reader must be referred to French treatises, especially that of Desains, for further information.

23 Our knowledge of the numerical rate of surface-emission is as yet scanty, but the following data, due to Nicol,[1] may be useful in approximate calculations. Loss in heat units (1 ℔ water raised 1° C. in temperature) per square foot per minute, from

Bright copper	1·09	0·51	0·42
Blackened copper	2 03	1·46	1·35

The temperatures of body and enclosure were 58° C. and 8° C., and the pressure of contained air in the three columns was about 30, 4, and 0·4 inches of mercury respectively. The enclosure was blackened.

24. Scanty as is our knowledge of radiation, it is not at all surprising that that of convection should be almost *nil*, except as regards some of its practical applications. Here we have to deal with a problem of hydrokinetics of a character, even in common cases, of far higher difficulty than many hydrokinetic problems of which not even approximate solutions have been obtained.

25. What is called Doppler's Principle (LIGHT, vol. xiv. p. 614) has more recently[2] led Stewart to some curious speculations, which a simple example will easily explain. Suppose two parallel plates of the same substance, perfectly transparent except to one definite wave-length, to be moving towards or from one another. Each, we presume, will radiate as before, and on that account cool; but the radiation which reaches either is no longer of the kind which alone it can absorb, whether it come directly from the other, or is part of its own or of the other's radiation reflected from the enclosure. Hence it would appear that relative motion is incompatible with temperature equilibrium in an enclosure, and thus that there must be some effect analogous to resistance to the motion. We may get over this difficulty if we adopt the former speculation of Stewart, referred to in brackets in § 13 above. For this would lead to the result that, as soon as either of the bodies has cooled, ever so slightly, the radiation in the enclosure should become that belonging to a black body of a slightly higher temperature than before, and thus the plates would be furnished with radiation which they could at once absorb, and be gradually heated to their former temperature.

26. A very recent speculation, founded by Boltzmann[3] upon some ideas due to Bartoli, is closely connected in principle with that just mentioned. This speculation is highly interesting, because it leads to an expression for the amount of the whole radiation from a black body in terms of its absolute temperature. Boltzmann's investigation may be put, as follows, in an exceedingly simple form. It was pointed out by Clerk Maxwell, as a result of his electro-magnetic theory of light, that radiation falling on the surface of a body must produce a certain pressure. It is easy to see (most simply by the analogy of the virial equation, MECHANICS, vol. xv. p. 719) that the measure of the pressure per square unit on the surface of an impervious enclosure, in which there is thermal equilibrium, must be one-third of the whole energy of radiation per cubic unit of the enclosed space. We may now consider a reversible engine conveying heat from one black body to another at a different temperature, by operations alternately of the isothermal and the adiabatic character (THERMODYNAMICS), which consist in altering the volume of the en-

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[1] *Proc. R. S. E.*, vii. 1870, p. 206.

[2] *Brit. Assoc. Report*, 1871.

[3] *Wiedemann's Ann.*, 1884, xxii.

closure, with or without one of the bodies present in it. For one of the fundamental equations gives

$$\frac{dE}{dv} = t\frac{dp}{dt} - p,$$

where t is the absolute temperature. If f be the pressure on unit surface, $3f$ is the energy per unit of volume, and this equation becomes

$$t\frac{df}{dt} - f = 3f.$$

Hence it follows at once that, if the fundamental assumptions be granted, the energy of radiation of a black body per unit volume of the enclosure is proportional to the fourth power of the absolute temperature. It is not a little remarkable that Stefan[1] had some years previously shown that this very expression agrees more closely with the experimental determinations of Dulong and Petit than does their own empirical formula.

27. It would appear from this expression that, if an impervious enclosure containing only one black body in thermal equilibrium is separated into two parts by an impervious partition, any alteration of volume of the part not containing the black body will produce a corresponding alteration of the radiation in its interior. It will now correspond to that of a second black body, whose temperature is to that of the first in the inverse ratio of the fourth roots of the volumes of the detached part of the enclosure.

28. Lecher[2] has endeavoured to show that the distribution of energy among the constituents of the radiation from a black body does not alter with temperature. Such a result, though apparently inconsistent with many well-known facts, appears to be consistent with and to harmonize many others. It accords perfectly with the notion of the absolute uniformity (statistical) of the energy in an enclosure, and its being exactly that of a black body, even if the contents (as in § 25) consist of a body which can radiate one particular quality of light alone. And if this be the case it will also follow that the intensity of radiation of any one wave-length by any one body in a given state depends on the temperature in exactly the same way as does the whole radiation from a black body. Unfortunately this last deduction does not accord with Melloni's results; at least the discrepance from them would appear to be somewhat beyond what could fairly be set down to error of experiment. But it is in thorough accordance with the common assumption (§ 14) that the percentage absorption of any particular radiation does not depend on the temperature of the source. The facts of fluorescence and phosphorescence, involving the radiation of visible rays at temperatures where even a black body is invisible, have not yet been dealt with under any general theory of radiation; though Stokes has pointed out a dynamical explanation of a thoroughly satisfactory character, they remain outside the domain of Carnot's principle. (P. G. T.)

RADIOMETER. See PNEUMATICS, vol. xix. p. 249.

RADISH. See HORTICULTURE, vol. xii. pp. 286, 287.

RADNOR, an inland county of South Wales, is situated between 52° 5′ and 52° 25′ N. lat. and between 2° 57′ and 3° 25′ W. long., and is bounded E. by Hereford and Shropshire, N. by Montgomery, W. by Cardigan, and S. by Brecknock. Its greatest length from north to south is about 30 miles, and its greatest breadth from east to west about 33 miles. The area is 276,552 acres, or 432 square miles.

The greater part of the surface of the county is hilly, and the centre is occupied by a mountainous tract called Radnor Forest, running nearly east and west, its highest summit reaching 2163 feet. Towards the south and south-east the hills are much less elevated and the valleys widen out into considerable plains, abounding with small rivulets. The hills for the most part present smooth and rounded outlines, but the valley of the Wye is famed for its beauty. The higher ranges are covered with heath, but there is good pasturage on the lower slopes. The smaller elevations are frequently clothed with wood. The prevailing strata are the Lower Silurian rocks; but in the east there is a considerable area occupied by Old Red Sandstone, and throughout the county felspathic ash and greenstone are found, while near Old Radnor there is a large patch of Silurian limestone. Lead and copper are said to exist, but not in quantities sufficient to pay the working. There are saline, sulphurous, and chalybeate wells at Llandrindod. The Wye enters the county in the north-west, 18 miles from its source in Plinlimmon, and flowing in a south-easterly direction divides it from Brecknock, until it bends north-east and reaches Hay, after which it for some distance forms the boundary with Hereford. Its principal tributary is the Ithon, which flows south-west and joins it 7 miles above Builth. The Teme, flowing south-east, forms the northern boundary of the county with Shropshire. The Llugw, rising in the northern part of the county, flows south-east into Hereford, a little below Presteigne.

Agriculture.—The climate is somewhat damp, and in the spring cold and ungenial. The greater part of the county is suitable only for pasturage, but there is some good arable land in the valleys in the southern and south-eastern districts, which produces excellent crops of turnips, oats, and Welsh barley, the soil being chiefly open shaly clay, although in the east there is an admixture of red sandstone soils. In 1884 there were 156,628 acres, or about five-ninths of the total area, under cultivation, and of these 114,242 acres, or about four-fifths, were in permanent pasture. Of the 21,356 acres under corn crops 12,245 acres, or more than half, were under oats, whilst wheat occupied 5200 acres and barley 3853. Green crops occupied only 7100 acres, of which 1107 were under potatoes and 5682 under turnips. Horses numbered 9249 (3755 used solely for agricultural purposes), cattle 30,917 (10,228 cows and heifers in milk or in calf), and sheep as many as 244,771. The inhabitants are dependent almost solely on agriculture, the manufactures being confined chiefly to coarse cloth, stockings, and flannel for home use.

Railways.—The county is intersected by several lines: the Central Wales Railway runs south-west from Knighton to Llandovery; another line runs south-eastwards by Rhayader and Builth and joins the Hereford line, which passes by Hay and Talgarth; while another branch line passes by Kineton to New Radnor.

Administration and Population.—Radnor comprises six hundreds, but contains no municipal borough. It has one court of quarter sessions and is divided into six petty and special sessional divisions. The ancient borough of Radnor (population 2005) is governed by the provisions of an old charter, and has a commission of the peace. The county contains sixty civil parishes with part of one other, and is partly in the diocese of St David's and partly in that of Hereford. It returns one member to the House of Commons. The population in 1871 was 25,430 and in 1881 it was 23,528, of whom 11,939 were males and 11,589 females. The number of inhabited houses was 4775. The average number of persons to an acre was 0·09 and of acres to a person 11·75.

History and Antiquities.—During the Roman occupation the district was included in the province of Siluria. The Roman road from Chester to Caermarthen entered the northern extremity of the county near Newtown and, following the valley of the Ithon, crossed the Wye and entered Brecknockshire near the town of Builth. There are remains of a Roman station at Cym near Llandrindod, and at Wapley Hill near Presteigne there is a very good example of a British camp. The district was afterwards included chiefly in Powis, but partly in Gwent and partly in Feryllwge. It was made a county by Henry VIII. Anciently it was called Maesyfedd. The name Radnor is also of very great antiquity, and occurs in the Cambrian annals as early as 1196. There are no ancient castles claiming special notice, and the only ecclesiastical ruin of importance is that of the abbey of Cwm-Hir, founded for the Cistercians in 1143, and occupying a romantic situation in the vale of Clywedog. A considerable portion of the ancient building has been used as materials for the adjoining modern mansion.

RADOM, a government of Poland, occupying a triangular space between the Vistula and the Pilica and bounded on the N. by Warsaw and Siedlce, on the E. by Lublin, on the S. by Austrian Galicia and Kielce, and on the W.

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[1] Sitzungsber. d. k. Ak. in Wien, 1879.

[2] Wiedemann's Ann., 1882, xvii.

by Piotrków. The area is 4765 square miles. Its southern part stretches over the hilly plateau of Poland, which consists of short ridges of hills from 800 to 2000 feet in height, intersected by deep valleys, and is known as the Sandomir Heights. These heights are thickly wooded; the valleys, running west and east and watered by several tributaries of the Vistula, are excellently adapted for agriculture. Farther north in its central portion the contour of the government is level, the soil fertile, and the surface, which is diversified here and there with wood, is further broken up by occasional spurs, 800 feet in height, of the Lysa Góra Mountains. The northern districts, where the Pilica joins the Vistula, consist of low flat tracts with undefined valleys, exposed to frequent floods and covered over large areas with marshes; the basin of the Pilica, notorious for its unhealthiness, is throughout a low marshy plain. Devonian, Carboniferous, Permian, and Triassic deposits appear in the southern plateau, Chalk and Jurassic in the middle, and Tertiary in the north. Wide tracts are covered with Glacial deposits,—the Scandinavian erratics reaching as far south as Ilża; these last in their turn are covered with widely spreading post-Glacial lacustrine deposits. The Vistula skirts the government on the south and east and is an important means of communication, several hundreds of light boats (*galary*) descending the river every year, while steamers ply as far up as Sedomierz. The Sędomierz district is occasionally exposed to disastrous inundations of the river. The tributaries of the Vistula (Radomka, Kamienna, and several others) are but short and small, while those of the Pilica are mere streams sluggishly flowing amidst marshes.

The population (644,830 in 1882) is Polish for the most part, one-seventh being Jews. According to creed the proportions are—Roman Catholic 84·0 per cent., Jewish 14·6, Protestant 1·3, and Greek 0·1 per cent. The chief occupation of the inhabitants is agriculture, the principal crops being wheat, oats, rye, potatoes, and beetroot (for sugar). Corn is exported and potatoes largely used for distillation. In 1879 there were 148 manufacturing establishments (197 in 1883), employing 1708 hands, with an aggregate production of 2,121,000 roubles (£212,000), the more important being tanneries, flour-mills, sugar-works, and several machinery and iron-works. These last are suffering, however, from want of wood-fuel, and many of them have recently been closed. Trade is not very extensive, the only channel of commerce being the Vistula. There is no lack of philanthropic institutions within the government (most of them founded early in this century), but nevertheless the sanitary condition of the people is deplorable. *Plica polonica*, which is endemic in the government of Radom as well as in that of Kielce, is widely diffused, no fewer than 15,000 persons suffering from it, and cognate maladies, such as goitre, scabies, and *tinea capitis*, are also widely prevalent.

The educational institutions include two lycées or gymnasia and two progymnasia (all at Radom), with 813 male and 287 female pupils, a normal school, a theological seminary at Sandomir, and 170 primary schools (112 in villages), with 8465 scholars.

The government is divided into eight districts, the chief towns of which are—Radom, Ilża (2750), Konsk (6275), Kozienice (5690), Opatow (5200), Opoczno (5585), and Sędomierz or Sandomir (6265, or 14,710 including suburbs). Zavihvost (3700) is an important custom-house. Ostrowiec (5290), Staszów (6910), Przedborz (6345), and Szidlowiec (5290) have municipal institutions.

RADOM, capital of the above government, situated on the Mleczna, a tributary of the Radomka, 65 miles south from Warsaw, is one of the best-built provincial towns of Poland. Lublin Street has a number of fine shops, and there are two well-kept public gardens. The permanent population in 1882 was 12,970, half of whom were Jews, and the town is rapidly growing towards the south-east. Though an old town, Radom has no interesting antiquities. The church of St Wlaclaw, contemporary with the foundation of the town, was transformed by the Austrians into a storehouse, and subsequently by the Russian Government into a military prison. The old castle is in ruins, and the old Bernardine monastery is now used as barracks. The manufactures are unimportant, but trade has been lately increasing.

Radom, which is mentioned in historical documents of the year 1216, at that time occupied the site of what is now Old Radom. New Radom was founded in 1340 by Casimir the Great. Here Jadwiga was elected queen of Poland in 1382, and here too in 1401 the first act relating to the union of Poland with Lithuania was signed; the "seim" of 1505, where the organic law of Poland was sworn by the king, was also held at Radom. Several great fires, and still more the Swedish War, were the ruin of the old city. After the third partition of Poland it fell under Austrian rule; later on, in 1809, it became capital of the Radom department of the grand-duchy of Warsaw. In 1815 it was annexed to Russia and became chief town of the province of Sandomir.

RAEBURN, SIR HENRY (1756-1823), portrait-painter, was born at Stockbridge, a suburb of Edinburgh, on the 4th of March 1756, the son of a manufacturer of the city. He was early left an orphan. Being placed in Heriot's Hospital, he received there the elements of a sound education, and at the age of fifteen was apprenticed to a goldsmith in Edinburgh. Here he had some little opportunity for the practice of the humbler kinds of art, and various pieces of jewellery, mourning rings and the like, adorned with minute drawings on ivory by his hand, are still extant. Soon he took to the production of carefully finished miniatures; and, meeting with success and patronage, he extended his practice to oil-painting, being all the while quite self-taught. The worthy goldsmith his master watched the progress of his pupil with interest, gave him every encouragement, and introduced him to David Martin, who had been the favourite assistant of Allan Ramsay junior, and was now the leading portrait-painter in Edinburgh. Raeburn received considerable assistance from Martin, and was especially aided by the loan of portraits to copy. Soon the young painter had gained sufficient skill to render it advisable that he should devote himself exclusively to art. When in his twenty-second year he was asked to paint the portrait of a young lady whom he had previously observed and admired when he was sketching from nature in the fields. She was the daughter of Peter Edgar of Bridgelands and widow of Count Leslie. The lady was speedily fascinated by the handsome and intellectual young artist, and in a month she became his wife, bringing him an ample fortune. After the approved fashion of artists of the time, it was resolved that Raeburn should visit Italy, and he accordingly started with his wife. In London he was kindly received by Sir Joshua Reynolds, who gave him excellent advice as to his study in Rome, especially recommending to his attention the works of Michelangelo. He also offered him more substantial pecuniary aid, which was declined as unneeded; but Raeburn carried with him to Italy many valuable introductions from the president of the Academy. In Rome he made the acquaintance of Gavin Hamilton, of Batoni, and of Byers. For the advice of the last-named he used to acknowledge himself greatly indebted, and particularly for the recommendation that "he should never copy an object from memory, but, from the principal figure to the minutest accessory, have it placed before him." After two years of study in Italy he returned to Edinburgh in 1787, where he began a most successful career as a portrait-painter. In that year he executed an admirable seated portrait of the second Lord President Dundas.

Of his earlier portraiture we have interesting examples in the bust-likeness of Mrs Johnstone of Baldovie and in the three-quarter-length of Dr James Hutton, works which, if they are somewhat timid and tentative in handling and wanting in the trenchant brush-work and assured mastery of subsequent productions, are full of delicacy and character. The portraits of John Clerk, Lord Eldin, and of Principal Hill of St Andrews belong to a somewhat later period. Raeburn was fortunate in the time in which he practised portraiture. Sir Walter Scott, Blair, Mackenzie, Woodhouselee, Robertson, Home, Ferguson, and Dugald Stewart were resident in Edinburgh, and they were all, along with a host of others less celebrated, immortalized on the painter's canvas. Of his fully matured manner we could have no finer examples than his own portrait and that of the Rev. Sir Henry Moncreiff Wellwood, the bust of Dr Wardrop of Torbane Hill, the two full-lengths of Adam Rolland of Gask and that of William Macdonald of St Martin's. It was commonly believed that Raeburn was less successful in his female than in his male portraits, but the exquisite full-length of his wife, the smaller likeness of Mrs R. Scott Moncrieff in the Scottish National Gallery, and that of Mrs Robert Bell are sufficient to prove that he could on occasion portray all the grace and beauty of the gentler sex.

Raeburn spent his life in Edinburgh, rarely visiting the metropolis, and then only for brief periods, thus preserving his own sturdy individuality, if he missed the opportunity of engrafting on it some of the fuller refinement and delicacy of the London portraitists. His leisure was employed in athletic sports, in his garden, and in architectural and mechanical pursuits, and so varied were the interests that filled his life that his sitters used to say of him, "You would never take him for a painter till he seizes the brush and palette." Professional honours fell thick upon him In 1812 he was elected president of the Society of Artists in Edinburgh, in 1814 associate, and in the following year full member of the Royal Academy. In 1822 he was knighted by George IV. and appointed His Majesty's limner for Scotland. He died at Edinburgh on the 8th of July 1823.

In his own day the portraits of Raeburn were excellently and voluminously engraved, especially by the last members of the great school of English mezzotint. In 1876 a collection of over 300 of his works was brought together in the Royal Scottish Academy galleries; in the following year a series of twelve of his finest portraits was included in the winter exhibition of the Royal Academy, London; and a volume of photographs from his paintings has been edited by Dr John Brown.

Raeburn possessed all the necessary requirements of a popular and successful portrait-painter. He had the power of producing a telling and forcible likeness; his productions are distinguished by breadth of effect, by admirable force of handling, by execution of the swiftest and most resolute sort. Wilkie has recorded that, while travelling in Spain and studying the works of Velazquez, the brush-work of that master reminded him constantly of the "square touch" of Raeburn. But the portraits of Velazquez are unsurpassable examples of tone as well as of handling, and it is in the former quality that Raeburn is distinctly wanting. The colour of his portraits is sometimes crude and out of relation, inclining to the use of positive and definite local pigments, and too little perceptive of the changeful subtilties and modifications of atmospheric effect. His draperies frequently consist of little more than two colours—the local hue of the fabric and the black which, more or less graduated, expresses its shadows and modelling. In his flesh, too, he wants—in all but his very best productions—the delicate refinements of colouring which distinguish the works of the great English portrait-painters. His faces, with all their excellent truth of form and splendid vigour of handling, are often hard and bricky in hue.

RAFF, Joseph Joachim (1822-1882), composer and orchestral conductor, was born near Zurich on 27th May 1822 and educated chiefly at Schwyz. Here, under the care of the Jesuit fathers, he soon became an excellent classical and mathematical scholar, but received scarcely any instruction in his favourite art, in which, nevertheless, he made extraordinary progress through sheer force of natural genius, developed by persevering study which no external obstacles could induce him to discontinue. So successful were his unaided efforts that, when in 1843 he sent some MSS. to Mendelssohn, that warm encourager of youthful talent felt justified in at once recommending him to Breitkopf & Härtel of Leipsic, who published a large selection of his early works. Soon after this he became acquainted with Liszt, who gave him much generous encouragement. He first became personally acquainted with Mendelssohn at Cologne in 1846, and gave up all his other engagements for the purpose of following him to Leipsic, but his intention was frustrated by the great composer's death in 1847. After this cruel disappointment he remained for some time at Cologne, where his attention was alternately devoted to composition and to the preparation of critiques for the well-known periodical *Cäcilia*. Thus far he must be regarded as, in every sense of the word, a self-taught artist; but he felt the need of systematic instruction so deeply that, retiring for a time from public life, he entered at Stuttgart upon a long course of severe and uninterrupted study, and with so great success that in 1850 he appeared before the world in the character of an accomplished and highly-cultivated musician. Raff now settled for a time in Weimar in order to be near Liszt. Hans von Bülow had already brought him into notice by playing his *Concertstück* for pianoforte and orchestra in public, and the favour with which this fine work was everywhere received encouraged him to attempt a greater one. During his stay in Stuttgart he had begun the composition of an opera entitled *König Alfred*, and had good hope of securing its performance at Dresden; but the political troubles with which Germany was then overwhelmed rendered its production in the Saxon capital impossible. At Weimar he was more fortunate. In due time *König Alfred* was produced there under Liszt's able direction with complete success; it is still frequently performed at the court theatre, as is also his second opera, *Dame Kobold*, written for the same theatre in 1870. His third opera, *Samson*, has not yet, we believe, been publicly represented.

Raff remained at Weimar until 1856, when he obtained a large *clientèle* at Wiesbaden as a teacher of the pianoforte. In 1859 he married Doris Genast, an actress of high repute, and thenceforward devoted himself with renewed energy to the work of composition, displaying an inexhaustible fertility of invention tempered by an amount of technical skill which stamped even his lightest works with the dignity to which the union of natural talent with high artistic cultivation can alone give birth. He resided chiefly at Wiesbaden till 1877, when he was appointed director of the Hoch-Conservatorium at Frankfort, an office which he retained until his death, 25th June 1882.

Raff's compositions are almost innumerable. More than 200 have been published, including ten symphonies—undoubtedly his finest works—quartets, concertos, sonatas, songs, and examples of nearly every known variety of style; yet he never repeats himself. Notwithstanding his strong love for the romantic school, he is never guilty of extravagance, and, if in his minor works he is sometimes a little commonplace, he never descends to vulgarity. His symphonies *Lenore* and *Im Walde* are truly wonderful examples of musical painting, and replete with poetry in every bar.

RAFFLES, Sir Thomas Stamford (1781-1826), the son of a captain in the West India trade, was born at sea off the coast of Jamaica on 5th July 1781. Returning with his mother to England, he was placed in a boarding-school at Hammersmith, where he remained till the age of fourteen, when he entered the East India House as an extra clerk. While employed there he occupied his leisure hours in particularly studying languages, for which he possessed great facility. In 1805 the directors of the India House having resolved to found a new trading settlement at Penang, Raffles was appointed assistant-secretary, and on his voyage out he acquired the Malay language. Owing to the illness of the chief secretary, he soon had to undertake the entire administrative labour of the new government. In 1808 he had to visit Malacca to recruit his shattered strength; here he enjoyed large opportunity of mingling with a very varied population, and, in company with the two Orientalists Marsden and

Leyden, he began his elaborate researches into the history, laws, and literature of the Hindu and Malay races. In zoology he took special interest, and on his return to England became founder and first president of the Zoological Society. While in Calcutta in 1809, Raffles suggested to Lord Minto, then governor-general of India, the desirableness of wresting Java from the French. The governor-general took up the idea with vigour; a fleet of ninety ships dropped anchor before Batavia in August 1811, and in a short time the conquest of the island was effected. Raffles was made lieutenant-general of the new territory, and resolved to give to the island a pure and upright administration. There were three sources of abuse to eradicate—the revenue system, the system of police and public justice, and the slave trade. In a period of only five years Raffles had almost effected his design; his popularity was secured, and the revenue was eight times larger than it had been under the Dutch. The policy of some of his measures being, however, considered doubtful by the home authorities, he was recalled in 1816, but his conduct was approved. He published a valuable and well-illustrated *History of Java*, in 2 vols. 4to, 1817.

Having received knighthood, Sir Stamford Raffles set out for Sumatra as lieutenant-governor of Bencoolen, arriving in March 1818, and immediately recommenced the work of reform. In 1819 he induced the marquis of Hastings to annex Singapore. He again visited Singapore, his "political child," in 1822, and occupied himself for nearly a year in laying out the new city, and in establishing its constitution as a free port. Java had been given up to the Dutch shortly after Sir Stamford left it, and now Bencoolen was granted to them in exchange for Malacca. On setting sail for England from Sumatra in February 1824 the ship took fire and the crew and passengers were with difficulty saved. The loss to Sir Stamford was beyond all repair. The whole of his drawings, all his collections in botany and zoology, all his multitudinous papers and manuscripts, fell a prey to the flames, his pecuniary loss amounting to more than £20,000. During one of his excursions into the interior of Sumatra, in company with Dr Arnold, he came upon the largest and most extraordinary of known flowers, the *Rafflesia Arnoldi* (see PARASITISM, vol. xviii. p. 265). In 1820 he sent home a large collection of preserved animals, now in the museum of the London Zoological Society, described in the *Transactions* of the Linnean Society. He died of apoplexy at his house near London on 5th July 1826.

RAFN, CARL CHRISTIAN (1795-1864), Danish archæologist, was born in Brahesborg, Fünen, on 16th January 1795 and died at Copenhagen on 20th October 1864. He is chiefly known in connexion with the controversy as to the question of the discovery of America by the Norsemen. (See AMERICA, vol. i. p. 706.)

RAGATZ, or RAGAZ, a watering-place in Switzerland, in the canton of St Gall, with a station on the railway to Coire, 64 miles south-east of Zurich, stands 1700 feet above the sea at the mouth of the magnificent gorge through which the impetuous Tamina forces its way to the Rhine; its baths are supplied with mineral water from the hot springs of Pfäffers, which issue from the right side of the ravine 2½ miles higher up. As the tourist centre for one of the most picturesque districts of Switzerland, Ragatz has greatly increased since the middle of the century. It had then only 650 inhabitants; in 1870 there were 1825, and in 1880 1996, while the annual number of visitors is about 50,000. In the churchyard is the grave of Schelling, who died at Ragatz in 1854. Ragatz originally belonged to the abbots of the Benedictine monastery of Pfäffers (713-1838); their residence became in 1840 the "Hof Ragatz" hotel, and in 1868 the whole property, which had been seized by the state in 1838, passed into private hands. The Swiss defeated the Austrians at Ragatz in 1446.

RAGLAN, FITZROY JAMES HENRY SOMERSET, BARON (1788-1855), English general, was the eighth and youngest son of the fifth duke of Beaufort by Elizabeth, daughter of Admiral the Hon. Edward Boscawen, and was born on 30th September 1788. He entered the army in 1804. In 1807 he was attached to the Hon. Sir Arthur Paget's embassy to Turkey, and the same year he was selected to serve on the staff of Sir Arthur Wellesley in the expedition to Copenhagen. In the following year he accompanied the same general in a like capacity to Portugal, and during the whole of the Peninsular War was at his right hand, first as aide-de-camp and then as military secretary. He specially distinguished himself at the storming of Badajoz, being the first to mount the breach, and it was to him that the governor delivered up his sword. During the short period of the Bourbon rule in 1814 and 1815 he was secretary to the English embassy at Paris. On the renewal of the war he again became aide-de-camp and military secretary to the duke of Wellington. At Waterloo he lost his right arm by a shot, but he quickly gained the facility of writing with his left hand, and on the conclusion of the war resumed his duties as secretary to the embassy at Paris. From 1818 to 1826 he sat in the House of Commons as member for Truro. In 1819 he was appointed secretary to the duke of Wellington as master-general of the ordnance, and from 1827 till the death of the duke in 1852 was military secretary to him as commander-in-chief. He was then appointed master-general of the ordnance, and shortly afterwards was raised to the House of Lords as Baron Raglan. In 1854 he was appointed to the command of the English troops sent to the Crimea. Here the advantage of his training under the duke of Wellington was seen in the soundness of his military tactics, but the trying winter campaign in the Crimea also brought into prominence defects perhaps traceable to his long connexion with the formalities and uniform regulations of military offices in peace time. At the same time the hampering influence of a divided command must be taken into account, and it ought not to be forgotten that, if his advice had been adopted by the French at the beginning, Sebastopol would very probably have fallen in a few weeks after the landing of the allies. His suggestion was to march straight upon the north side of Sebastopol, but after the battle of Alma on 20th September the plan was abandoned, and the south side was reached by the desperate expedient of a perilous flank march. For the hardships and sufferings of the English soldiers in the terrible Crimean winter owing to a failure in the commissariat, both as regards food and clothing, Lord Raglan and his staff were at the time severely censured by the press and the Government; but, while Lord Raglan was possibly to blame in representing matters in a too sanguine light, it afterwards appeared that the chief neglect rested with the home authorities. The monotony of the siege was broken by the battles of Balaclava on 26th October and of Inkermann on 5th November, in which the accurate and rapid decision of Lord Raglan changed impending disasters into brilliant victories. During the trying winter of 1854-55 the suffering he was compelled to witness, the censures, in great part unjust, which he had to endure, and all the manifold anxieties of the siege seriously undermined his health, and he died of dysentery on 28th June 1855.

See Kinglake's *History of the Invasion of the Crimea.*

RAGMAN ROLLS, the name given to the collection of instruments by which the nobility and gentry of Scotland were compelled to subscribe allegiance to Edward I. of

England between the conference of Norham in May 1291 and the final award in favour of Baliol in November 1292, and again in 1296. Of the former of these records two copies were preserved in the chapter-house at Westminster (now in the Record Office, London), and it has been printed by Rymer (*Fœdera*, ii. 542). Another copy, preserved originally in the Tower of London, is now also in the Record Office. The latter record, containing the various acts of homage and fealty extorted by Edward from Baliol and others in the course of his progress through Scotland in the summer of 1296 and in August at the parliament of Berwick, was published by Prynne from the copy in the Tower and now in the Record Office. Both records were printed by the Bannatyne Club in 1834. The derivation of the word "ragman" has never been satisfactorily explained, but various guesses as to its meaning and a list of examples of its use for legal instruments both in England and Scotland will be found in the preface to the Bannatyne Club's volume, and in Jamieson's *Dictionary*, *s.v.* "Ragman." The name of "Ragman" has been sometimes confined to the record of 1296, of which an account is given in *Calendar of Documents relating to Scotland preserved in the Public Record Office, London* (1884), vol. ii., Introd., p. xxiv.; and as to the seals see p. lii. and appendix.

RAGUSA (Slavonic *Dubrovnik*, Turkish *Paprovnik*), a city on the east coast of the Adriatic, for many centuries an independent republic, now at the head of a district in the province of Dalmatia in Austria-Hungary. It is built close to the sea at the foot of the bare limestone mass of Monte Sergio, on which stands an unfinished Fort Impérial erected by the French. In front lies the island of Lacroma, the traditional landing-place of Cœur-de-Lion. Several ancient stone-built forts—San Lorenzo (11th century), Leverono (16th), &c.—defend the harbour, and the city is fenced in with lofty walls. The main street runs in a narrow valley between the mountain and a seaward ridge; the valley was up till the 13th century a channel of the sea, and the seaward ridge was the rocky island of Lavve or Ragusa proper, opposite which lay among its pine trees the Slavonic settlement of Dubrovnik. Though still a fine street, this corso is not so imposing as before its palatial mansions were overthrown by the earthquake of 1667. It contains a 15th-century cistern, a church (Del Redentore) erected after the earthquake of 1536 to avert similar catastrophes, and a Franciscan monastery; and in the piazza off its southern extremity are the Palazzo Rettorale, or residence of the "rectors" of the republic (1435-52), the old custom-house and mint, completed in 1520, and the Torre del Orologio, with its curious clock. The "palace" is a marvellous specimen of late Romanesque influence, especially famous for the six columns of its façade and the alchemist group with which one of the capitals is decorated; and the custom-house has also a fine Romanesque element in its style. The cathedral (dedicated to the Virgin Mary, though the patron saint of the city is St Blasius, whose effigy perpetually occurs on its coins, fortifications, and churches) is a building in the Italian taste of the 18th century. Ragusa can never have been a large city. In the 16th century it is said to have contained 30,000 or 40,000 inhabitants; in 1881 it had only 7245, and its commune, with its fifteen additional villages, 10,936. The harbour, once one of the great ports of southern Europe, is altogether too small for modern requirements, in spite of the new breakwater constructed in 1873 to protect it from the south-west winds. From 400 to 600 vessels (mostly under 50 tons burden) enter yearly. The neighbouring harbour of Gravosa (Slav *Gruž*; population 677) is the real port of Ragusa as far as steamboat traffic is concerned. The staple trade is that of oil; but the whole supply is sent to the Trieste market. Ragusan Malmsey, once famous, has disappeared before the vine-disease since 1852.

The history of Ragusa has been thus summarized by Mr Freeman:—"Those hills, the slopes of which begin in the streets of the city, once fenced in a ledge of Hellenic land from the native barbarians of Illyricum. Then they fenced in a ledge of Roman land from the Slavonic invader. Lastly they still fence in a ledge of Christian land from the dominion of the infidel." The city was founded on a rocky island by Roman Christian refugees from Epidaurus (now Ragusa Vecchia, 675 inhabitants), in the middle, say some, of the 3d century after Christ; and in the middle of the 7th century it was strengthened by other refugees from Salona, destroyed by the Slavs. In course of time a Slavic settlement was incorporated within its walls; and thus by language and sympathies it became a link between two great civilizations. Ragusa[1] maintained its independence against all comers partly by war but more by diplomacy. In the 9th century it more than once repulsed the Saracens, and in the 10th defended itself against Venice, the pirates of the Narenta, Samuel (czar of the Bulgarians), and the emperor Otho; in the 11th century it was drawn by its alliance with Robert Guiscard into a war with Byzantium and Venice, and in the 12th century fought with the ban of Bosnia and with Stephen Nemanya of Servia, who twice invested the city. But its policy was generally peaceful. To refugees of all nations, even to those who had been its own bitter foes, it afforded asylum; and by means of treaty and tribute it gradually worked its way to a position of mercantile power which Europe could hardly parallel. A compact which it made with the Turkish ruler at Broussa in 1370 was renewed by Bajazet in the 15th century and saved the little state from the fate of her most powerful neighbours, Byzantium and Servia. By that time Ragusa had stations at Serai, Bucharest, Tirgovisce, Widdin, Rustchuk, Sophia, and Adrianople; and her vessels were known not only in Italy, Sicily, Spain, Greece, and the Levant, but in the more northern parts of Europe. Our own language retains in the word "argosy" a relic of the carracks of Ragusa, then known to Englishmen as Argouse, Argusa, or Aragosa. As the world widened the Ragusan merchants went farther,—to India, even, and America. But the finest vessels of their fleet were compelled to join the Spanish Armada and shared its fate; and the city, which had felt shocks of earthquake in 1520, 1521, 1536, and 1639, was in April 1667 laid utterly in ruins and lost a fifth of its inhabitants. "The rector of the republic, five-sixths of the nobles, nine-tenths of the clergy, a Dutch ambassador with his suite of thirty-three on his way to Constantinople, and 6000 citizens were buried." Ragusa never quite recovered its prosperity, though it was again a busy trading town of 15,000 inhabitants when Napoleon seized it in 1806. In 1808 it was deprived of its independence; and by the congress of Vienna in 1814 it was assigned to Austria. This is not the place to describe the remarkable literary development, Latin, Italian, and Slavonic, of which Ragusa was the centre in the 15th, 16th, and 17th centuries, and to which so many of its patricians contributed; a detailed account will be found in Pypin and Spasovich's *History of Slavic Literatures* (German edition, 1880). Gondulic (Gondola) the poet and Boscovich the mathematician are leading names.

See Engel, *Geschichte von Ragusa* (Vienna, 1807); Makusheff, *Investigations into the Historical Documents of Ragusa* (in Russian, St Petersburg, 1867); *Monumenta hist. Slavorum meridionalium* (Warsaw, 1864); Appendini, *Notizie storico-crit. sulle antichità, &c., dei Ragusei* (Ragusa, 1802-3); Sir Gardner Wilkinson, *Dalmatia*; A. A. Paton, *The Danube and Adriatic*; J. A. Evans, *Thro' Bosnia and the Herzegovina*, 1876; E. A. Freeman, *Subject and Neighbour Lands of Venice*, 1881.

RAGUSA, a city of Italy in the province of Syracuse (Sicily), 16 miles east of Vittoria and 10 north-north-west of Modica, lies on the right side of the valley of the Ragusa or Erminio (Herminius). It consists of an upper town with 24,183 inhabitants and a lower town with 6260 (1881), the two communes having a total population of 30,720. The church of Santa Maria della Scala is in part modern, but in part of considerable antiquity and interest; and San Giorgio contains the tomb of Bernardo Caprera (ob. 1423), who tried to seize the crown of Sicily. Ragusa possesses a large cotton-factory. Stone impregnated with petroleum is quarried in the Grotta Oleosa in the neighbourhood, and after the oil is burned out becomes an article of export under the name of *pietra nera*. The city, which was destroyed by earthquake in 1693, is of considerable antiquity, as is proved by the numerous ancient tombs existing in the district; but whether it is to be identified with Hybla Heræa is matter of opinion.

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[1] The name, of unknown origin, appears as Rhausia, Rhaugium, Rhausium, Ragusium, Lavusa, Labuda, [illegible]

RAHEL. See Varnhagen von Ense.

RAHWAY, a city of the United States in Union county, New Jersey, 19 miles by rail south-west of New York, lies on Rahway river at the head of schooner navigation, about 4 miles above its mouth in Staten Island Sound. It is best known for its carriage-factories, but has also a wool-mill, a printing-press manufactory, a printing-house, a shirt-factory, a hunting-goods factory, &c. The population was 6258 in 1870 and 6455 in 1880. First settled in 1720 and named after Rahwack, the Indian owner of the site, Rahway was incorporated as a city in 1858.

RAI BARELI or Roy Bareilly, a district of British India, in the Rai Bareli division[1] of Oudh, under the jurisdiction of the lieutenant-governor of the North-Western Provinces, has an area of 1738 square miles. It lies between 25° 49′ and 26° 35′ N. lat. and between 80° 45′ and 81° 40′ E. long., and is bounded on the N. by the districts of Lucknow and Bara Banki, on the E. by Sultanpur, on the S. by Partabgarh and the Ganges, and on the W. by Unao. The general aspect of the district is slightly undulating, and the country is beautifully wooded; in fact, the beauty of the country is not to be surpassed by any part of the real plain of Hindustan. The soil is remarkably fertile, and the cultivation of a high class. The principal rivers of the district are the Ganges and the Sai: the former skirts it for 54 miles and is everywhere navigable for boats of 40 tons; the latter traverses it from north-west to south-east, a distance of 55 miles. Other rivers are the Basha, the Loni, and the Naiya. The indigenous products of Rai Bareli consist of several magnificent and useful timber trees, numerous kinds of grazing and thatching grasses, and a variety of rice known as "pasahi," which grows wild in many tanks and marshes; its jungle products are lac and silk cocoons. Herds of wild cattle are to be found in the south of the district, near the Sai river, and do much harm to the crops; nylghau are common near the Ganges, and wolves are occasionally met with in the jungles.

According to the census of 1881 Rai Bareli district contains a population of 951,905 (males 466,906, females 484,999). By religion 874,180 are Hindus, 77,424 Mohammedans, and 123 Christians. The most numerous castes are the Ahirs (114,869), the Brahmans (113,212), and the Rajputs (70,757). Compared with other Oudh districts, the proportion of high castes is large, which is accounted for by the fact that Rai Bareli was for centuries the seat of Hindu authority and but little controlled by the Mohammedan kings. The population is almost entirely rural, there being only three towns with a population exceeding 5000, viz., Rai Bareli (see below), Jais (11,044), and Dalmau (5367). The principal occupation of the people is agriculture. Of the total area 892 square miles were in 1882 returned as cultivated, 432 as cultivable, and 414 square miles as uncultivable. The greater portion of the cultivated area is two-crop land. The principal crops are rice, wheat, gram, arhar, and pease. In years of scarcity Rai Bareli is worse off than other districts, having no railway and only some 56 miles of water communication along its border. On the other hand, its masonry wells afford it a greater assurance against famine; its drainage is superior to that of other districts; it suffers comparatively less from floods; and its area of artificial irrigation is so large that absolute famine ought to be almost unknown. The average rainfall of the district is 37 inches; the rainfall is, however, very capricious and often deficient in the very months when it is most needed for agricultural purposes. Although possessing no railway communication, the district is well opened up by roads. Its gross revenue in 1882 was £153,072, of which £129,841 was derived from the land-tax. There are little trade and few manufactures, except cloth-weaving for local use, the making of brass and copper utensils, and glass ware.

RAI BARELI or Roy Bareilly, town and administrative headquarters of the above district, is situated on the banks of the Sai in 26° 14′ N. lat. and 81° 17′ E. long. It was founded by the Bhars, who called it Bharauli, but it was subsequently corrupted into Bareli. The prefix "Rai" is either derived from Rahi, a village near the town, or from the fact of its having been long in the possession of a Kayasth family bearing the name of Rai. The population of the town (1881) is 11,781 (males 5970, females 5811). It possesses many architectural features, chief of which is a spacious and strong fort erected in 1403, and constructed of bricks 2 feet long by 1 foot thick and 1½ wide. Among its ancient buildings are the magnificent palace and tomb of Nawab Jahan Khan, the governor in the time of Aurangzeb, and four fine mosques.

RAIKES, Robert (1735-1811), the founder of Sunday schools, was the son of Robert Raikes, a printer in Gloucester and proprietor of the *Gloucester Journal*, and was born on 14th September 1735. On the death of his father in 1757 he succeeded him in the business, which he continued to conduct till 1802. Along with some others he started a Sunday school at Gloucester in 1780, and on his giving publicity to the enterprise in the columns of his journal the notice was copied into the London papers and awakened considerable attention. For nearly thirty years he continued actively engaged in the promotion of his undertaking, and he lived to witness its wide extension throughout England. He died on 5th April 1811. Among various accounts of the life and work of Raikes mention may be made of that by P. M. Eastman, 1880.

RAIL (German *Ralle*, French *Râle*, Low Latin *Rallus*), originally the English name of two birds, distinguished from one another by a prefix as Land-Rail and Water-Rail, but latterly applied in a much wider sense to all the species which are included in the Family *Rallidæ* of Ornithology.

The Land-Rail, also very commonly known as the Corn-Crake, and sometimes as the Daker-Hen, is the *Rallus crex* of Linnæus and *Crex pratensis* of recent authors. Its monotonous grating cry, which has given it its common name in several languages, is a familiar sound throughout the summer nights in many parts of the British Islands; but the bird at that season very seldom shews itself, except when the mower lays bare its nest, the owner of which, if it escape beheading by the scythe, may be seen for an instant before it disappears into the friendly covert of the still standing grass. In early autumn the partridge-shooter not unfrequently flushes it from a clover-field or tangled hedgerow; and, as it rises with apparent labour and slowly flies away to drop into the next place of concealment, if it fall not to his gun, he wonders how so weak-winged a creature can ever make its way to the shores if not to the interior of Africa, whither it is almost certainly bound; for, with comparatively few individual exceptions, the Land-Rail is essentially migratory—nay more than that, it is the *Ortygometra* of classical authors—supposed by them to lead the Quail (*supra*, p. 146) on its voyages—and in the course of its wanderings has now been known to reach the coast of Greenland, and several times that of North America, to say nothing of Bermuda, in every instance we may believe as a straggler from Europe or Barbary. The Land-Rail needs but a brief description. It looks about as big as a Partridge, but on examination its appearance is found to be very deceptive, and it will hardly ever weigh more than half as much. The plumage above is of a tawny brown, the feathers being longitudinally streaked with blackish brown; beneath it is of a yellowish white; but the flanks are of a light chestnut. The species is very locally distributed, and in a way for which there is at present no accounting. In some dry upland and corn-growing districts it is plentiful; in others, of apparently the same character, it but rarely occurs; and the same may be said in regard to low-lying marshy meadows, in most of which it is in season always to be heard, while in others having a close resemblance to them it is never met with. The nest is on the ground, generally in long grass, and therein from nine to eleven eggs are commonly laid. These are of a cream-colour, spotted and blotched with light red and grey. The young when hatched are thickly clothed with black down, as is the case in nearly all species of the Family.

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[1] Rai Bareli division comprises the three districts of Rai Bareli, Sultanpur, and Partabgarh, and contains an area of 4882 square miles, with a population (1881) of 2,756,864 (males 1,362,761, females 1,394,103). The great majority of the people are Hindus, of whom there are 2,493,536; the Mohammedans number 262,892 and the Christians 226.

The WATER-RAIL, locally known as the Skiddy or Bill-cock, is the *Rallus aquaticus* of Ornithology, and seems to be less abundant than the preceding, though that is in some measure due to its frequenting places into which from their swampy nature men do not often intrude. Having a general resemblance to the Land-Rail,[1] it can be in a moment distinguished by its partly red and much longer bill, and the darker coloration of its plumage—the upper parts being of an olive brown with black streaks, the breast and belly of a sooty grey, and the flanks dull black barred with white. Its geographical distribution is very wide, extending from Iceland (where it is said to preserve its existence during winter by resorting to the hot springs) to China; and though it inhabits Northern India, Lower Egypt, and Barbary, it seems not to pass beyond the tropical line. It never affects upland districts as does the Land-Rail, but always haunts wet marshes or the close vicinity of water. Its love-note is a loud and harsh cry, not continually repeated as is that of the Land-Rail, but uttered at considerable intervals and so suddenly as to have been termed "explosive." Besides this, which is peculiar to the cock-bird, it has a croaking call that is frog-like. The eggs resemble those of the preceding, but are more brightly and delicately tinted.

The various species of Rails, whether allied to the former or latter of those just mentioned, are far too numerous to be here noticed. Hardly any part of the world is without a representative of the genera *Crex* or *Rallus*, and every considerable country has one or perhaps more of each—though it has been the habit of systematists to refer them to many other genera, the characters of which are with difficulty found. Thus in Europe alone three other species allied to *Crex pratensis* occur more or less abundantly, but one of them, the Spotted Rail or Crake, has been made the type of a so-called genus *Porzana*, and the other two, little birds not much bigger than Larks, are considered to form a genus *Zapornia*. The first of these, which used not to be uncommon in the eastern part of England, has a very near representative in the Carolina Rail or Sora, *Crex carolina*, of North America, often there miscalled the Ortolan, just as its European analogue, *C. porzana*, is in England often termed the Dotterel. But, passing over these as well as some belonging to genera that can be much better defined, and other still more interesting forms of the Family, as *Aphanapteryx* (BIRDS, vol. iii. p. 733), COOT (vol. vi. p. 341), MOOR-HEN (vol. xvi. p. 808), and OCYDROME (vol. xvii. p. 722), a few words must be said of the more distant group formed by the South-American *Heliornis*, and the African and Indian *Podica*, comprising four or five species, to which the name "Finfoots" has been applied—from the lobes or flaps of skin that fringe their toes. Though for a long while placed among the *Podicipedidæ* (GREBE, vol. xi. p. 79), their osteology no less than their habits appear to indicate their alliance with the Rails, if they be not members of the Family *Rallidæ*; but they seem to shew the extreme modification of that type in adaptation to aquatic life. Then again the curious genus *Mesites* of Madagascar, whose systematic place has been so long in doubt, has been referred by Prof. Alph. Milne-Edwards (*Ann. Sc. Naturelle*, ser. 6, vii. art. 2) to the neighbourhood of the Rails, though offering some points of resemblance to the Herons. On the other hand the Jacanas (vol. xiii. p. 531) or *Parridæ*, which from their long toes were once thought to belong to the Rails, are now generally admitted to be Limicoline, while the genus *Aramus*—the Courlan or Limpkin of the Southern United States—still occupies a very undetermined position. On the whole the *Rallidæ* constitute a group of birds which, particularly as regards their relations to some other remarkable forms, of which the Sun-Bittern, *Eurypyga*, and Kagu, *Rhinochetus*, may especially be named, will deserve greater attention from the systematist, and any ornithologist in want of a subject could hardly find one more likely to reward his labours if he were only to carry them out in a judicious way. Based on the safe ground of anatomy, but due regard being also had to the external characters, habits, and other peculiarities of this multifarious group, a monograph might be produced of surpassing interest, and one that in its bearings on the doctrine of evolution would be likely to prove a telling record. (A. N.)

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[1] Formerly it seems to have been a popular belief in England that the Land-Rail in autumn transformed itself into a Water-Rail, resuming its own characters in spring. The writer has met with several persons who had serious doubts on the subject!

RAILWAY

RAILWAYS had their origin in the tramways which were laid more than two hundred years ago in the mineral districts of England for the conveyance of coal to the sea. In those days, before Macadam, roads bearing heavy traffic were with difficulty kept in repair. This led to the plan of laying planks or timbers at the bottom of the ruts as a better contrivance than filling in with stones, and then to laying rails of timber on the level surface. In 1676 tramways consisted of rails of timber laid "from the colliery to the river, exactly straight and parallel, and bulky carts were made with four rollers fitting the rails, whereby the carriage was so easy that one horse would draw down four or five chaldron of coals." The rails originally were formed of scantlings of good sound oak, and were connected by sills or cross timbers of the same material pinned together with oak trenails. By and by an additional or wearing rail, which could be easily renewed when worn, was placed above the supporting rail, and it was then possible to cover the cross pieces or sleepers with earth to protect them from the horses' feet. These ways, laid by permission of local proprietors, were called "way-leaves." It became a common practice to nail down bars of wrought iron on the surfaces of the ascending inclines of the road. These bars or rails were about 2 inches wide and half an inch thick, and were fastened to the wood rails by countersunk spikes. But the iron bars, not being stiff enough, were considerably bent when the trucks were loaded, and the resistance was reduced but slightly below that of a well-constructed double wooden tramway.[2] Nevertheless, while the regular load of coals for one horse on the common road was but 17 cwt., on the tramway the horse could regularly take a load of 42 cwt. Cast-iron was first tried incidentally as a material for rails in 1767 by the Coalbrookdale Iron Company. The iron rails were cast in lengths of 5 feet, 4 inches wide, and 1¼ inches thick, formed with three holes, through which they were fastened to the oak rails. The tramway was developed into the railway by the employment of cast-iron flange rails (fig. 1) to replace the wooden rails; the continuous flange or ledge on their inner edge kept the wheels on the track. The roads were then called tram-roads, probably as an abbreviation of trammel-roads, the flanges of the rails being in reality trammels to gauge the road and confine the wheels to

Iron rails on tram-roads.

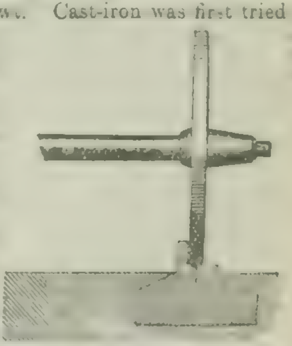

FIG. 1.—The tram-road, 1776-1800.

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[2] The earliest system of way on the Baltimore and Ohio Railroad and other railroads in the United States was a simple reproduction of this compound of wood and iron. As the ends of the bars became loose and turned upwards they were known as "snakes' heads." Occasionally they pierced the floors of the carriages and injured passengers.

the track. The leading objection to this system was that the rail was liable to be covered with dust. Jessop therefore in 1789 laid down at Loughborough cast-iron "edge rails," raised above the ground so as to allow a flanged cast-iron wheel to run on them (fig. 2). This appears to have been the first system of rails laid on cast-iron chairs and on sleepers. The rails were pinned or bolted into the chairs. A wrought-iron rail was patented by Birkenshaw in 1820, as the "fish-belly" rail, similar in form and mode of support to Jessop's rail, but rolled in continuous lengths, embracing a number of spans, with stiffening ledges or flanges on the under side. This form of rail grew into favour. It weighed 33 ℔ per yard, and was laid in cast-iron chairs, spiked down to square stone blocks at 3-feet bearings (see fig. 3). The edge rail and the flanged wheel constitute the basis of the whole system of a railway. The rails forming a line of way were placed to a gauge or distance apart of 4 feet 8½ inches, and two parallel lines of way were spaced with 6 feet between the inner rails of the ways. This interspace is popularly known as the "six-foot."

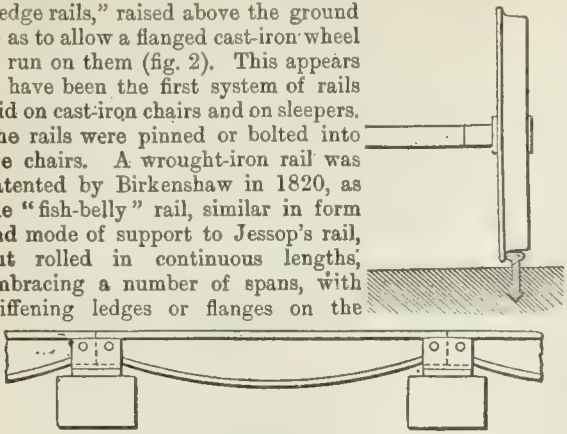

Fig. 2.—The edge rail, 1789.

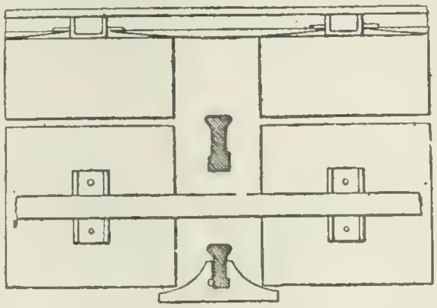

Fig. 3.—The fish-belly rail, 1820-30.

The benefits derived from the use of the tramway or railway for the transport of coal suggested to reflective persons the employment of it for the conveyance of general merchandise and of passengers. For the conveyance of heavy merchandise inland the canals little more than sixty years ago furnished the principal means. Though there were three such water-routes between Liverpool and Manchester, they were sometimes so crowded that cotton took a month to pass from the seaport to the manufacturing towns in the interior; yet the whole of the merchandise passing between Liverpool and Manchester did not average more than 1200 tons a day. The average rate of carriage was 18s. per ton, and the average time of transit on the 50 miles of canal was thirty-six hours. The conveyance of passengers by the improved coach-roads was comparatively rapid, but it was very costly. The first great movement to mend this state of things was the passing of the Act in 1821 for the construction of the Stockton and Darlington Railway. Colliery railways were in evidence to prove the benefits of railway communication by steam-power. The Hetton Railway, for instance, in the neighbourhood of Newcastle, from the colliery to the river Wear, was 7 miles long, and trains of 60 tons net weight were taken over the line at a speed of 4½ miles per hour. On the Killingworth Railway an engine and tender weighing 10 tons drew a load of 40 tons at a speed of 6 miles per hour, consuming 50 ℔ of coal per mile run. Whilst animal-power only was at first relied on for working the Stockton and Darlington Railway, the Act provided for working with men and horses or "otherwise." By another Act applied for at the request of George Stephenson, who became engineer to the line, the company was empowered to work the railway with locomotive engines. The line, with three branches, was over 38 miles in length, and was at first laid as a single line, with passing places at intervals of a quarter of a mile, the way being constructed with wrought-iron fish-belly rails, weighing 28 ℔ per yard. It was opened in September 1825 by a train of thirty-four vehicles, making a gross load of about 90 tons, drawn by one engine driven by Stephenson, with a signalman on horseback in advance. The train moved off at the rate of from 10 to 12 miles an hour, and attained a speed of 15 miles per hour on favourable parts of the line. A train weighing 92 tons could be drawn by one engine at the rate of 5 miles per hour. The principal business of the new railway was the conveyance of minerals and goods, but from the first passengers insisted upon being carried, and in October 1825 the company began to run a daily coach, called the "Experiment," to carry six inside, and from fifteen to twenty outside, making the journey from Darlington to Stockton and back in two hours. The fare was 1s., and each passenger was allowed to take baggage not exceeding 14 ℔ weight. The rate for carriage of merchandise was reduced from 5d. to one-fifth of a penny per ton per mile, and that of minerals from 7d. to 1½d. per ton per mile. The price of coals at Darlington fell from 18s. to 8s. 6d. per ton.

The Monklands Railway in Scotland, opened in 1826, was the first to follow the example of the Stockton and Darlington line, and several other small lines—including the Canterbury and Whitstable, worked partly by fixed engines and partly by locomotives—quickly adopted steam-traction. But the inauguration of the Liverpool and Manchester Railway, opened in 1829, made the first great impression on the national mind that a revolution in the modes of travelling had really taken place. In 1838 a line was opened between London and Birmingham, and the first train accomplished the whole distance—112½ miles—at an average speed of over 20 miles per hour. The London and Greenwich, the London and Southampton, the Great Western, Birmingham and Derby, Bristol and Exeter, Eastern Counties, Manchester and Leeds, Grand Junction, Midland Counties, North Midland, South-Eastern, London and Brighton, Manchester and Birmingham, and Edinburgh and Glasgow, together with many small Bills, were all passed within four years from the time of the passing of the London and Birmingham Bill. Thus in the course of four or five years the foundations were laid of most of the existing trunk lines of railway in Great Britain. The original Liverpool and Manchester line, 30½ miles in length, now forms part of a network of lines, the property of one company, nearly 1800 miles in extent, representing a capital invested in railway works and plant of £100,000,000.

Meantime the construction of the way was the subject of much consideration. The fish-belly form of wrought-iron rail was troublesome to roll, and so the flat-bottom or flat-foot rail (fig. 4) was designed, combining a solid head with a flange base. This rail, with holes through the flange to hold the spikes, was used to some extent, and was laid on longitudinal timber sleepers, and also on transverse sleepers. The disadvantage was want of vertical stiffness of the system; and, if the rail was made higher, it was liable to rock on the sleeper and work loose on the spikes. This rail, known as the Vignoles rail, has been much improved in form and proportions and is extensively used. The bridge rail (fig. 5)—so called

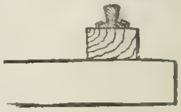

Fig. 4.—The flat-bottomed rail.

because it was first laid on bridges—was that first used on the Great Western Railway, and is of a shallow section, but wide, and possessed of lateral stiffness. The first line was a series of beech piles, 12 inches square, driven into the ground, to which were bolted at the surface level cross balks of timber, one on each side of the pilehead on which they were shouldered. Longitudinal balks, 15 feet long, were laid on the cross balks. The longitudinals were covered with oak or elm planking screwed down to the surface. When the ballast was packed under the longitudinal balks, the surface of the oak planks was planed level, and the bridge rails screwed down on them, with felt between. It was supposed that there would be no yielding whatever, but a very short time demonstrated that the piles formed a series of solid resistances, while the balks between sprang, and it was found necessary to cut away the piles. Transoms were then framed into the longitudinals and secured by strap-bolts, and the whole resembled a long ladder laid on the ground. Eight different sections of rails were tried in succession; one section measured $1\frac{1}{2}$ inches in height by 7 inches in width, weighing 44 ℔ per yard; and the last section $2\frac{3}{4}$ inches high by 6 inches wide, weighing 62 ℔ per yard. The screws which held down the rails were counter-sunk beneath the wheel-flanges, and nut-headed on the other side (see fig. 6). In consequence of the want of depth in the rails, they bent longitudinally under the wheels, and the horizontal flanges curled up at the sides, while the holes through them bent into angles. One remedy tried was to cross-board the longitudinal timbers on the surface, and thus the fibre was made less yielding.

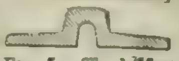

FIG. 5.—The bridge rail.

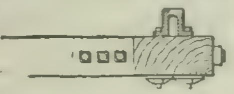

Fig. 6.—Bridge rail on Great Western Railway.

The double-headed rail (fig. 7) was originated by Joseph Locke, and was first laid on the Grand Junction Railway. It also weighed 62 ℔ per yard. The two tables were equal; the rail was more easily rolled than others, and, being reversible, it was in fact two rails in one. But as it was laid in cast-iron chairs the lower table was exposed to damage under the hammering of the traffic; and many engineers were led to make the lower table of smaller size, as in fig. 8, merely as a support, not as a surface to be used by the wheels. This rail, which acquired the title of "bull-headed," was, like the flat-foot and bridge rails, used as a prop supported on its base. There was a waste of metal in these early rails, both flat-foot and double-headed, owing to the excessive thickness of the vertical web, which has been corrected in recent designs. It was found, naturally, that rails would not rest in their chairs at the joints, but were loosened and bruised at the ends by the blows of the traffic. The fish-joint was therefore devised in 1847 by Mr W. Bridges Adams, the intention being by "fishing" the joints to convert the rails into continuous beams. In the original design two chairs were placed, one under each rail, a few inches apart, as in fig. 9. The joint was thus suspended between the two chairs, and two keys of iron, called "fishes," fitting the side channels of the rails, were driven in on each side between the chairs and the rails. In subsequent modifications the fishes were, and they continue to be, bolted to and through the rails, the sleepers being placed further apart. and the joint suspended between them.

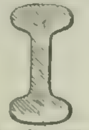

FIG. 7.—The double-headed rail

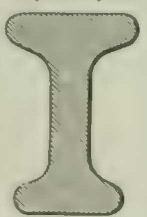

FIG. 8.—The bull-headed rail (62 ℔ per yard).

In the employment of steam-power for traction on railways rapid progress was made in response to the demand for power. The year 1829 is famous in the annals of railways not only for the opening of the Liverpool and Manchester line but for the invention and construction of the first high-speed locomotive of the standard modern type. Robert Stephenson's engine, the "Rocket," was made under competition for the Liverpool and Manchester Railway, and it gained the prize for lightness, power, and speed awarded by the directors. The two steam-cylinders of the "Rocket" were 8 inches in diameter, with $16\frac{1}{2}$ inches of stroke, and the driving-wheels were 4 feet $8\frac{1}{2}$ inches in diameter. The engine weighed 4 tons 5 cwt., the tender following it 3 tons 4 cwt., and two loaded carriages drawn by it on the trial 9 tons 11 cwt.: thus the weight drawn was 12 tons 15 cwt., and the gross total 17 tons. The pressure of steam in the boiler was 50 ℔ per square inch. An average speed of 14 miles per hour was attained, the greatest velocity being 29 miles per hour; and the boiler evaporated $18\frac{1}{4}$ cubic feet, or 114 gallons, of water per hour. The "Rocket" possessed the three elements of efficiency of the modern locomotive,—the internal water-surrounded fire-box and the multitubular flue in the boiler, or a number of small tubes in place of one large tube; the blast-pipe by which the waste steam of the engine was exhausted up the chimney; and the direct connexion of the two steam-cylinders, one on each side of the engine, with the driving or propelling wheels, on one axle. The subdivision of the single large flue, up to that time in general use in locomotives, into a number of small tubes greatly accelerated the generation of steam without adding to the size or weight of the boiler. But the evaporating tubes would have been of little avail practically had they not been supplemented by the blast-pipe, which, by ejecting the steam from the engine after it had done its work in the cylinder straight up the chimney, excited a strong draught through the boiler and caused a brisk and rapid combustion of fuel and generation of heat. The heat was absorbed with proportional rapidity through the newly applied heating tubes. The blast-pipe, thus applied, in conjunction with the multitubular flue, vastly improved the capacity and usefulness of the locomotive. And, taking into account the direct connexion of the steam-cylinder with one axle and pair of wheels, the improvements were tantamount to a new and original machine. The "Rocket" subsequently drew an average gross load of 40 tons behind the tender at a speed of 13·3 miles per hour. The old Killingworth engine, one of the earlier type of locomotives constructed by George Stephenson, weighing with its tender 10 tons, could only work at a maximum of 6 miles per hour with 50 tons.

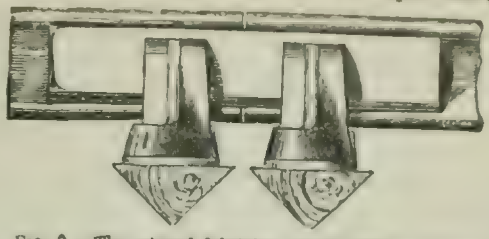

FIG. 9.—The original fish-joint, by W. Bridges Adams.

For many years engines belonged to two general classes. In one class there were six wheels, of which one pair was placed behind the boiler, typified in the engines of the day made by Robert Stephenson; in the other class there were but four wheels, placed under the barrel of the boiler, leaving the fire-box overhung, typified in the engines made by Bury for the London and Birmingham Railway. Experience demonstrated the disadvantage of an overhanging mass, with a very limited wheel-base, in the four-wheeled engine running at high speed; and now it is the generpractice to apply six wheels at least to all ordinary locomotive stock. The earliest four-wheeled locomotive constructed by Robert Stephenson and Co. as an article of regular manufacture weighed 9 tons in working order. The six-wheeled engines which followed weighed 11½ tons. In the course of business locomotives of greater power and greater weight were constructed; and there are locomotives of the present time which weigh 47½ tons in working order, and with the tender full of water and coal about 80 tons gross. There are other engines of special design with twelve wheels which weigh in working order, with fuel and water, 72 tons. The contrast is emphasized in the history of the old Garnkirk and Glasgow Railway, which was opened about the year 1829. The first engines of that line weighed from 8 to 9 tons. They had steam-cylinders 11 inches in diameter, and 4-feet wheels of cast-iron, with a working pressure in the boiler of 50 ℔ per square inch. The "Garnkirk" engine used to take a train of three carriages, together weighing 7 tons gross, at the average speed of 16 miles per hour between Glasgow and Gartsherrie. When the old line, 8 miles in length, was merged in the Caledonian Railway, now comprising a system of nearly 1000 miles in length, the power of the engines was greatly increased, and at this day (1885) there are express passenger engines working over the same ground having large cylinders of 17 or 18 inches in diameter, and wheels of 7 and 8 feet in diameter, weighing from 35 to 45 tons. These engines, with steam of 120 ℔ pressure per square inch, take a gross load of 30 tons at a speed of from 40 to 50 miles per hour.

STATISTICS.

Length of lines open.

Length of Railways in the United Kingdom.—The length of railways open for traffic at the end of the year 1854, twenty-five years after the opening of the Liverpool and Manchester Railway, was 8053 miles (of which nearly one-fourth was single line of way), costing about £35,500 per mile. In 1874 that mileage was doubled (16,449 miles, nearly one-half being only single line), costing about £37,000 per mile. According to the latest published return the length of railways open for traffic at the end of 1883 amounted to 18,681 miles, and the proportion of single line had decreased, being under 46 per cent. Whilst the mileage open was increased at the rate of 420 miles a year during the earlier period (1854-74), it was only increased by 248 miles a year during the later period (1874-83). But many miles of way in multiple have been laid for the working of traffic concentrated on main lines,—127 miles of triple line and 285 of quadruple. The largest share of multiple way belongs to the London and North-Western Railway Company, which owns 28 miles of triple way and no less than 114 of quadruple. The principal section of this railway, 80 miles in length, between London and Rugby, is entirely in quadruple,—two lines for goods and two for passenger traffic. Table I. shows the distribution of the 18,681 miles of railway open at the end of 1883:—

Country	Double Line or more.			Single Line.			Total.
	Miles.		Per cent.	Miles.		Per cent.	Miles.
England and Wales	8,380	or	63·5	4,835	or	36·5	13,215
Scotland	1,147	,,	39	1,817	,,	61	2,964
Ireland	578	,,	23	1,924	,,	77	2,502
Total........	10,105	,,	54	8,576	,,	46	18,681

The railways here represented were owned by 281 companies (206 in England and Wales, 31 in Scotland, and 44 in Ireland). But the whole property is worked by 123 companies.[1]

The longest mileage of railway worked by one company is that of the Great Western Railway, which at the end of 1883 was 2268 miles. Next to this ranks the London and North-Western (1793), then the North-Eastern (1534), the Midland (1381), the North-British (1006), and the Caledonian (877). The three longest mileages in Ireland owned each by one company are those of the Great Northern (503), the Great Southern and Western (478), and the Midland Great Western (425). The four largest English companies, taken together, work nearly 7000 miles of railway,—more than half of the whole length of railways in England and Wales. The two leading lines in Scotland, taken together, work nearly 1900, or two-thirds of the whole length of railways in Scotland. In Ireland the three leading lines, taken together, work 1400,—more than half of the whole length of railways in Ireland.

Capital Invested, Expenditure per Mile, &c.—The capital raised for the construction of railways at the end of the year 1883 amounted to about £785,000,000, representing an expenditure of £42,000 per mile open. Some small portion of this cost belongs to lines in course of construction. The money has been raised in the following proportions:—

Ordinary share capital paid up	£293,437,106	or	37·4	per cent.
Guaranteed stock	94,672,823	,,	12·1	,,
Preferential stock	200,888,198	,,	25·6	,,
Loans	15,423,505	,,	1·9	,,
Debenture stock	180,499,680	,,	23·0	,,
Total (say £785,000,000)....	£784,921,312	,,	100·0	,,

In 1857 the ordinary stock was 57 per cent., as against 37·4 per cent. in 1883; and the guaranteed and preferential stock together were but one-third of the ordinary share capital, while in 1883 they equalled it. The English railway system, so far as capital is concerned, has become adjusted to the rule of having rather less than 40 per cent. of the capital in "open stock." In 1845-46 the dividends of railways appear to have reached a maximum. The precipitate influx of new lines during the four years from 1846 to 1850, contests before parliament, competition in various forms, and other causes then came in to depress dividends, and reduced the average proportion of net receipts in 1849 to 2·83 per cent. of the total capital and loans raised at that time. In 1857 the percentage of net receipts had risen again to 4·06 per cent. of the total capital and loans; and notwithstanding the accumulation of preference capital and loans, both taking precedence of ordinary capital, the available dividend on the latter increased from 1·88 per cent. to 3·6 per cent. Since that time the average dividend paid on ordinary capital has maintained its level at least, and it amounted for 1883 to 4·68 per cent. The average cost per mile open at the end of 1883, calculated on the amount of capital raised, with that for 1857 added for comparison, was as follows (Table II.):—

	Miles Open.	Capital.	Per Mile 1883.	Per Mile 1857.
England and Wales	13,215	650,945,834	£49,260	£39,270
Scotland	2,964	98,531,315	33,240	28,230
Ireland	2,502	35,444,163	14,170	15,660
	18,681	784,921,312	42,020	34,950

The marked increase in capital expenditure per mile is due to permanent improvements, station accommodation, reconstruction, and multiplication of lines. Of the great cost of English railways, independently of the permanent improvements already noticed, part has been incurred in parliamentary warfare, while much of it is due to great and costly termini, and to the character of the earlier works of construction in England, where great expenditure was incurred for the sake of securing long levels and very easy gradients, until Joseph Locke made a new departure, and constructed the Grand Junction Railway on economic principles by following in great part the contour of the surface. For this line and the London and Birmingham line, for which Robert Stephenson was the engineer, Acts were passed in the same year (1833). The latter line was expensively laid out with tunnels, viaducts, and heavy cuttings and embankments, and cost in round numbers £53,600 per mile, as against £23,200 per mile for Locke's line. The cheaper line abounded in inclines of from 1 in 85 to 1 in 265, whilst the more expensive line was ruled by gradients not steeper than 1 in 330. Locke reckoned upon the sufficiency of the engine-power to take the trains up the inclines, and the famous Crewe engine was the outgrowth of the situation. The London and South-Western Railway, which cost £26,800 per mile, was laid out by Locke to a ruling gradient of 1 in 250. There are other instances of economical construction by the same engineer in the original Caledonian and Scottish Central Railways—now amalgamated—the former of which was made with long gradients of 1 in 75, 1 in 80, 1 in 100, and other steep slopes. Besides these there are other cheaply made railways in Scotland; but there is only one Scottish railway of the monumental class,—the Edinburgh and Glasgow, nearly dead level, with enormously expensive works. On the Metropolitan Railway system, 22 miles in length, upwards of £11,000,000 have been paid up, or about £500,000 per mile. The enormous cost of this line, as well as of the Metropolitan District system (18 miles long, costing £374,000 per mile) and the North London system (12 miles long, costing £325,000 per mile), is sufficiently explained by the place and conditions. The original London and Blackwall Railway, built, like the North London, for the most part on arches, cost £311,912 per mile. The original Birkenhead, Cheshire, and Lancashire Junction Railway, now vested in the neighbouring railway companies, cost upwards of £75,000 per mile, owing partly to the protracted contests in which it had been involved with the neighbouring railways, and partly to the costly works of construction joining the railway to the docks at Birkenhead. Of railways in England, the original Carlisle and Silloth

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[1] It would appear that less progress has been made in Ireland than in Great Britain in amalgamation and concentration of management.

Railway, 13 miles long, has the honour of standing at the foot of the list, having cost £6474 per mile. Of the Scottish lines the Caledonian system stands at the head of the list, costing £45,500 per mile. The North British system cost £33,000 per mile. At the foot of the list stood the original East of Fife line, 7 miles long, with a cost of £4351 per mile. But the cheapest lines of considerable length are the Forth and Clyde line, costing £5525 per mile, and the Peebles line, costing £5545 per mile. Both these lines have been taken into the North British system. In Ireland the Dublin and Kingstown Railway, 8 miles long, a suburban railway, cost £53,000 per mile. The original Limerick and Foynes line, costing £5282 per mile, is probably the cheapest piece of railway in the United Kingdom.

The proportions of expenditure on capital account cannot in the absence of data be exactly determined. The following may be accepted as an approximate analysis of the average cost of the railways, as it stood in 1871 :—

	Per mile.		Per cent.
Law and parliamentary expenses	£2,000	or	5¼
Land and compensation	7,000	,,	19¾
Works of construction and stations complete	18,000	,,	50
Locomotive and carrying stock	3,000	,,	8
Interest on stock, discounts, bonuses, dividends from capital, contingencies, &c.	6,000	,,	17
	36,000		100

Cost of working stock.

From this estimate it would appear that the net cost of construction and equipment was £21,000 per mile, or about 58 per cent. of the entire cost. The capital cost of the working stock is given by the London and North-Western Railway Company. Excluding a considerable number of engines and carrying stock which had been constructed as duplicate stock—charged to revenue, no doubt —at 31st December 1884 the quantities and costs were as follows :—

2,323 locomotives 1,647 tenders	£3,574,284 (£1538 per engine).
3,463 passenger carriages 2,116 horse-boxes, guards' vans, &c.	1,496,212 (£268 per vehicle).
51,847 waggon stock	3,320,322 (£64 ,,).
Total	£8,390,818

It is to be explained with reference to these low rates of cost that the original cost of the early working stock stands unaltered in the books of the company, whilst the whole of the original working stock has been replaced at the charge of revenue by engines and vehicles of modern design and larger capacity. Divided by the number of miles (1793) open at 31st December 1884, the total charge for working stock is at the rate of £4680 per mile open. For new working stock manufactured by the same company during the eighteen months ending 31st December 1884 the following average sums were charged to capital :—

31 locomotives with tenders or tank-engines	£1100 each.
229 vehicles, carriage stock	385 ,,
2192 vehicles, waggon stock	59 ,,

Rolling stock.

Working or Rolling Stock.—The working or rolling stock of railways consists of locomotives with their tenders, passenger carriages, horse-boxes, carriage trucks, travelling post-offices with their tenders and vans, goods waggons, covered goods waggons, cattle trucks, coke and coal waggons, timber trucks, ballast waggons, and goods brake vans. Table III. (below) shows that in England and Wales there is nearly one locomotive per mile of line open, or for the United Kingdom three engines for every 4 miles. The greatest waggon stock per mile open is to be found in Scotland—nearly thirty-one per mile. The proportions of vehicles for traffic of all classes for each locomotive averaged at the end of the year 1883 :—

England and Wales	31·1	vehicles per engine.
Scotland	51·7	,, ,,
Ireland	24·6	,, ,,
Total	33·9	,, ,,

The excessive proportion of fifty-two vehicles per engine in Scotland corresponds to the comparatively excessive number of train miles with goods and minerals, which are 20 per cent. more than the passenger-train miles, whilst in England they are 8 per cent. less, and in Ireland more than 50 per cent. less. The various proportions of rolling stock for twenty-one leading British railways (31st December 1883) are exhibited in detail in Table IV., arranged in the order of the numerical proportions which the carrying stock for traffic bears to the locomotive stock :—

Railway.	Miles open.	Locomotives.	Carriage Stock.	Waggon Stock.	Carriage and Waggon Stock.		
	Miles	Engines.	Vehicles.	Vehicles.	Vehicles.	Per [illegible]	Per [illegible]
England and Wales.							
Metropolitan	22	60	241	59	[illegible]	[illegible]	[illegible]
Metropolitan District	18	42	[illegible]	[illegible]	315	[illegible]	[illegible]
North London	12	[illegible]	[illegible]	[illegible]	1,004	[illegible]	[illegible]
London, Chatham, and Dover	[illegible]	168	972	1,967	2,939	[illegible]	18·7
London and South-Western	721	471	[illegible]	[illegible]	9,431	[illegible]	13·1
South-Eastern	370	325	2047	[illegible]	[illegible]	21·1	18·5
London and North-Western	1793	2451	[illegible]	[illegible]	[illegible]	21·9	29·9
London, Brighton, and South Coast	403	410	2817	7,078	[illegible]	24·1	24·5
Great Eastern	1049	615	2960	11,957	14,917	24·3	14·2
Great Western	2268	1577	4505	[illegible]	39,302	24·9	17·3
Manchester, Sheffield, and Lincolnshire	314	505	781	12,434	[illegible]	26·2	42·1
Great Northern	768	733	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lancashire and Yorkshire	491	832	2495	[illegible]	22,718	[illegible]	46·0
Midland	381	1629	[illegible]	[illegible]	65,398	40·1	47·3
North-Eastern	534	1462	2739	76,369	79.108	54·1	51·6
Scotland.							
Glasgow and South-Western	330	290	886	[illegible]	12,175	42·0	36·9
North British	997	573	1354	[illegible]	[illegible]	[illegible]	[illegible]
Caledonian	[illegible]	690	1630	[illegible]	44,883	65·0	51·8
Ireland.							
Midland Great Western	425	100	298	1,921	2,219	22·1	5·2
Great Southern and Western	478	160	344	3,345	[illegible]	23·1	7·9
Great Northern	503	127	468	2,807	3,275	25·8	6·5

Here the number of vehicles varies from 5 per engine on the Metropolitan Railway, 7 on the District Railway, and 11·7 on the North London Railway—all of these specially passenger lines of dense traffic—to 54 per engine on the North-Eastern Railway, 59 on the North British Railway, and 65 on the Caledonian Railway—all these being specially lines of mineral traffic.

Train miles run.

Train Miles Run, 1883.—The number of miles run by passenger and goods and mineral trains, and the number run by mixed trains, are as follows (Table V.) :—

Country.	Passenger.		Goods and Minerals.		Mixed.		Total.	
	Train Miles.	Per average mile open	Train Miles.	Per average mile open	Train Miles.	Per average mile open	Train Miles.	Per average mile open
England and Wales	117,406,242	8940	108,446,732	8258	498,415	38	226,351,389	17.236
Scotland	13,243,827	4486	15,933,637	[illegible]	[illegible]	553	30,810,516	10.436
Ireland	7,526,871	3030	3,602,884	1450	[illegible]	246	11,735,532	4,726
Total	138,176,040	7442	127,983,253	6893	2,737,043	147	268,897,236	14.482
Total, per cent.	51·4	..	47·6	..	1·0	..	100	..

The mixed-train miles constitute just ·1 per cent. of the total number, and the mileages run by passenger and goods trains are nearly equal. On an average each mile of way was traversed forty times a day. Taking the means of the numbers of engines for the end of 1882 and the end of 1883 as the average number during the year, the train miles run per locomotive are as follows (Table VI.) :—

1883.	Average Number of Engines.	Train Miles per Engine.
England and Wales	11,996	18,863
Scotland	1,678	18,361
Ireland	626	18,747
Total	14,600	18,805

An engine when actually on duty may accomplish 120 train miles

TABLE III.—*Summary of the Quantities of Working Stock at the end of the Year* 1883.

Country.	Locomotives.		Passenger Carriages.		Other Vehicles attached to Passenger Trains.		Total Passenger Train Stock.		Waggons and Trucks for Live Stock, Minerals, and Merchandise.		Total Passenger, Goods, and Mineral Train Stock.		Other Vehicles, as Ballast Waggons, &c.		Total No. of Vehicles for Passengers, Goods, Ballast, &c.	
	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.	Number.	Per mile open.
England and Wales	12,144	·92	27,274	2·06	10,133	·77	37,407	2·83	329,622	24·94	367,029	27·77	10,609	·80	[illegible]	[illegible]
Scotland	1,698	·57	3,591	1·21	[illegible]	·43	4,860	1·64	91,444	30·85	96,304	32·49	1,166	·39	97,470	[illegible]
Ireland	632	·25	1,439	·57	622	·25	2,061	·82	13,195	5·27	15,256	6·09	297	·12	[illegible]	6·21
Total	14,469	·77	32,304	1·73	12,024	·64	44,328	2·37	434,261	23·24	478,589	25·61	12,072	·65	490,661	26·26

per day, which would make upwards of 40,000 per annum. But at any moment half the engines may be taken as in reserve or under repair, which reduces the average performance per engine of the whole stock to some 20,000 miles per year, and the circumstances of many lines do not admit of such high averages of mileage run. Taking the twenty-one leading lines in detail, following the selection already made to show the quantities of working stock, the number of train miles run on the different lines in 1883 is shown in Table VII. as follows :—

Railway.	Average Miles Open.	Average Number of Locomotives.	Train Miles run. Passenger.	Goods and Minerals.	Total.	Miles run per Engine.
England and Wales.						
Metropolitan	22	58	1,443,401	3,794	1,447,195	24,950
Metropolitan District	16	39	1,191,966	5,719	1.197,685	30,710
North London ..	12	87	1,705,749	285,085	1,990,834	22,880
London, Chatham, and Dover	160	168	8,152,677	678,178	8,830,850	22,800
London and South-Western	721	456	8,001,548	3,045,365	11,046,913	24,220
South-Eastern ..	370	322	4,930,330	1,416,949	6,347,279	19,710
London and North-Western	1784	2424	18,931,111	19,395,461	38,326,572	15,810
London , and Brighton	130	404	6,521.451	1,427,306	7,948,757	19,680
Great Eastern ..	1032	608	8,486,858	5,334,027	13,820,385	22,730
Great Western ..	2254	1565	14,298,157	16,047,939	30,346,096	19,390
Manchester, Sheffield, and Lincolnshire	314	496	4,507,290	5,065,879	9,573,169	19,300
Great Northern ..	770	726	8,091,256	8,238,177	16,329,433	22,490
Lancashire and Yorkshire	493	815	7,602,008	5,467,541	13,069,549	16,040
Midland	1378	1605	13,105,400	19,981,855	33,087,255	20,620
North-Eastern ..	1521	1462	9,681,906	14,763,232	24,445,138	16,720
Scotland.						
Glasgow and South-Western	331	285	2.230.838	2,294,680	4,525,518	15,880
North British....	1002	563	5,032 790	6.428,496	11,461,286	20,360
Caledonian	872	690	5,232,096	6,617,610	11,849,703	17,170
Ireland.						
Midland Great Western	425	100	1,104,971	682,651	1,787,622	17,880
Great Southern and Western ..	478	160	1,678,691	1,164,993	2,843,684	17,780
Great Northern ..	503	127	1,851,768	783,148	2,634,916	20,750

Table VIII.—*Duties performed by Engines of Manchester, Sheffield, and Lincolnshire Railway.*

	Half-year ending 31st Dec. 1857	Half-year ending 31st Dec. 1883.
Locomotives	115	505
Tenders	...	431
Number of hours in steam—		
With passenger trains	95,337	246,674
With goods trains		876,576
With ballast trains		19,746
Shunting	49,093	621,000
Standing...............	28,842	421,430
Total hours in steam	173,272	1,685,426
Train miles run by engines—		
Passenger	693,921	2,343,689
Goods	360,243	....
Cattle	8,772	....
Mixed	87,244	....
Coal...............	94,189	....
Stone	162	....
Total goods and mineral.....	550,610	2,614,546
Total train miles	1,244,531	4,958,235
Ballast (8 miles per hour)............	1,045	73,292
Shunting (6 miles per hour)...........	....	1,123,242
Assisting	34,250	33,304
Empty...............	81,327	253,794
Total engine miles	1,361,153	6,441,867
Difference of engine miles and train miles	116,622	1,483,632
Difference per cent. of train miles	9·37	29·9
Fuel consumed—		
Coke	12,076·3 tons	....
Coal...............	11,484·0 „	117,679 tons
Per train mile run	42·4 lb	53·4 lb
„ engine mile run	38·8 lb	40·9 lb
„ hour in steam	304·5 lb	156·5 lb
Cost for fuel per train mile, at 6s. 5·42d. per ton	....	1·84d.
Cost for fuel per engine mile	....	1·41d.
„ per hour in steam	....	5·40d.

In general the lines of preponderating passenger-train miles run the greater number of miles per engine. The small mileage per engine of the London and North-Western line, with a relatively small goods-train mileage, is partly explained by the fact that this company had 141 duplicate locomotives in 1883. Engines run many miles unavoidably "empty,"—that is, without a train, the proportion of the empty or unprofitable mileage depending on the traffic and the nature of the line. A line with locally heavy gradients must have "assistant" or "pilot" engines in readiness to assist the trains up the inclines, and such engines usually have to return empty to the depôt; and in cases of special trains empty engines are run to or from the train, as the case may happen. Engines, especially assistant engines, may have to stand "in steam" or with the steam up and the fire in good order, in readiness to act when required. Some railway companies register the whole time the engines are in steam, also the assistant, ballasting, and empty mileage run, besides the time on active duty and the train miles run. The nature of the duty of goods engines, which is various, is also distinguished, so as, in short, to make a complete record of the work done. Thus for the Manchester, Sheffield, and Lincolnshire Railway Table VIII. (see above) gives the duties performed by the engines during the second half-years of 1857 and 1883. The times of engines assisting and running empty are included in the hours in steam with trains,—passenger and goods respectively. There were about 170 engines employed in shunting and marshalling trains. The relative percentages of the hours the engines were in steam and of miles run on different duties in the second half-year of 1883 are given in Table IX. :—

Service.	Hours in Steam.	Miles run.
	Per cent.	Per cent.
Passenger trains	14·6	36·4
Goods and mineral trains	22·4	40·6
Passenger, goods, and mineral trains......	37 0	77·0
Ballast trains	1·2	1·1
Shunting...............	36·8	17·4
Assisting	included in passenger, goods, and mineral trains	·5
Empty		4·0
Standing	25·0	..
Total	100·0	100·0

The proportion of extra engine mileage to the work done in hauling goods, minerals, and passengers varies very much on different systems, according to the nature of the traffic, for by far the greater part of it arises in connexion with goods and minerals, which itself is a very varying quantity. The train mile, therefore,—that is, the revenue producing train mile—though it is the simplest and handiest unit of performance, is not an absolute measure of work done. The shunting or marshalling of trains is an item not indicated by train mileage, and yet it is hard work and occupies as many hours in steam as the train mileage. Again, the fuel consumed, reckoned only on the train mileage run, amounts to 53 lb per mile run; but, reckoned on the total mileage run by engines, in which the extra mileage, whether ballasting, shunting, or assisting, is hard work, it amounts only to 41 lb per mile run.

On the London and North Western Railway in 1874 the total shunting time was 613,472 hours of one engine—about the same as on the Sheffield line in 1883 - and on this work 171 engines were constantly employed, marshalling and classifying the trains in the sidings. A like number, so employed on the Sheffield line, amount to one third of the total locomotive stock.

Passenger traffic.

Traffic.—Before the establishment of the railway, from twenty to thirty coaches ran daily between Manchester and Liverpool, whereas the railway carried 700,000 passengers during its first eighteen months. Wherever railways were made, the carriage of passengers was found to be one of the most remunerative sources of traffic. Nearly fifty years ago Porter, in his *Progress of the Nation* (1836), estimated that in Great Britain 82,000 persons daily, or 30,000.000 per annum, travelled by coach an average distance of about 12 miles each, at an average cost of 5s. for each passenger, or 5d. per mile, whereas in 1881 upwards of 600,000,000 passengers travelled by railway at a cost, taking averages, of 10½d. each, which at the average rate of say 1¼d. per mile travelled would represent an average length of 8½ miles, at one-fourth of the cost and in one-third of the time required by coach.

Table X. shows the total number of passengers of each class conveyed in 1883 :—

Country.	First Class	Second Class.	Third Class and Parliamentary.	Total.
England and Wales	29,897,866	59,083,508	523,420,384	612,401,758
Scotland	4,790,982	2,835,687	44,404,858	52,031,527
Ireland	1,699,029	4,177,589	13,408,234	19,284,852
Total	36,387,877	66,096,784	581,233,476	683,718,137[1]

The proportions of passengers, independent of season-ticket holders, were as follows (Table XI.) :—

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[1] Season-ticket holders in addition :—England and Wales, 570,686; Scotland, 87,924; Ireland, 23,440; total, 682,050.

Country.	First Class.	Second Class.	Third Class.	Totals.
	Per cent.	Per cent.	Per cent.	
England and Wales	4·9	9·7	85·4	100
Scotland	9·2	5·4	85·4	100
Ireland	8·8	21·6	69·6	100
Total..............	5·3	9·7	85·0	100

The number of passengers conveyed in the year 1883 per mile of the mean length of railway open during the year was, in England 46,340, in Scotland 17,550, and in Ireland 7710.

The receipts from passenger traffic in 1883 are given in Table XII. (see below). The decided preponderance of third-class traffic shown in this table is the outcome of the work of years. In 1854 upwards of 111 million passengers travelled by railway, of whom 13 per cent. travelled by first, 34 by second, and 53 by third class and parliamentary carriages. In 1873, the year before the Midland Railway Company ceased to carry second-class passengers, upwards of 455 million passengers travelled by railway, of whom only 8½ per cent. travelled by first, 15 by second, and 76½ by third class carriages. In 1881 upwards of 623 million passengers travelled by railway, nearly six times as many as in 1854. Of these only 6 per cent. were first and 10½ second class passengers, whilst the third-class and parliamentary passengers rose to 83½. Finally, in 1883 (as already stated in Table XI.), 85 per cent. of the passengers were third class. The same movement is exemplified in the receipts, the mass of receipts gravitating towards third class, as shown by the following abstract per mile open for the years already mentioned (Table XIII.):—

Year.	First Class.	Second Class.	Third Class.
1854	£349	£416	£382
1873	274	250	737
1881	209	190	846
1883	196	178	913

These figures show that in 1854 first and second class receipts together made up two-thirds of the whole receipts from passengers, but that they steadily declined in succeeding years, not only proportionally but absolutely,—the third-class receipts, on the contrary, exhibiting a rapid increase, insomuch that, whereas in 1854 they were exactly one-third of the whole receipts, in 1883 they amounted to more than two-thirds of the whole receipts from passengers. The reaction in first-class receipts is all the more remarkable because the number of first-class passengers in 1854—14½ millions—was nearly trebled in 1873, that of 1873 was almost exactly the same as in 1881,—about 38 millions; whilst in 1883 there were nearly 36½ millions. The explanation is probably to be sought partly in the fact that first-class fares have been reduced in many cases and express fares have been almost entirely abolished, and partly to the increased habit of taking third class for long journeys, so that first-class journeys, being shorter on the average, have become less remunerative to the companies than before. The third class is by far the most remunerative portion of the passenger traffic of railways; and it is difficult to understand the policy still pursued by railway companies in France, of discouraging third-class traffic. On those railways where fast trains do not take third-class passengers, or third-class carriages are deterrently uncomfortable and repulsive, only those travel who travel by necessity, or to whom money is no object. On the contrary, low fares and comfortable carriages invite traffic; they may almost be said to create it,—a fact which has long been recognized by the more intelligent of railway managers. The high speed of express trains —from 45 to 50 miles and upwards per hour—is, of course, an additional inducement to travel. On certain lines there are only two classes of carriages,—first and third. The Caledonian Railway Company was the first to adopt, about thirty-five years ago, the system of two classes only for local main-line passenger traffic. The Great North of Scotland Railway Company opened its line in 1854 with only first and third class carriages. The Midland Railway Company, as already noticed, ceased in 1874 to run second-class carriages, at the same time readjusting and lowering the fares, —the revised rates being 1½d. and 1d. respectively per mile for first and third class. The result was that in 1875 27¾ million passengers travelled on this railway,—nearly 5 millions more than in 1873, before the change was made; whilst in 1881 there were 29 million travellers, of whom 27 millions were third and only 2 millions first class passengers; and in 1883 upwards of 31 million passengers were carried, of whom 29½ millions were of the third and a little over 1¾ millions of the first class. The gross receipts for passenger traffic on the Midland Railway were, in round numbers, £1,660,000 in 1873, £1,787,000 in 1881, and £1,904,000 in 1883, whilst the percentage of working expenditure remained the same. On the whole, it appears from the results of this grand experiment that the change has succeeded financially, whilst there is no doubt that it has stimulated the provision for and development of third-class travelling on other railways. The gravitation of traffic to the lowest level is unquestionable; and it is aided by the fact that third-class carriages have been (1885) for some years run with nearly all trains, fast as well as slow, and that the largeness of the number of third-class passengers has forced upon the management of the companies improvements in the popular class of carriage. As the downward movement of the classes continues the outcome will most likely be a general reduction of the number of classes to two,—nominally first and third, practically first and second. On 1st May 1885 second-class carriages were abolished on the branch lines of the Great Northern Railway, and, if the experiment answers expectations, second-class carriages will be abolished on the entire Great Northern system.

Goods traffic.

The returns to the Board of Trade do not supply material for close analysis of goods traffic. The quantities of minerals and goods or general merchandise conveyed in 1883 were as follows (Table XIV.):—

Country.	Minerals.	General Merchandise.	Total.	Total per average mile open.
	Tons.	Tons.	Tons.	Tons.
England and Wales	160,522,029	[illegible]	[illegible]	17,100
Scotland	27,767,095	[illegible]	86,459,528	12,300
Ireland	1,196,488	2,817,569	4,014,057	1,600
Total	189,485,612	76,897,356	266,382,968	14,260

The receipts from mineral and goods traffic in 1883 are given in Table XV.:—

Country.	Merchandise.	Live Stock.	Minerals.	Total.
England and Wales	£18,028,587	£787,642	£14,057,188	£32,873,417
Scotland	2,267,685	[illegible]	2,062,223	4,530,869[1]
Ireland	952,215	208,808	136,010	1,297,033
Total..........	£21,248,487	£1,172,446	£16,255,421	£38,701,319[1]
Total per mile open	£1137	£63	£870	£2070
Proportion per cent. of total..................	55·0	3·0	42·0	100

These statistics of merchandise and mineral traffic show that upwards of 266 million tons were conveyed in 1883 in the United Kingdom, seven-tenths of which were minerals. In 1857 71 million tons were conveyed, of which only two-thirds consisted of minerals; whence it appears that a more rapid development of mineral traffic than of general merchandise took place in the interval.

Receipts

The whole of the receipts directly earned on the railways in 1883, with the miscellaneous receipts derived from rents, tolls, navigation, steamboats, &c., are brought together in Table XVI. (see below). The receipts per train mile from passengers and from goods and mineral traffic are reckoned exclusive of the receipts on railways working mixed trains; but all the receipts per train mile for passengers and goods together are divided by the total mileage run by all trains. In the last column the gross receipts, including miscellaneous receipts, are divided by the total train mileage.

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[1] Including £24,965 from goods-traffic receipts not classified.

TABLE XII.—*Receipts from Passenger Traffic in 1883.*

Country.	Receipts from Passengers.					Luggage, Parcels, Carriages, Horses, Dogs, &c.	Mails.	Gross Total.
	First Class.	Second Class.	Third Class.	Season Tickets.	Total.			
England and Wales	£2,998,905	£2,859,017	£14,702,697	£1,498,554	£22,059,178	£2,562,166	£483,537	£25,104,881
Scotland	450,010	147,085	1,661,281	146,038	2,404,414	336,742	144,021	2,885,177
Ireland	221,138	323,642	686,086	47,929	1,278,865	126,447	113,363	1,518,675
Total	£3,670,053	£3,329,744	£17,050,064	£1,692,521	£25,742,452	£3,025,355	£740,921	£29,508,733
Average per mile open	£196	£178	£913	£91	£1378	£161	£40	£1580
Proportion per cent. of gross total..............	12·4	11·3	57·8	5·7	87·2	10·3	2·5	100

TABLE XVI.—*Statistics of Receipts earned in* 1883.

Country.	Passengers.		Merchandise and Minerals.		Passengers, Merchandise, and Minerals.		Miscellaneous.	Total Receipts from all sources.	
	£[1]	Per train mile. s. d.	£[1]	Per train mile. s. d.	£	Per train mile. s. d.	£	£	Per train mile. s. d.
England and Wales	[illegible]	4 [illegible]	32,873,417	[illegible] 6·6	[illegible]	5 1[illegible]	[illegible]	60,521,538	5 4·2
Scotland	[illegible]	4 0·0	[illegible]	5 5·5	7,416,046	4 9·8	[illegible]	7,[illegible],493	4 11·9
Ireland	[illegible]	[illegible] 10·3	[illegible]	6 11·2	2,815,708	4 9·6	[illegible]	2,865,239	4 10·4
Total	[illegible]	4 2·7	[illegible]	6 0·1	[illegible]	5 0·9	2,[illegible],216	71,062,270	5 3·4
Total per mile open	1,579	....	2,071	....	3,651	....	153	3,804	....
Total per mile per week	30·4	....	39·8	....	70·2	....	3	73·1	....
Proportion per cent. of gross receipts	41·5	....	54·5	....	96	....	4·0	100	....
Receipts per cent. of capital cost	....	....	..	....	8·[illegible]	....	....	9·05	....

Of the total receipts for passengers and goods, goods brought 56·8 per cent. and passengers 43·2. In 1857 the proportions were nearly the same,—56 and 44 per cent. respectively. For the three kingdoms separately the percentages for 1883 were (Table XVII.):—

	Passengers.	Minerals and Merchandise.
	Per cent.	Per cent.
England and Wales	[illegible]	[illegible]
Scotland	[illegible]	61·0
Ireland	[illegible]	47·5
Total	43·2	56·8

The average traffic receipts per mile open in 1883 were distributed between the three kingdoms as shown in Table XVIII.:—

	Per average Mile open.	Per Mile per Week.
England and Wales	£4415	£84·9
Scotland	[illegible]	4[illegible]·2
Ireland	11[illegible]4	21·3
Total	£3673	£70·6
Total, 1857	£2715	£52

These quantities for 1883 are proportionally for the three kingdoms as 4, 2¼, 1. For the year 1857 the corresponding amounts were as 3, 2, 1, so that the growth of traffic in the interval has been greater in England than in Scotland, and greater in Scotland than in Ireland.

Table XIX. (below) contains a summary of the expenditure of the railways of the United Kingdom for the year 1883, with the rate of expenditure of different kinds per mile open and per train mile run, and, in addition, the proportional expenditure of the different kinds in parts of the total working expenditure. The heads of expenditure are classified in this table in order to separate direct or really working expenditure from what may be called contingent or incidental expenditure not essential to the working of a railway, as rates, duty, compensation, &c. The direct or essential working expenditure is thus upwards of 32 millions sterling, or 86 per cent. of the whole expenditure. The amount and proportion of the net receipts are shown by deducting the total working expenditure from the total receipts, as under:—

		Per train mile.	
Total receipts	£71,062,270,	or 5s. 3·4d.	or 100 per cent
Gross working expenditure	37,369,562	,, 2s. 9½d.	,, 52 6 ,,
Net receipts	£33,692,708	,, 2s. 6d.	,, 47 4 ,,

The net receipts available for payment of dividend are equal to 4·29 per cent. on the paid-up capital, and they were disposed for 1883 in the following fashion:—

On ordinary capital	£13,725,935,	equivalent to 4·68 per cent.
On guaranteed and preferential capital	12,601,797	,, ,, 4·26 ,,
On bonus and debenture stock	8,254,643	,, ,, 4·21 ,,
Total payments	£34,582,373	,, ,, 4·41 ,,
Net available receipts	£33,692,708	,, ,, 4·29 ,,

The total distribution, it appears, exceeded the available net receipts for the year by nearly £1,000,000. In explanation of the

TABLE XIX.—*Statistics of Expenditure for the United Kingdom for* 1883.

Country.	Average Miles open during 1883.	Maintenance of Way, Works, &c.	Locomotive Power (including Stationary Engines).	Repair and Renewal of Carriages and Waggons.	Traffic Expenses.	General Charges.	Total Direct Expenditure on Working.	Contingent Working Expenditure.								Gross total Working Expenditure.
								Rates and Taxes.	Government Duty.	Compensation for Personal Injuries, &c.	Compensation for Damage and Loss of Goods.	Legal and Parliamentary Expenses.	Steamboat, Canal, and Harbour Expenses.	Miscellaneous Expenditure.	Total Contingent Working Expenditure.	
	Miles.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
England and Wales	13,133	5,545,784	8,013,274	2,705,031	9,705,382	1,384,598	27,354,069	1,598,490	681,560	172,335	171,237	314,139	1,239,878	338,875	4,516,514	31,819,248 [2]
Scotland	2,952	774,038	929,352	471,806	1,096,011	158,644	3,429,851	181,047	57,696	63,167	19,883	45,657	74,068	103,427	544,945	3,974,796
Ireland	2,484	422,976	391,721	130,909	411,675	80,595	1,439,876	81,312	..	11,530	6,821	13,389	11,010	11,580	135,642	1,575,518
Total	18,569	6,743,798	9,334,347	3,307,746	11,213,068	1,623,837	32,223,796	1,860,849	739,256	247,032	197,941	373,185	1,324,956	453,882	5,197,101	37,369,562 [2]
Working Expenditure per Mile open per Year.																
	Miles.	£	£	£	£	£	£								£	£
England and Wales	13,133	422	610	206	739	105	2082	..	..	..	..	..	..	..	337	2423
Scotland	2,952	262	314	160	371	54	1161	..	..	..	..	..	..	..	184	1345
Ireland	2,484	171	158	53	166	32	580	..	..	..	..	..	..	..	54	634
Total	18,569	363	503	178	604	87	1735	..	..	..	..	..	..	..	280	2013
Working Expenditure per Train Mile run.																
	Train Miles.	d.	d.	d.	d.	d.	s. d.								d.	s. d.
England and Wales	226,351,389	5·88	8·49	2·87	10·29	1·47	2 5	..	..	..	..	..	..	..	4¾	2 9¾
Scotland	30,810,315	6·03	7·24	3·68	8·54	1·24	2 2¼	..	..	..	..	..	..	..	4½	2 7
Ireland	11,735,532	8·67	8·01	2·68	8·42	1·65	2 5½	..	..	..	..	..	..	.	2¾	2 8¼
Total	268,897,236	6·02	8·33	2·95	10·01	1·45	2 4¾	..	..	..	..	..	..	.	4¾	2 9½
Proportions of Working Expenses in parts of the Total Expenses.																
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.								per cent.	Total.
England and Wales	..	17·4	25·2	8·5	30·5	4·4	86·0	..	..	..	..	..	..	..	14·0	100
Scotland	..	19·5	23·4	11·9	27·5	4·0	86·3	..	..	..	..	..	..	..	13·7	100
Ireland	..	26·9	24·9	8·3	26·2	5·1	91·4	..	..	..	..	..	..	..	8·6	100
Total	..	18·0	25·0	8·9	30·0	4·3	86·1	..	..	..	..	..	..	..	13·9	100

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[1] Exclusive of receipts on railways in cases where the traffic is conveyed by mixed trains.

[2] Exclusive of £51,335 received by the North London Company for working other lines.

apparent discrepancy it may be stated that some companies had invested a portion of their capital in the stocks and shares of other companies; that interest is occasionally paid on the capital of companies whose lines are not open for traffic; and that interest on loan capital is not always paid out of net earnings. The appropriation of the gross receipts to working expenditure and dividends, according to the tabulated statement of expenditure, is summarily as follows, in parts of the gross receipts:—

	Per cent.	
Maintenance of way, works, &c.	9·5	
Locomotive power	13·1	
Maintenance of carriages and waggons	4·6	
Traffic expenses	15·8	
General charges	2·3	
Direct expenditure on working	45·3	
Contingent expenditure on working	7·3	
Total working expenditure		52·6
Payments of interest and dividends		47·4
Gross receipts		100

Growth and distribution of traffic. The statistics of traffic returns of railways in the United Kingdom since 1842 indicate a remarkably steady and rapid increase of traffic. In 1842 the total receipts amounted to upwards of £4,250,000. In 1852 they were nearly £16,000,000, and during the thirty-one years following they are given at intervals as in Table XX.:—

Year.	Average Miles open.	Total Receipts.	Receipts per Mile.	Receipts per Mile per Week.	Working Expenditure in parts of Receipts.
	Miles.				Per cent.
1853	7,488	£18,035,879	£2408	£46	..
1856	8,523	23,165,493	2718	52	..
1859	9,772	25,743,502	2635	51	..
1862	11,258	29,128,558	2599	50	49
1865	13,059	35,890,113	2752	54	48
1868	14,488	?	....	..	..
1871	15,457	48,592,750	3162	61	47
1874	16,266	59,255,715	3643	70	55
1877	16,975	62,97[illegible]	3709	71	54
1880	17,815	65,491,625	3677	71	51
1883	18,669	71,062,270	3804	73	53

Thus the receipts were quadrupled during the thirty years from 1853 to 1883, whilst the mileage of railway open was increased by two and a half times. The receipts per mile increased notwithstanding their continual dilution by the accession of new lines. These results, taken together, indicate the inherent elasticity of the railway and its seemingly inexhaustible resources.

Of the main trunk-lines, which constitute the foundation of the railway system, those which converge towards and terminate in London—the metropolitan lines—are more important than the provincial lines. London is the great heart of the country and is the chief centre of commerce; moreover, the metropolitan railways, taken together, possess a greater variety of traffic than others; hence they are selected for discussion illustrative of the growing magnitude and distribution of traffic. On the nine metropolitan railways, including the London and Blackwall and the North London, in operation in 1854-57, Table XXI. shows the receipts for these four years; and the receipts for the year 1883 derived from the twelve metropolitan companies then in operation are added for comparison:—

Year.	Average Miles open.	Total Receipts.	Receipts per Mile.	Receipts per Mile per Week.
1854	2579	£9,354,425	£3627	£70
1855	2664	9,920,609	3724	71
1856	2778	10,559,658	3801	73
1857	2834	10,743,118	3790	73
1883	8649	43,389,062	5017	96

In the early years—1856, for instance—the metropolitan railway mileage open constituted one-third of the total mileage open, whilst it produced nearly one-half of the total traffic receipts of the United Kingdom, insomuch that the receipts per metropolitan mile were two-fifths more than the average total receipts per mile. Recently—in 1883—though the metropolitan mileage open was less than one-half of the total mileage open of the United Kingdom, it earned six-tenths of the total receipts; and the receipts per metropolitan mile were one-third more than the average total on the whole mileage of the country. Lastly, the increase of receipts of the metropolitan lines is greater than that of the entire system. Whether, therefore, the increase of receipts be compared with the total receipts or with the mileage open, the traffic of the metropolitan railways increases the most rapidly, and it is also of the greatest absolute magnitude. But, to bring out clearly the relative importance and progress of the traffic of different districts, let us separate what may be distinguished as the coast lines to the south and east of the metropolis—the Great Eastern, and the railways south of the Thames—from the interior lines to the north and west, the Great Northern, Midland, North-Western, Great Western, and the three local lines, the North London, Metropolitan, and District. The receipts may be correspondingly classified and compared with the receipts in other parts of the United Kingdom (Table XXII.):—

District	Year 1857.		Year 1883.	
	Average Miles open.	Receipts per Mile per Week.	Average Miles open.	Receipts per Mile per Week.
	Miles.		Miles.	
Metropolitan interior lines	1515	£86·5	[illegible]	£96·0
Metropolitan coast lines	1029	56·5	2[illegible]	98·0
Other English lines not included in the above	3616	51·5	[illegible]	[illegible]
Scottish railways	1183	40·5	[illegible]	[illegible]
Irish railways	1074	21·0	2454	22·1

This comparative statement shows some strong contrasts. In 1857 the densest traffic in England, averaging £86, 10s., over 1515 miles lay to the north and west of the metropolis; the railway traffic of the country was very partially distributed; and, taking London as the great focus, the traffic radiated and converged in all directions, with decreasing intensity as the distance from the centre increased. In the year 1883, on the contrary, whilst the metropolitan traffic continued to be the densest, the traffic of the metropolitan coast lines per mile open had advanced so rapidly as even to surpass that of the interior metropolitan lines,—the receipts being £98 per mile per week against £96. The rapid development of the southern lines passenger traffic is, as will be shown, the cause of the great advance in receipts. Further insight into the comparative conditions of interior and coast lines may be got by taking four great inland lines (Great Northern, Great Western, Midland, and London and North-Western), which are lines of preponderating goods and mineral traffic, and contrasting them with four great coast lines of preponderating passenger traffic (South-Eastern; London, Brighton, and South Coast; London, Chatham, and Dover; and South-Western). In the annexed table (XXIII.) for 1883 the average fare per passenger is calculated on the assumption that the fares formed 80 per cent. of the whole receipts for passenger trains, and the average length of a passenger's journey is got by taking 85 per cent. of the passengers as third class at 1d. a mile and 15 per cent. as first and second class at 1½d. a mile.

	Four Metropolitan Interior Railways.		Four Metropolitan Coast Railways.	
		Per mile open.		Per mile open.
Average miles open	6,186	..	1,381	..
Passenger train miles run	54,425,924	8,799	22,606,006	16,370
Goods and mineral train miles run	63,663,432	10,291	6,567,793	4,7[illegible]
Total train miles run	118,089,356	19,090	29,173,799	21,1[illegible]
Number of passengers	159,656,870	25,814	131,002,266	94,860
Tons of goods and minerals conveyed	94,570,258	15,340	10,265,098	7,[illegible]05
Receipts from passenger traffic	£11,234,047	£1,816	£5,755,000	£4,167
Proportion of total receipts	38·6 per cent.	..	72·3 per cent	..
Receipts per train mile	4s. 1·[illegible]d.	..	5s. 1·0[illegible]d.	..
Average receipt per passenger	1s. 4·8[illegible]d.	..	10·65d.	..
Average fare	1s. 1·50d.	..	8·11d.	..
Approximate average length of passenger journeys	12 miles	..	7¼ miles	..
Receipts from goods, &c.	£17,831,467	£2,892	£2,202,137	£1,595
Proportion of total receipts	61·4 per cent.	..	27·7 per cent	..
Receipts per train mile	5s. 7·21d.	..	6s. 8·46d.	..
Average receipt per ton	3s. 9·[illegible]d.	..	4s. 3·00d.	..
Total receipts	£29,065,514	£4,698	£7,957,137	£5,762
Per train mile	4s. 11·0[illegible]d.	..	5s. 5·45d.	..
Direct working expenditure	£13,461,020	£2,176	£3,621,907	£2,623
Per train mile	2s. [illegible]d.	..	2s. 5·9[illegible]d.	..
Special net receipts	£15,604,494	£2,522	£4,335,230	£3,139
Per cent. of total receipts	53·70	..	54·48	..
Receipts per train mile	2s. 7·70d.	..	2s. 11·[illegible]6d.	..
Capital raised	£275,582,650	£44,550	£94,988,202	£68,776
Net receipts per cent. of capital	5·66	..	4·5[illegible]	..

The coast lines, being freer from competition, get higher rates both for goods and passengers; but the inland lines have the advantage in direct working expenditure per train mile, and a still greater advantage in the much smaller capital raised per mile of line open, so that, in spite of competition and low rates, they earn 5¾ per cent. on their capital as against a little over 4½ earned by the coast lines. The greater capital outlay on the coast railways seems to be due to the costliness of stations and carriage stock for a preponderating passenger traffic; and as this more than outweighs the gains from higher rates the statistics support the generally accepted opinion that goods and mineral traffic on railways is profitable and should be encouraged and developed. Mr R. Price Williams, an accepted authority on railway statistics, supports this conclusion. Mr F. R. Conder, on the contrary, who has deeply studied the question, maintains that the heavy mineral traffic of railways should be relegated to the canals, which, though slow, are low in their charges.

Employés.—In 1856 Robert Stephenson estimated that 1 per cent. of the population of the United Kingdom was maintained by the railways then in operation, independently of the considerable amount of labour employed on railways in course of construction. On 31st March 1884 railway employés numbered in all 367,793 persons, or 19·69 per mile open, showing an increase of more than 50 per cent. on the proportion per mile in 1857, which was only 12·63. Table XXIV. gives details:—

		Persons.	Per Mile.
Secretary's departments	..	4,199	·23
General manager's departments	..	751	·04
Superintendent's departments—			
Superintendents and assistant superintendents	143	..	..
Station-masters and clerks	16,178	..	..
Inspectors	1,389	..	..
Guards	5,902	..	..
Signalmen and pointsmen	19,012	..	..
Ticket-collectors	2,060	..	..
Shunters, porters, messengers, &c.	29,493	..	..
		74,177	3·97
Goods manager's departments—			
Goods and assistant managers	113	..	
Agents and clerks	17,058	..	..
Inspectors	963	..	..
Guards and brakesmen	7,410	..	..
Shunters, porters, messengers, &c.	44,169		..
		69,713	3·73
Locomotive and carriage departments—			
Engineers and assistant engineers	125	..	
Draughtsmen	248	..	..
Clerks	2,013	..	..
Foremen, mechanics, and artisans	47,130	..	..
Drivers and firemen	25,669	..	..
Labourers	43,141	..	..
		118,326	6·33
Engineer's departments—			
Engineers and assistant engineers	201	..	
Draughtsmen	585	..	..
Clerks	782	..	..
Inspectors	1,166	..	..
Foremen and Gangers	8,020	..	..
Artisans and mechanics	10,539	..	..
Plate-layers, labourers, &c.	59,316	..	..
		80,609	4·32
Storekeeper's departments	..	2,820	·15
Police departments	..	1,781	·10
Legal	..	222	·01
Telegraph	..	3,754	·20
Canals, steamboats, docks, and piers	..	8,004	·43
Hotels, refreshment-rooms, and sundries	..	3,407	·18
Total		367,793	19·69

From this table it may be estimated that there are now two drivers and two firemen for every 3 miles of line open. In 1857 there were only two drivers and two firemen for every 5 miles; and, though the train service has increased faster than the train mileage, the work of the drivers has sensibly diminished, each man on an average doing 20,950 miles as against 23,420 in 1857.

RAILWAY CONSTRUCTION.

The selection of lines of railway is mainly governed by the same principles as hold good for roads, but the cost of the rails renders it of greater importance to shorten the length of the route than to make slight savings in embankments and cuttings. The first step in the survey is to ascertain the positions of the watercourse and watershed lines of the district to be passed through. The general direction having been selected by the help of an ordnance map, a sketch-map, or a special reconnaissance survey, the river-crossings are to be examined and decided upon, and the points determined at which the watersheds are to be crossed and the approaches to bridges set out. Trial lines should be run between the points thus fixed, and the country should be carefully examined on each side of these before the route is finally decided on. Sharp curves and steep gradients are in themselves evils, involving special cost for maintenance and for working, although original outlay may be economized by the adoption of them. A straight and horizontal surface is assumed as the standard of perfection; and the proper business of the engineer in laying out a railway is to harmonize the engineering and the financial conditions of the problem so as to yield the highest practicable return on the money expended, and to see that, whilst the railway may be neither quite straight nor quite level, it shall not be unduly costly in construction from excessive cutting, tunnelling, and making of embankments, in order to obviate severe curves and gradients, nor excessively cheap from following the surface of the ground too closely and incurring heavy gradients and severe curves, and as a consequence heavy working expenditure.

Cuttings and Embankments.—Engineers endeavour so to plan the works of a railway that the quantity of earth to be excavated shall be equal to the quantity that goes to form the embankments. The earthwork is the foundation and support of the superstructure, and as such it must be uniformly firm, of liberal width, easy slopes, thorough drainage. Figs. 10 and 11 are type-sections of cuttings and embankments for a double line of way on the national gauge, showing the "formation" surface and the ballast on which the permanent way is supported, with the slopes, the side drains, and the fencing. Fig. 12 is a type-section of the permanent way on the national gauge, settled by Mr John Fowler for the South Wales railway. Upon the formation level the ballast is deposited, 2 feet in depth at the centre, dressed level, for about 22 feet in width for a double line of way. The sleepers and chairs are buried in the ballast, and the rails partially also, these standing 2 or 3 inches above the ballast. The intermediate space between the two lines of way is, as before stated, 6 feet, and, taking the lengths of the sleepers at 9 feet, the total width for two lines of way over the sleepers is 6 feet + 4 feet 8½ inches + 2½ inches × 2 (width of the rails) + 9 feet = 20 feet 1½ inches; and it is seen that, as the ballast is 22 feet wide at the upper surface, it extends to nearly 1 foot beyond the ends of the sleeper at each side and about 3½ feet beyond the outer rails at each side.

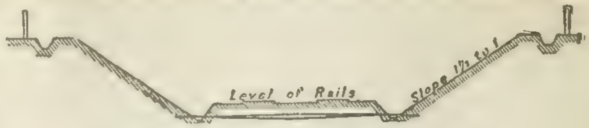

FIG. 10.—Type section of a cutting.

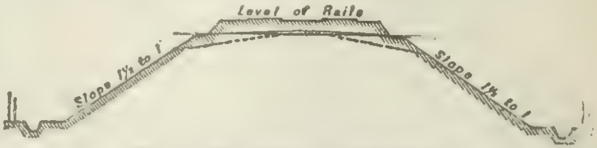

FIG. 11.—Type section of an embankment.

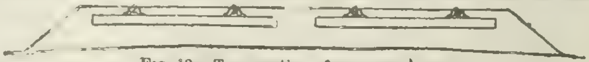

FIG. 12.—Type section of permanent way.

Cuttings. The slopes of cuttings vary according to stratification, soil, direction of the vein, moisture. In gravel, sand, or common earth the slopes rise 1 foot for 1 to 1½ or 2 feet of base; in solid rock the slopes are nearly vertical. Cuttings are as deep as from 50 to 100 feet below the surface, and embankments as high above. The London and Birmingham Railway had upwards of 12 million cubic yards of excavation, and 10½ millions of excavation in the original estimates, or above 100,000 cubic yards of earthwork per mile. The heaviest cutting on the line is at Tring, 2½ miles long, averaging 40 feet deep, the greatest depth being 60. In the case of the great Blisworth cutting the strata were unequal in consistency. About halfway up the face of the cutting a stratum of limestone rock, 25 feet in thickness, was found, with loose strata below and above it, and it was necessary to prevent the lower stratum, consisting of wet clay, from being forced out under the superincumbent mass by undersetting. A rubble wall, averaging 20 feet in height, was built on each side underneath the rock, strengthened by buttresses at intervals of 20 feet, resting on inverted arches carried across underneath the line. A puddle-drain was formed behind each wall, with a small drain through the wall to let off the water from behind. Fig. 13 is an elevation of the west end of the cutting where it is about 40 feet deep, showing clearly the method of undersetting, and fig. 14 is a cross section of the side walls at the same place, where the left-hand shows a section of the wall in the water, and the right-hand side shows the section through a buttress, together with the invert and drains. One of the walls is shown in front elevation in fig. 15. The New Cross cutting through the London clay, on the South-Eastern Railway, is 2 miles long, and is for some distance from 80 to nearly 100 feet in depth. This cutting affords an example of the tendency of some soils to slip. The slopes of the cutting were finished at 2 horizontal to 1 vertical; and they remained as thus finished for

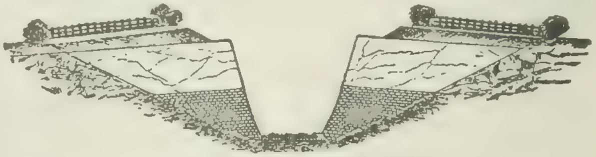

FIG. 13.—Blisworth cutting; west end.

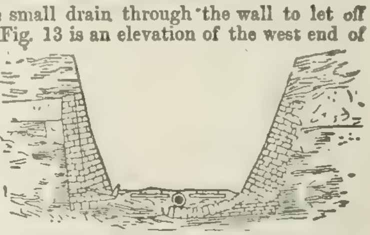

FIG. 14.—Section of the same cutting.

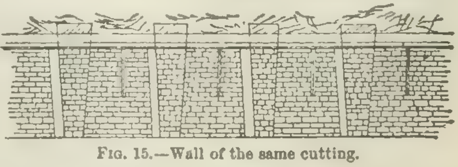

FIG. 15.—Wall of the same cutting.

about two years, when, after continued bad weather, the slopes commenced slipping to such an extent that the line was rendered impassable for some weeks, and parts of the slopes were reduced to an inclination of 4 to 1. The Winchburgh cutting, on the Edinburgh and Glasgow Railway, is 4 miles long and from 25 to 60 feet deep, through solid rock. It is succeeded by an embankment 1½ miles long and 60 feet high, followed in immediate succession by a stone viaduct half a mile long and 80 feet high. The Olive Mount cutting of the Liverpool and Manchester Railway is 2 miles long and at some places 100 feet deep.

Perhaps the most interesting case of embankment and cutting in combination is that of the crossing of Chat Moss, on the Liverpool and Manchester Railway. The moss was 4½ miles across, and it varied in depth from 10 to 30 feet. Its general character was such that cattle could not stand on it, and a piece of iron would sink in it. The subsoil was composed principally of clay and sand, and the railway had to be carried over the moss on the level, requiring cutting and embanking for upwards of 4 miles. In forming 277,000 cubic yards of embankment 670,000 yards of raw peat were consumed, the difference being occasioned by the squeezing out of the water. Large quantities of embanking were sunk in the moss, and, when the engineer, Stephenson, after a month's vigorous operations, had made up his estimates, the apparent work done was sometimes less than at the beginning of the month. The railway ultimately was made to float on the bog. Where embankment was required drains about 5 yards apart were cut, and when the moss between them was dry it was used to form the embankment. Where the way was formed on the level drains were cut on each side of the intended line, and were intersected here and there by cross drains, by which the upper part of the moss became dry and firm. On this surface hurdles were placed, 4 feet broad and 9 long, covered with heath, upon which the ballast was laid.

Tunnels.—The relative costs of rock-cuttings and cuttings in clay do not greatly differ; for, not only does the vertical rock-cutting require less excavation than the wide yawning earth-cutting of the same depth, with extended slopes, but, when it is executed, the rock-cutting is not liable to the expensive slips which sometimes overtake the other. For depths exceeding 60 feet it is usually cheaper to tunnel.

The tunnel (see fig. 16) under Callander ridge near Falkirk station, on the Edinburgh and Glasgow Railway, is a fair representation of tunnels as usually constructed. It is lined with brick 18 inches thick, founded on stone footings of greater breadth, in order to throw the load securely upon the subsoil, as shown in the transverse section. The sides and roof of the tunnel are curved from footing to footing, so as effectually to resist the inevitable external pressure of the earth, to a span of 26 feet in width and a height of 22. The sectional view shows also the centering or timber framing employed in the building of the tunnel, which was braced diagonally and transversely to resist the unavoidable inequalities of pressure without alteration of form whilst the arch was in course of construction. Externally the entrances are built of stone, and the flank walls are 3 feet in thickness, with counterforts at intervals. This tunnel is not straight, but is formed on a curve of 1 mile radius, and is 830 yards, or nearly half a mile in length.

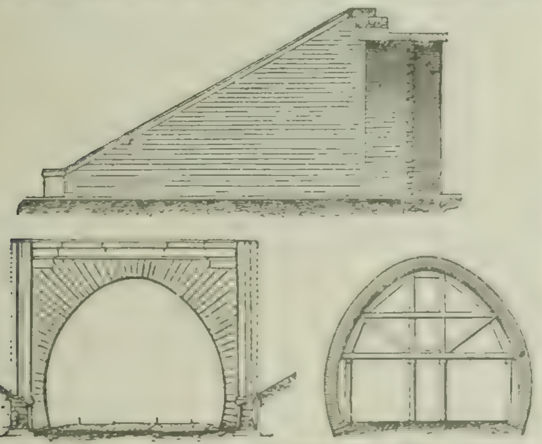
FIG. 16.—Tunnel under Callander ridge, on the Edinburgh and Glasgow Railway.

The Kilsby tunnel, on the London and Birmingham Railway, was rendered necessary by the opposition raised to the line passing through Northampton. It is driven 160 feet below the surface and is 2398 yards in length, 30 feet in width, and 30 feet high, constructed with two wide air-shafts 60 feet in diameter, not only to give air and ventilation but to admit light enough to enable the engine-driver in passing through it with a train to see the rails from end to end. The construction of the tunnel was let for the sum of £99,000, but, owing chiefly to the existence of unseen quicksands, the tunnel is stated to have actually cost nearly £300,000, or £125 per lineal yard.

The Box tunnel, on the Great Western Railway, between Bath and Chippenham, was another difficult and expensive work. It is about 70 feet below the surface, and is 3123 yards in length, or rather more than 1¾ miles; the width is 30 and the height 25 feet. Where bricked, the sides are constructed of seven and the arch of six rings of brick, and there is an invert of four rings. There are eleven air-shafts to this tunnel, generally 25 feet in diameter.

The tunnel under the Mound at Edinburgh (see fig. 17), on the Edinburgh and Glasgow Railway, supplies an excellent illustration of tunnels formed with inverts,—that is to say, inverted arches built under the rails. The figure is a transverse section, showing the truly circular arch of the tunnel, 28 feet in diameter and 20 high above the rails, built of brick 3 feet thick, stiffened with counterforts externally, and with ribs of masonry internally, founded on a solid bed of mason-work, with an inverted arch to distribute the weight. The Mound was a mass of loose earth and rubbish on a boggy soil, hence the necessity for the invert arch, on which the tunnel may be conceived to float.

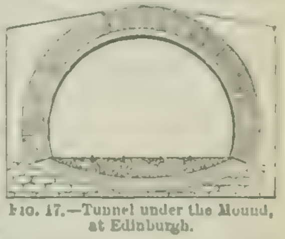
FIG. 17.—Tunnel under the Mound, at Edinburgh.

The Shakespeare tunnel, or, more correctly, double tunnel, driven through the Shakespeare Cliff near Dover, on the South-Eastern Railway, is in fact two narrow tunnels, carrying each one line of rails (see fig. 18), 12 feet wide and 30 in extreme height, through the chalk, separated by a solid pier or wall of chalk 10 feet thick. The chalk is of variable quality, and the greater part of the tunnel is lined with brick, strengthened by counterforts at 12 feet intervals, which carry the weight of doubtful beds of chalk. The tunnel is 1430 yards, or upwards of three-quarters of a mile in length, rising westward with an inclination of 1 in 264. The tunnel being within a short distance of the face of the cliff, the material excavated was discharged through galleries about 400 feet long, driven in from the face of the cliff, into the sea,—the first operation being to run a bench or roadway along the face of the cliff. There are seven vertical shafts from the surface, averaging 180 feet deep.

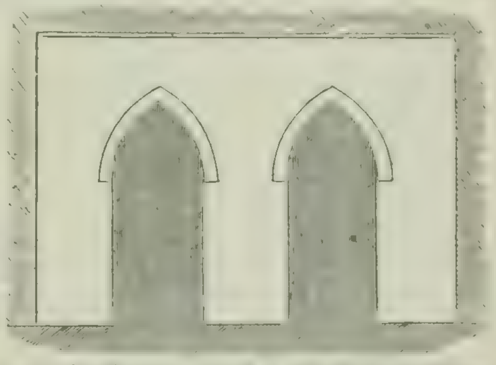
FIG. 18.—The Shakespeare tunnel, on the South-Eastern Railway.

There were in 1857 about 70 miles of railway tunnelling in Great Britain, or 1 mile of tunnel for 130 miles of railway. There are now (1885) probably at least 100 miles of tunnelling. The cost of tunnelling has averaged £102 per mile. The longest tunnel is the Woodhead, at the summit of the Manchester, Sheffield, and Lincolnshire Railway, being 3 miles and 60 feet long. The tunnelling on the Metropolitan Railway is noticed below, p. 239.

Bridges and Viaducts.—There are very few level crossings on English railways—that is, the crossing of one railway with another, or with a common road, at the same level—the chances of accidents having demanded, in general, the construction of bridges over or under the railway. The general appearance of an ordinary stone or brick bridge is represented by fig. 19, showing in elevation a bridge over or under the railway. The minimum height of a bridge over the railway is ruled by the elevation necessary to clear the top of the chimney of the locomotive. An excellent method of carrying roads over railways, where the height is limited and the span is moderate, consists in erecting flat-arched cast-iron beams over the railway, and throwing brick arches of small span between the beams upon their lower flanges, to carry the roadway. Thus the vertical depth from the soffit or crown of the main arch to the roadway above may but very little exceed the depth of the beam, which is apparent in the sectional view. This method of construction is, moreover, well adapted for skew-bridges. Cast-iron has, however, as a material for railway structures, been very generally superseded by wrought-iron, forming plate girder bridges. Timber is now almost unheard of for railway bridges on account of its want of durability and stiffness; and such bridges as have formerly been built of timber in Great Britain are being rebuilt of stone, brick, or plate-iron.

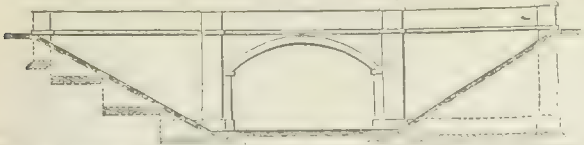

Fig. 19.—Ordinary bridge over or under a railway. The left-hand side is for a cutting, and a bridge over the railway; the right-hand side is for an embankment and a bridge under the railway; the difference is in the foundations.

The longest viaduct in England is perhaps the Congleton, on the Manchester and Birmingham Railway; it is of stone, 1026 yards or more than half a mile in length and 106 feet high, and it cost £113,000, or £113 per yard run. The Dane viaduct, on the same line, is of brick, 572 yards long and 88 feet high, and it cost £54,000, or £96 per yard run, having 23 arches of 63 feet span. The Avon viaduct, on the Midland Railway, is of brick, 240 yards in length and 51 feet high, with 11 arches of 50 feet span; it cost £14,000, or £60 per yard run. For comparison it may be stated that the Britannia Tubular Bridge across the Menai Straits, 616 yards long and 104 feet high, cost £600,000, or £974 per yard run. On the different lines entering London there are several miles of brick viaducts in the approaches to termini, and also at Manchester and other large cities and towns. Many interesting details might be given as to bridges and viaducts of the larger kind, but we must here confine ourselves to some account of the Forth Bridge, now in course of construction at Queensferry, referring the reader for other examples to the article BRIDGES.

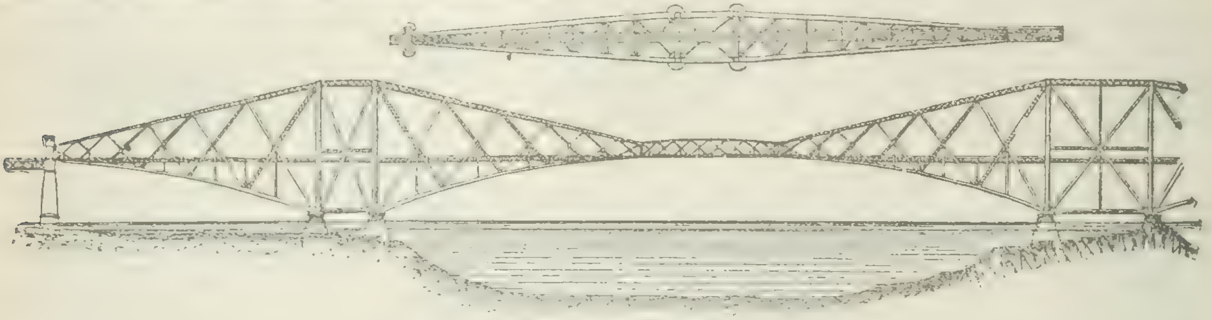

Fig. 20.—The Forth Bridge.

Forth Bridge. The Forth Bridge, designed by Mr John Fowler and Mr Benjamin Baker, is the largest and most remarkable railway bridge in the world. One of its spans is shown in elevation and plan in fig. 20. The bridge consists of 2 spans of 1700 feet each, 2 of 675 each, 15 of 168 each, and 5 of 25 each. Including the width of the piers, there is almost exactly 1 mile of main spans and half a mile of approaches by viaducts, making together about 1½ miles of total length. The clear headway under the centre of the bridge is 150 feet above the level of high water, and the highest part of the bridge is 361 above the same level. Each of the three main piers consists of a group of four cylindrical piers of masonry and concrete, 49 feet in diameter at the top and from 60 to 70 in diameter at the bottom. The deepest pier is about 70 feet below low water, and the rise of the tide is 18 feet at ordinary spring tides. In the piers there are about 120,000 cubic yards of masonry and in the superstructure 44,500 tons of steel. The contract was let for the sum of £1,600,000, being at the rate of £645 per lineal yard. An impression of the magnitude of the bridge is derived from a comparison with the largest railway bridge in England, the Britannia Bridge, which has a span of 465 feet, the ratio of which to that of the Forth Bridge—1700 feet—is as 1 to 3·65. The site of the Forth Bridge is at Queensferry. At this place the Firth of Forth is divided by the island of Inchgarvie into two channels, which, being as much as 200 feet in depth, precluded the construction of intermediate piers. Hence the adoption of two large spans of 1700 feet each, between which the central pier is founded on the island midway across. The bridge is composed of three double lattice-work cantilevers, like scale-beams, 1360 feet in length, poised on three substructures, and connected at their extremities by ordinary girders 350 feet long, which complete the main spans. The bridge is taper in plan, varying from a width of 120 feet—the distance apart of the lower members of the cantilevers at the piers—to a minimum of 31½ at the ends, in order to confer a degree of stiffness laterally, for resisting irregular stresses, wind-pressure in particular. The columns above the piers, forming the basis of the cantilevers, are 12 feet in diameter. The lower booms, as well as the struts of the cantilevers, being the members in compression, are circular in cross section, this form of section having been selected as the most effective for resisting compressive stress. The lower boom is at the piers 12 feet in diameter, constructed of plates 1¼ inches in thickness. The size is gradually reduced towards the ends, where the diameter is 5 feet, made of plates three-eighths of an inch in thickness. Correspondingly the upper member of each cantilever is a tapering box-lattice girder, rectangular in section, 12 feet deep by 10 wide at the piers, and 5 feet by 3 at the ends. The central girders are 32 feet apart. The wind-pressure is assumed for calculation at a maximum of 56 lb per superficial foot. It is calculated that the maximum possible stress on any member of the bridge is at the rate of 7½ tons per square inch of section. The required ultimate strength of steel under compression is from 34 to 37 tons per square inch, and under tension from 30 to 33 tons. Between the two main girders the double line of way is to be carried on an internal viaduct (see smaller figure in fig. 20), supported by trestles and cross girders. The way will consist of heavy bridge rails, Brunel section, laid on longitudinal sleepers bedded in four steel troughs, into which the wheels will drop in case of derailment, and then run on the sleepers.

Stations. *Railway Stations.*—Railway stations are either "terminal" or "intermediate." A terminal station embraces (1) the passenger station; (2) the goods station; (3) the locomotive, carriage, and waggon depôts, where the engines and the carrying stock are kept, cleaned, examined, and repaired. At many intermediate stations the same arrangements, on a smaller scale, are made; in all of them there is at least accommodation for the passenger and the goods traffic. The stations for passengers and goods are generally in different and sometimes in distant positions, the place selected for each being that which is most convenient for the traffic. The passenger station abuts on the main line, or, at termini, forms the natural terminus, at a place as near as can conveniently be obtained to the centre of the population which constitutes the passenger traffic. The goods station is approached by a siding or fork set off from the main line at a point short of the passenger station. Terminal branches of the railways—where, for example, there is a sharp incline—are sometimes worked by stationary engines and ropes to the point where the locomotive joins the train. The locomotive station is placed wherever the ground may most conveniently be obtained, at or near to the terminus; in some cases it is found at a distance of 3 or 4 miles. An abundant supply of good water and ample means of drainage are important at stations. There should be ample area of land to admit of the greatest possible extension of accommodation, and the erection of buildings on land adjacent to the station grounds should be discouraged. Companies have been compelled to repurchase at greatly advanced cost land originally disposed of by them as "surplus," and generally with a view to building operations. When this course is adopted prudent managers should take care to secure in the conveyance power to repurchase the freehold at original prices, with allowance for outlay in building or otherwise, by valuation.

In laying out the approaches and station-yard of passenger stations ample width and space should be provided, with well-defined means of ingress and egress to facilitate the circulation of vehicles, and the setting-down pavement should be as long as possible, to admit of several carriages discharging passengers and luggage at the same time. The pavement should be wide and sheltered from the weather by a roof, overhanging beyond the kerb, or spanning the roadway, but in all cases free from columns. The position of the main buildings relative to the direction of the lines of rails is the distinguishing feature in terminal stations. When space permits, the usual course is to place them on the departure side parallel to the platform, but they are frequently placed at the end of the station at right angles to the rails and platforms. Or these two systems are combined in a third arrangement, in which the offices are placed in a fork, between two or more series of lines and platforms. Of the metropolitan termini, the Great Northern passenger station, the Great Western, and the South-Western stations are examples of the first class; the London Bridge, Cannon Street, Charing Cross, and Victoria stations (comprising the South-Eastern and the Brighton lines), and the Great Eastern and the Fenchurch Street stations (comprising the North London, Blackwall, North Woolwich, and Tilbury lines), are examples of the second class; and the London and North-Western station is an example of the third class. The first and usual class of stations commands the greatest length of setting-down pavement, ample space for booking and other offices, waiting-rooms, &c., and the shortest average distance for passengers and luggage from the offices to the outgoing trains. Nevertheless, where the traffic is various, involving the despatch of numerous trains to different points in quick succession, and necessarily with perfect regularity, the second system is the best. But where the frontage is limited, and where trains start at some distance from the entrance, there is inconvenience in the movement of luggage over a crowded platform. The third plan is probably the least commodious of the three; but it has the advantage of affording two arrival platforms, with carriage-roads alongside, the others having but one so situated. In all the classes, it may be observed, transverse lines are inserted with turn-tables, to place all the lines in compact communication for turning on or off spare carriages, loaded horse-boxes, or carriage-trucks. Independently of the turn-tables, the lines of rail are connected by switches or points converging towards the two main lines of rail, outgoing and incoming; and thus the assortment and marshalling of trains may be effected by horse or engine power independently of the turn-tables. Each plan of station comprises one or more large turn-tables for reversing the engine with its tender together.

The correct arrangement and appropriation of the several lines of railway in a terminal station materially affect the economical and efficient working of the traffic. It is essential that every traffic line, both in and out, should be provided with one or more spare sidings, in addition to those set apart for the break-vans, horse-boxes, and carriage-trucks, and for the locomotive department. All these lines should communicate with each other by means of points and crossings, to allow of shunting with engine-power, and to reduce to the lowest limits the number of turn-tables or their substitutes. Curves ought never to have a radius of less than 800 feet.

Platforms.

The practice with regard to the height of platforms above the rails has varied considerably, the tendency being to raise them much higher than was usual at first; 3 feet may be stated as the limit in this respect. Too much attention cannot be given to the necessity for obtaining the greatest possible width of platform. Where the platform is used on one side only, the width ought never to be less than 20 feet; and when both sides are required 30, or even 40, should be allowed. The best mode of constructing the platform is undoubtedly with stone slabs laid hollow upon longitudinal walls, so as to admit of carrying beneath it the water and gas pipes, telegraph or signal wires, and the general drainage, with free access to each. Cutting out for turn-tables and openings for cross lines of rails are frequently inevitable difficulties, which have given rise to various ingenious contrivances, as shifting-stages, drawbridges, &c. By far the best substitute for the turn-table yet introduced is the traverser. If well made and carefully worked and attended to, the shifting of carriages from line to line can be performed without extra manual labour or interference either with the rails or the platforms. The other objection is best met by the use of easy inclines, with crossings on the rail-level. Where the platforms do not exceed 2 feet in height and the surface is smooth, gradients of 1 in 10 are not too steep for luggage-barrows, nor are they dangerous in a crowd.

The earlier terminal railway stations were designed either with intermediate columns supporting the roof or with brick walls, varying in number of spans from two to five or six. It often happens that in the course of a few years such stations have to be remodelled to meet the constantly increasing traffic; and great difficulties are occasionally met with in the rearrangement of platforms which are wasted where lines of rails have been laid, whilst rails are wasted where platforms are placed, and where columns interfere. To allow engines and carriages to pass from one line of rails to another at the shortest possible intervals it becomes necessary to have diagonal crossings from one part of the station to another in many directions, while at the same time the free movements of passengers and luggage on the platforms must not be impeded. Thus there arose a system, originated, it is believed, in the great Continental termini, of constructing roofs in two spans, one covering the up lines of rails and the other the down lines. King's Cross passenger station is an example of this kind. The principle of wide spans for the roofs of railway stations, clear of intermediate walls or columns, was adopted in England probably for the first time in 1848-49, in covering Lime Street station, Liverpool, on the London and North-Western Railway, by one span of 153½ feet. The extreme length of the roof was 374 feet. The new Lime Street station, it may be added, is covered by a roof of one span of 212 feet. Tythebarn Street station, Liverpool, on the Lancashire and Yorkshire Railway, is covered by a roof in one span of 136 feet there, as the traffic increased, the lines and platforms were changed so as to admit of treble the quantity of traffic being conducted, which would have been impossible if the roof had been built with sectional spans and columns. It is averred that the railway company has been repaid the excessive cost of the single-span roof many times over in economy of working. The next single-span roof on a large scale appears to have been that of 212 feet covering the New Street station, Birmingham, in which five lines of way, belonging to different companies—the London and North-Western and others—meet and concentrate passenger and goods traffic of every description. The roof was 840 feet in length, with trusses or principals placed at intervals of 24 feet. The principal consists of one arched plate-iron girder 15 inches deep, having a rise of 45½ feet at the centre. The ends of the arch are tied by a round tie-bar 4 inches in diameter, from which the arch is strutted at intervals. This is said to cover the largest area of any station in England.

The Cannon Street station of the Charing Cross Railway is the terminus of the City extension of that line, giving direct access to the City of London for the South-Eastern Railway, and linking the Charing Cross station at the west end with the City. During the year 1867—the first year the extension was open for traffic—about 8 million passengers used the Cannon Street station, of which nearly one-half were local passengers booked between Cannon Street and Charing Cross. The length of ground between the river Thames and Cannon Street is 855 feet, of which the fore-court occupies 90, the booking-offices 85, and the shed or covered portion of the station reaching to the river 680. The station is 201 feet 8 inches wide outside the walls and 187 feet inside. The whole of the station is built on a substructure of brick piers and arches, excepting the booking-offices and the part which is over Upper Thames Street. The ordinary piers are 5 feet thick with footings 8 feet wide, resting on a bed of concrete 10 feet in thickness, and the whole of the under structure is made available for storage and other purposes. The rails and platforms are carried across Upper Thames Street on wrought-iron girders 2½ feet deep to 37 feet of span. The floor of this bridge is of creasoted Baltic planking 8 inches thick. The walls of the station are of brick-work, 45 feet high above the level of the platform. They are built in piers 6 feet 4½ inches thick and panels 2 feet 7½ inches thick. The roof is of one clear span of 190 feet 4½ inches circular, having a rise or versed sine of 60 feet at the centre, composed of ribs constructed of plate-iron and angle-iron, and, like ordinary girders, 21 inches deep, each foot of each rib being tied by a tie-bar of round wrought-iron $5\frac{1}{16}$ inches in diameter. The tie-bar rises 30 feet and the depth of the truss at the centre is 30 feet. One end or foot of the rib is fixed to the supporting wall and the other end is placed on rollers, by the aid of which the principal or truss is free to expand or to contract according to the variations of temperature. The trusses are placed at from 33½ to 35 feet apart. The booking-offices, waiting-rooms, &c., are at the end of the station on the ground floor of the building, which above and below them forms the City Terminus Hotel. Parcels offices, stores, cellarage, &c., are provided in the basement, with hydraulic lifts worked by direct pressure from tanks in the towers at the south end. The used water is discharged into tanks about 9 feet above the level of the platform, whence it is again utilized for the general purposes of the station. There are nine lines of way in the station, of which eight run alongside five platforms, and one line is space for stock and for standing-room. The two outer platforms are employed for the short traffic to Greenwich and Mid-Kent and to Charing Cross, 13½ feet wide by 522 and 256 feet long respectively. The general departure platform is 665 feet long and 19 wide; and the two general arrival platforms, one on each side of the cab road, are 721 feet long by 12½ wide. On this system there are two lines of rail to each platform, reckoning the general arrival platforms as one; accommodation is thus found for 4788 lineal feet of trains. These nine lines of way converge and merge in five lines of way over the bridge for a length of about 600 feet, constituting the station-yard. The first line, on the western or up-stream side, is exclusively for trains proceeding from Cannon Street to Charing Cross; the second line is for trains approaching Cannon Street, whether from London Bridge, the country, or Charing Cross; the centre line is exclusively for trains from London Bridge or the country; the fourth is the main down line; the fifth, or east line, is for engines going to or from the engine depôt at the far end of the bridge, or for engines waiting for their trains. The movements of the trains are regulated from the signal-bridge, which crosses the converged lines of way at a distance of about 140 feet from the south end of the station, by means of about forty pairs of points, with twenty-four semaphore arms, eight of which are for trains outward and sixteen for trains inward. The signal-box on the bridge is 42 feet long and 9 wide, and contains sixty-seven levers, by thirty-seven of which signals on Saxby and Farmer's system are worked, and by thirty the points are worked. Several of the point-levers work the switches at both ends of cross-over lines. The signals lock the points and each other, so that no contradictory signals can be given; nor can ingress to or egress from a platform be given until the points are set accordingly. There are in the locking frame thirty-two slides and about a thousand locks, and an idea of the duty that falls on this apparatus may be formed from the fact that 775 trains have passed under the signal-bridge in a single working day (Whit-Monday), and that, each train being reversed here, a fresh engine has to be attached to it, the superseded engine being passed into a siding. In the course of thirty-five minutes one morning thirty-five trains were signalled and passed in or out of the station. The duty of signalling is performed by two men.

The cost of the works of the Cannon Street station, with the cost for Charing Cross station for comparison, is shown in Table XXV. (below). The substructure is reckoned to the formation-level, inclusive of the public footway under Charing Cross station and the public roadway under Cannon Street station, but exclusive of the river abutment of the bridge. The superstructure includes the fore-court, booking-offices, fittings, towers, roof, gas and water mains, &c., excluding the permanent way.

	Cannon Street.		Charing Cross.	
Area, exclusive of fore-court . .	152,652 square feet		103,452 square feet	
Substructure	£74,962	..	£41,422	..
,, per square foot....	..	9s. 10d.	..	8s.
Superstructure	157,262	..	111,604	.
,, per square foot .	..	20s. 7d.	.	21s. 6d.
Total.	£232,224	..	£153,026	..
,, per square foot..	..	30s. 5d.	..	29s. 7d.

The total cost of the works of the whole Charing Cross Railway, from London Bridge station to Cannon Street and Charing Cross, with the terminal stations, was £1,160,118. The cost of the land for the whole railway, after deducting the value of surplus land, Hungerford Bridge, pier tolls, &c., was £1,900,000, making a total for land and works of over £3,000,000. For this sum there are 4½ miles of railway for double line, the cost being at the rate of £680,000 per mile. The works include two large bridges over the river Thames, a number of expensive bridges over streets, viaducts, and two large metropolitan termini. The cost for land at Cannon Street station was at the rate of £3, 15s. 7d. per square foot, and that at Charing Cross station was £2, 18s. 5d.

St Pancras passenger station of the Midland Railway is the most recently constructed metropolitan terminus. The approach to the land on which the station is built was crossed by the Regent's Canal, and in order to secure good gradients and suitable levels for metropolitan suburban stations the main passenger line is carried over the canal; and, as a result, the level of St Pancras station is from 12 to 17 feet higher than that of the adjoining roads. The St Pancras branch, on the contrary, for effecting a junction with the Metropolitan Railway, leaving the main line some distance from the terminus, descends through a tunnel beneath the Regent's Canal and the passenger station, as well as under a considerable length of the main line. The height of the rails above the ground-level admitted of the construction of a lower floor with direct access to the streets, built and arranged for Burton beer traffic. The floor of the station is supported on girders and columns extending from side to side and acting as a tie for the roof girders, which start from the ground-level and form the roof as a single arch. The ribs or girders forming the roof are laid to a clear span of 240 feet; the walls built between the ribs are 245½ feet apart. The clear height of the ribs above the level of the platforms is 96 feet at the centre. The length of the station is 689 feet 4 inches. The lower floor contains 720 cast-iron columns set on brick piers, and 49 rows of principal girders across the station, with 15 rows longitudinally. Upon these intermediate girders are carried, and the whole is covered in with Mallett's buckled plates. The cost of the ironwork of the floor was £57,000, being at the rate of £3, 0s. 6d. per square yard. The roof girders, twenty-five in number, are placed at intervals of 29 feet 4 inches, except at the outer end, where the last two girders are only 14 feet 8 inches apart. The cost of the roof, including covering, with two gables and screens, amounted to £69,365, being at the rate of £40, 18s. per square of 100 square feet or 10 feet square. If there had not been any floor-girders to act as roof-ties, the extra cost for ties at the level of the floor would have been about £1 per square.

Table XXVI. gives the spans and areas covered by the roofs of some of the principal London passenger termini:—

Railway and Station.	Span of Roof.	Covered Area.	Cost per square of 100 sq ft.	Additional for one Gable.
	Feet.	Sq. yds.	£ s. d.	£ s. d.
London and North-Western, Euston	..	23,144	....	....
,, ,, New Lime Street	212	..	30 0 0	....
Great Northern, King's Cross	..	22,808	....	....
Midland, St Pancras	240	18,822	31 11 0	4 7 0
South-Eastern, Charing Cross	166	[illegible]	34 0 0	6 0 0
,, Cannon Street	190	13,875	43 10 0	6 0 0
Great Western, Paddington	..	28,807	....	....
Victoria Station, Great Western side	120	..	27 13 4	with gable

The goods and mineral station at King's Cross may be selected as an example of such stations. It comprises coal depôts and wharves, potato-stores, engine-sheds, repairing sheds, stores, stables, and all the necessary offices, buildings, and appliances required for the goods and mineral traffic of the company. Twelve lines of rail run into the goods-shed, with a platform at each side for the receipt and despatch of goods. On the outer side of the rails, within the building, space is reserved for the vans engaged in collecting and distributing the goods. The outer line of rails at the east side of the platform is used for unloading the waggons with the inward goods, and that on the west side for loading the outward goods. The inner lines nearest to these are used for the arrival of goods trains, for empty waggons, and for making up trains for departure. The waggons, after being unloaded, are taken by means of turn-tables and cross-roads to the departure side of the station, where the business of loading and despatching them is carried on. The platforms have each two rows of hydraulic cranes, of 1 and 2 tons lifting power alternately. The receiving offices are on the platforms, but the general offices are adjacent to the main building. The stables are under the platform; the granary is at the south end of the goods-shed, through which it is approached by two lines running through the middle of the shed,—two other lines, one on each side of them, being reserved for full waggons. When emptied, the waggons are removed by two lines which run one on each outer side of the goods-shed. The shed and the granary are supplied with water communication through tunnels under the roads to a basin on the south, and thence to the Regent's Canal; and lighters can receive or discharge their freights directly under the buildings. On the west of the goods-shed are the coal depôts and staiths. The coal arriving at the station is discharged in some cases directly from the waggons into carts alongside; in other cases it is discharged through hoppers on to weighing machines at a lower level, and thence filled into sacks. For this operation there is a frontage of 343 yards; and there is in addition a coal depôt in Cambridge Street, adjoining the goods-yard, with a frontage of 196 yards. There is a coal and stone dock or basin connected with the Regent's Canal, where barges are loaded directly from the coal-waggons, either through doorways in the bottom of the waggons or by discharging the coal from the sides of the waggons into hoppers. There is also a hopper at the Cambridge Street depôt for the purpose of loading barges on the canal. Adjoining the canal basin there are numerous private wharves for bricks and other merchandise. To the north are the locomotive and carriage sheds for repairing the stock, also two engine-running sheds, one round and the other rectangular. The goods, mineral, and locomotive stations cover an area of about 70 acres, and the total area covered by the goods and passenger stations and the running lines to Copenhagen tunnel is upwards of 90 acres. The principal goods-shed and granary is 300 feet long and 175 wide, and the area occupied by the goods-warehouses, potato-market, coal-offices, and other buildings amounts to 8¾ acres. In addition, 1 acre is covered by open sheds and 1½ acres by the stables and the engineers' shops. The engine-sheds can hold eighty-four engines and tenders, and they, with the workshops, tanks, carriage-repairing shops, and sundry premises, cover 2½ acres.[1] There are in the goods, mineral, and engine yards 28½ miles of single line of way and more than 250 sets of switches; 200 turn-tables for waggons, and one for engines and tenders; of that length of line 11½ miles of sidings are used for coal-waggons.

It is unnecessary to dwell at length on the arrangement of small terminal stations for branch lines. Where the line is single a single platform suffices, the trains being light and moving only in one direction at one time.

Intermediate stations.

In fixing intermediate stations the first step should be to get a good map of all the places within the scope of the railway, and to mark upon it the population of each place from the last parliamentary census. The greater the number of stations, the more the travelling increases; for quick and cheap transit creates traffic. Stations, especially important ones, should be on the surface rather than on an embankment or a viaduct or in a cutting. Facilities of access in all directions from the surrounding districts, with good roads in the case of passenger traffic, and good water and railway communication for goods depôts, are obviously indispensable. For safety and regularity there should be an uninterrupted view along the line of railway—no sharp curves or complication of over-bridges —in the vicinity of a large station. Intermediate and junction stations should be situated on dead levels, since, when a good length of level can be had, with gradients falling from it both ways, there is the greatest possible facility for working the traffic. Falling gradients towards a station are objectionable, but cannot in all cases be avoided. When the station is situated midway between towns of such extent as to cause an equal flow of traffic in each direction, offices may be requisite on both sides of the line; but, where the bulk of the traffic tends one way only, it will be desirable to concentrate it on that side which involves the larger number of passengers and the greater extent of waiting space.

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[1] The headquarters of the locomotive and carriage department are at Dc caster station.

This rule, again, will be modified by the position of the town or the district whence the traffic is to be derived, especially if the railway lies on the natural surface and adjoins a public road, whether crossing on the level or otherwise. This last condition is the most frequent one; and, as some portion at least of the traffic must be expected to depart from the platform opposite to the offices, provision must be made for crossing with the least amount of danger to the public. When the passengers are numerous in both directions, over bridges, as before stated, are objectionable; and in a surface-station an archway under the line is frequently impracticable. Some good authorities have adopted the plan of making the trains take up and set down the passengers at one platform only, when the platform may be made rather more than double the length of a single train, having crossings in the centre to communicate with both lines of rails, thus placing the trains when standing on the platform upon a loop-siding distinct from those lines. This system offers great convenience to the public when there is much first-class traffic and a large quantity of baggage; and it is especially applicable when the station partakes of the character of a terminus, or is used as a receiver from branch or neighbouring lines, offering, as it does, great facilities for making up and receiving trains which may run over a portion only of the main lines, as well as for attaching and detaching the carriages intended or used for branch traffic.

The buildings and yards in junction stations may be placed in the fork between the two double lines of railway forming the junction, or beyond the point of junction.

Locomotive stations comprise two departments,—the running and the constructing and repairing of engines and tenders. The chief locomotive station of the Midland Railway at Derby may be taken as an example. It is contiguous to the passenger station, and is in communication with the main line by a number of sidings branching off at the north end of that station, near the bridge over the Derby Canal. The area of ground enclosed is about 80 acres, of which 12 are covered by buildings. The walls of the erecting shops are 28½ feet high; those of the fitting and other shops are 20. The tools are 693 in number. The number of locomotives housed at Derby station (1885) is 289. There is room in the erecting shops for seventy-one locomotives. The workshops are capable of turning out 120 engines per year—say, thirty new engines with tenders, and ninety engines with new boilers, cylinders, and other working parts.

The carriage and waggon works of the Midland Railway at Derby are situated about half a mile south of the passenger station, with which they are connected by a double line of way branching out from the south end of the station. The works were built in 1875-76, on an enclosed piece of land 67 acres in extent, of which 19¾ are covered by buildings. There are 15½ miles of single way within the enclosure. The workshops are built in blocks, separated by open spaces of at least 70 feet in width. They consist principally of seven large shops, of red brick, the walls being of a uniform height of 21 feet; four on the west side are devoted to the preparation of timber and the building and painting of carriages and waggons, and three on the east side to the manipulation of various metals, comprising the foundry and iron stores, the smithy and the machine and fitting shop. Each block of building is entirely surrounded by a 7-inch water-main continually charged with water at a pressure sufficient to throw a jet over the ridge of the roof of any of these buildings. Vehicular communication is carried on between the shops on the east and the west side of the works by means of traversing tables, the rails for which are laid the entire distance across the shops from north to south, and intersect the nine principal lines of sidings flanking the shops. Both steam-power and horse-power are used for moving the traversers.

The saw-mill is 320 feet long and 200 wide. In the cellar underneath all the main shafting, pulleys, and belting are placed. About a hundred loads of oak logs are converted into plank or scantling weekly. There are in all about a hundred machines for sawing and working wood. Outside the saw-mill are large cross-cutting saw-benches, with circular saws 6 feet in diameter, by which logs of deal are cut to the required length before being taken into the mill. The waggon-shop is 320 feet long and 200 wide. The carriage building and finishing shop is 384 by 200 feet wide. In the panel-shed fitted with louvre ventilators, mahogany panel boards, maple boards, &c., are stored for about two years, to be thoroughly dried and seasoned before being used in vehicles. The painting and trimming shop is 384 by 300 feet. It has seventeen lines of rails, each capable of holding ten ordinary vehicles. From the commencement to the finish, twenty-five distinct operations—pruning, filling up, rubbing down, painting, varnishing—are performed on a passenger carriage. Young girls and women—the children and widows of the company's servants who have lost their lives by accident in the service—are employed on the light work of sewing, stuffing of cushions and backs of carriages, french-polishing, washing and dyeing, cleaning and lacquering light brass-work and gilding.

The foundries, iron and brass, are 200 feet long by 90 wide. Two thousand tons of iron castings are turned out annually. There are the bar-iron stores 200 by 45 feet, the general stores 150 by 90 feet, and the mess-room 45 by 70 feet, providing accommodation for 500 workmen; also two smiths' shops, one of them 225 by 200 feet, the other 140 by 200 feet; the machine and fitting shop, 400 by 225 feet; and the coal-waggon repairing shop, 350 by 300 feet. The carriage and waggon works just noticed are capable of turning out seven new carriages and eighty new waggons weekly. All the building of railway carriages for the Midland Railway is done at their works, and 80 per cent. of the new waggons are built here. Eighty per cent. of the carriages and 20 per cent. of the waggons are repaired here. The machinery of all kinds laid down for carrying on the business of the carriage and waggon works comprises 500 machine tools, 9 steam-engines, 1 gas-engine, 15 stationary boilers, 4 warming boilers, 3 steam traversers, 2 steam cranes, 2 steam travelling cranes, with a number of hydraulic cranes and overhead cranes.

One of the engine houses or sheds for engines on duty, at Gorton station, on the Manchester, Sheffield, and Lincolnshire railway, is shown in fig. 21. It is a rotunda of 150 feet in diameter inside, and is capable of holding seventeen engines with their tenders, leaving the entrance and exit lines clear. The advantage of this arrangement over the ordinary polygonal engine-house is in the absence of pillars for supporting the roof, of which there are twelve for a twelve-sided polygon; in this building there is but one column, at the centre. To the left of the entrance is a furnace for holding live fuel, from which the engines are lighted; and there are two lines of rail across the central turn-table, on one of which the engines enter and on the other depart. Between the rails of each radiating line a pit is constructed to afford access below the engines for inspection. The roof is of wrought-iron, surmounted by a louvre for ventilation, which is glazed to admit light freely. In the engine-shed of the North-Eastern Railway at Newcastle five ordinary engine-house rotundas have been replaced by a single rectangular building 450 by 280 feet with five turn-tables. This shed has berths for ninety engines, and the extra space enclosed by the rectangular building as against separate rotundas is used for executing minor repairs.

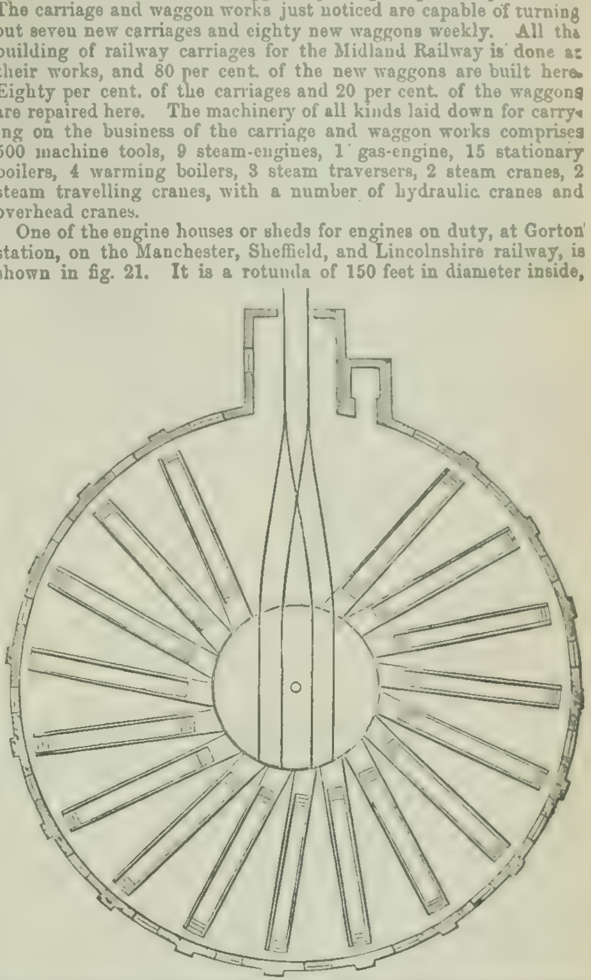

Fig. 21.—Rotunda at Gorton locomotive station, to house the working engines.

Station Fittings.—The use of switches and crossings is to form a link of communication between one line of rails and another. They are either constructed with ordinary rails or with rails specially rolled, and are carried in cast-iron chairs spiked down to sleepers. The switch-rails are movable, and when worked independently are moved by rods to which heavy weights are attached, —the function of the weights being to retain the points in one position, and to act as a self-acting adjustment in restoring them to their normal position after they have been shifted for the passage of a vehicle or a train. When only one of the terminal rails is movable it is called a single switch, and is [illegible] sidings or branch lines of rail. The double switches, being more perfect in action, are adopted on the main line; and, as a general rule, switches on the main line are ordered to be laid with the points in the direction of the traffic, so that passing trains may run out of the points, and not into them. "Facing-points," as they are termed, are such as are laid on the main line, facing or pointing towards the regular advancing trains. Many accidents have been caused to trains by facing-points, improperly set or out of order, turning the train unexpectedly into a siding, when it was impossible to pull up in time to prevent a collision, or throwing the train off the rails altogether. So dangerous are facing-points felt to be, particularly on high-speed lines, that on some railways they are absolutely forbidden at all except at terminal stations and at intermediate stations where every train is ordered to stop. In some situations this rule can only be followed by sacrificing simplicity and increasing the number of backing-points; but it no doubt diminishes the risk of accident.

Turn-tables are of two classes,—for turning carriages and waggons, and for turning engines and tenders together. Those ordinarily used are of cast-iron, and carry two transverse lines of rails. They revolve upon a central pivot and conical rollers near the circumference, which are upheld by and turn upon a cast-iron base bedded in cement, or on a built foundation (see fig. 22). For turning engines and tenders together turn-tables about 40 feet long are required. A common plan of table consists of two longitudinal balks of timber, to carry a line of rails, framed together with cast-iron beams in such a way that the centre is supported on a pivot and the extremities on rollers. The table revolves, in a pit about 4 feet deep, on a large circular race of cast-iron bedded on a firm foundation to carry the rollers, and the motive force is applied by means of gearing. In situations where there is much traffic it is needful to extend the deck of the table laterally, like wings, to complete the circle, and so cover in the pit.

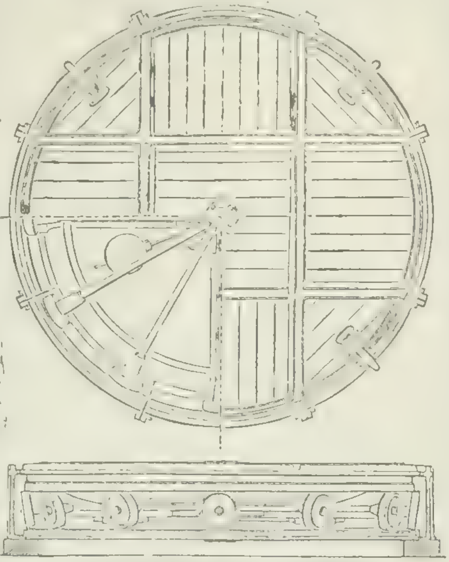
FIG. 22.—Carriage turn-table for stations.

Traversers. Traversers are a convenient substitute for turn-tables, particularly for working a number of parallel lines of rails. A traverser is simply a low rectangular frame, made with two overhanging rails, to receive carriages or waggons, and movable on rollers across the lines of rail, so as to receive the carriage from any one line of rail and deposit it on any other.

Water-cranes. Water-cranes for delivering water to locomotives are too familiar to every one to need description.

Signals *Railway Signals.*—The earliest passenger railways were opened without any fixed signals. Flags and disks, elevated on posts and pillars, were first employed, in various forms, and were worked on various codes. Sir Charles Hutton Gregory, about the year 1841, designed and erected at New Cross station, on the Croydon Railway, the semaphore signal, an adaptation of the old form of semaphore used for telegraphing over short distances. This was the most important step ever taken in the development of railway signalling. The semaphore has been almost universally adopted for fixed signalling on railways. There are two arms, to the right and to the left, to command trains arriving in either direction. The arm is turned out horizontally, in a position perpendicular to the post, to signal danger; diagonally downwards at an angle of about 45° as a signal of caution; and it is turned home, disappearing within the post, when the line is right for the approach of a train. But the general practice now (1885) is to work the semaphore in two positions only,—at danger and at caution. It is thus always in sight, and its position can be identified without hesitation. To make the signal system safe there must be clear definition and strict enforcement of the duties of the attendant; good men must be selected at adequate pay, and they must have convenient, warm, well-fitted lodges, with ample window-space, within which they may keep a constant watch over the line without exposure to weather. At junctions and other important signal-stations the lodges should be raised some height above the surface, to give perfect supervision in every direction and prevent distraction. At night the place of semaphores or disks is supplied by large and powerful lamps with reflectors, capable of showing lights of three colours,—a white light, a blue or green light, and a red light, signifying respectively safety, caution, danger; or, as in general practice, two lights only are shown,—red and green.

Signalling has been a subject of much controversy, and has been divided into two main systems. In "negative" signalling the normal position is that of caution, or that of safety, as the practice may be, and the signal is only turned on to danger when specially required for the protection of the station on the line. On the other hand, the "positive" system presupposes the normal state of the signal to be that of danger, so that, if the signalman neglect his duty to lower the semaphore when the station is clear for the passage of an approaching train, the train is bound to stop. The positive system has long been in successful operation at all large and important junctions. In such a situation the use of a stringent code is manifestly conducive to the greatest degree of safety, as by the unavoidable intersections of the lines of rails there are many chances of collision. The positive system has been merged in what is known as the block system of signalling,—that is to say, the positive system has been on most railways extended to every station on the lines in combination with telegraphic signalling. The best, perhaps the only, safeguard against error on the part of the persons in charge of trains is to be found in the adoption of the absolute block system, and of means for enabling engine-drivers to observe signals well in advance. The absolute block system consists in dividing the line of railway into intervals of convenient lengths, and by means of telegraphic and fixed signals allowing only one train at a time on any single length of single way. The signalman at station A does not send a second train to station B until he receives a signal from station B that the first train has arrived there; meantime the signal at A stands at danger until the man at B signals the arrival of the train at B. Under the "permissive block" system it is simply permitted to signalman B to block signalman A in the event of anything occurring at station B that may render that course advisable. But, supposing that a train has just left station A, then the message from B comes too late to enable signalman A to prevent the train from running into the obstruction at B. The permissive system has been well tried on the principal railways, and is preferred on some lines because it admits of trains being passed on one after another with greater rapidity than on the absolute block system. But it does not afford much protection, and it is now generally preferred to work on the absolute block system, and, for the purpose of doing so effectually, to erect intermediate stations on lines of constant traffic, so as to provide shorter intervals for blockings and obviate the delay incidental to unduly long intervals. The average distance apart of passenger stations is, say, 3 miles, but the distance of signal-stations, whilst it seldom exceeds 4 miles, is frequently only a quarter of a mile, and the average interval may be taken as 1½ miles. Distant signals—that is, signals placed at a distance in advance of points of danger and worked by wire communication from the signal-box—were, it is believed, first introduced on the North British Railway at Meadowbank station near Edinburgh in 1846, after the opening of the Hawick branch. In 1852 the Great Northern Railway was completely fitted with distant signals of the semaphore type. Distant signals are occasionally fixed at 1500 yards' distance; but beyond 800 yards their action is uncertain, and it is checked by a repeater—electric or mechanical—by which, by way of confirmation, the signal is returned to the signalman.

As railway junctions were multiplied it became apparent, not only that distant signals were to be provided for distinct lines, but that concerted action should be established between signals and switches. They are said to be connected when they are simply coupled together and are moved simultaneously. They are said to be interlocked when the necessary movement of the switches is completed before that of the signal to safety is commenced; and, conversely, the movement of the signal to danger is completed before the movement of the switches can be commenced. This is the fundamental principle of the interlocking system of signalling now generally practised. By the combination of the absolute block system and the interlocking system the greatest possible number of trains are enabled to travel over one pair of rails in a given time. At Cannon Street station, at the busiest time of the day, eighteen trains arrive and eighteen depart within an hour; 108 operations of shifting switches and signals, by means of sixty-seven levers or handles, have to be performed in that time. On the North London Railway, at Liverpool Street station, 250 trains pass over the same rails in a day of nineteen hours, averaging only four minutes between trains; frequently only two minutes elapse. The number of trains daily using Moorgate Street station on the Metropolitan Railway is more than 770, involving twice as many movements of engines—1540 movements—on four lines of way in nineteen hours, and every movement is separately signalled. This, of course, could not be performed without the aid of electric instruments, to enable the signalmen to communicate with each other, and to have a constant record on the faces of the instruments to show what is being done.

METROPOLITAN RAILWAYS.

Railways designed for the local service of large cities are necessarily either sunk below or raised above the level of the streets. The late Mr Charles Pearson, solicitor to the City of London, was the originator of the system of intra-metropolitan railways. He worked at the subject from the year 1837. The Metropolitan and the Metropolitan District Railways in and around London are examples of the underground system. In 1854 the first Act of Parliament was passed; the works were commenced in 1860; the first section of the line—Paddington to Farringdon Street—was opened in January 1863, Mr John Fowler being the engineer. Several consecutive extensions into the City and towards Westminster and the Mansion House were made at different times, until the "inner circle" was completed in October 1884, thirty years after the passing of the first Act, and twenty-four years after the commencement of the work of construction. The inner circle of railways as constructed is the direct outcome of the recommendation of the Lords' Committee of 1863, that they should abut upon, if they did not actually join, nearly all the principal railway termini in the metropolis, completing the circle by a line on the north side of the Thames. The total length of the inner circle is 13 miles and 176 yards. About 2 miles of this length are laid with four lines of rails, and there are twenty-seven stations on the circle at an average distance of half a mile apart. The combined length of the two systems, including the extensions beyond the inner circle, amounted in December 1883 to 40 miles.

The cost of the Metropolitan Railway system, 22 miles in length, in December 1883 has already been stated as £500,000 per mile, and that of the Metropolitan District Railway system, 18 miles in length, as £374,000 per mile. In 1871, when the works had been completed and opened from Moorgate Street to Mansion House station, the capital expenditure by the District Railway Company for works and equipment of 7½ miles of double-line railway was officially stated to be £5,147,000; and by the Metropolitan Railway Company £5,856,000 on 10½ miles,—subject to deduction in respect of surplus lands. The combined cost for 17½ miles was at the rate of £630,000 per mile—the greater cost per mile being, no doubt, due to the greater proportion of underground work. The cost of the 1¼ miles recently opened between Mansion House and Aldgate stations was about £450,000, or about £400,000 per mile. The longer axis of the inner circle is about 5½ miles in length, east and west, and the shorter about 2 miles long at the widest part, north and south. The line runs at very various levels, traversing the sloping ground that stretches from the river Thames towards the heights of Hampstead and Highgate. Several natural sewers, formerly clear brooks or tidal channels, now covered, are traversed by the railway. They occasioned many difficulties and great outlay, as they required to be conveyed across the line in specially constructed conduits. The Ranelagh sewer, for instance, is carried under the Metropolitan Railway at Gloucester Terrace in a brick-built channel 9 feet wide by 8 high; and over the District Railway at Sloane Square station in a cast-iron tube 9 feet in diameter, supported on wrought-iron girders of 70 feet span. The Fleet Ditch had to be crossed five times. The average level of the rails of the District Railway, which traverses the old bed of the river and the swamps of Pimlico and Bridge Creek, is 13 feet below Thames high-water mark; whilst that of the northern part, on the Metropolitan Railway, is 60 feet above that datum, making 73 feet of difference of level, and giving rise to heavy works and steep gradients at the west and east ends of the circle. Cuttings 42 feet deep and a tunnel 421 yards in length are found at Campden Hill on the west; and cuttings 33 feet deep and a tunnel 728 yards in length at Clerkenwell on the east, on gradients of 1 in 75 and 1 in 100 respectively.

The works of construction consist of covered ways, tunnels, and open cuttings with retaining walls. The cost of property precluded the use of ordinary open cuttings with slopes. The covered ways were formed by making open cuttings in the first place and then building "open" or artificial tunnels, and covering them in, so as to restore the surface. The sides of the cuttings were made vertical or nearly vertical, and they were supported by timber framing or poling boards till the masonry of the tunnel was completed. The line from Paddington to Moorgate was made in this way with a mixed gauge—that is, the 7 feet gauge and the 4 feet 8½ inch gauge in combination—to take the traffic of the Great Western Railway as well as that of national gauge lines. The covered way was therefore made 28½ feet wide and 17 high for the mixed gauge, and the arch is elliptical, built of seven "rings" or courses of brick, with side walls three bricks or 27 inches thick, on footings 4 feet wide. At the junction of a branch with the main line a "bell-mouth" or expanding arch was constructed in which the span was gradually enlarged to 60 feet. The covered way on the extension, where the national gauge alone was laid, was 25 feet wide. The normal or standard type of arched covered way is 15 feet 9 inches high above the level of the rails. The side walls are three bricks or 27 inches in thickness, and the backs of the walls are carried down vertically to the foundation. The arch was ordinarily built with five rings of bricks, making 22½ inches of thickness; but the number of rings was increased occasionally to eight, nine, or ten rings. The haunches of the arch were backed with concrete. The footings of the walls rest on concrete foundations 3 feet in thickness. A drain pipe 15 inches in diameter is laid longitudinally along the middle of the tunnel. The whole of the tunnelling of the District Railway, of which Mr Fowler was the engineer, was put in with open cuttings. Two trenches 6 feet wide were sunk to receive the side walls, which were built up to a level 4 feet above the springing of the arch. As the construction of the walls proceeded the timbering was removed and replaced by concrete backing behind the walls. The earth in the middle, called the "dumpling" or core, was excavated to such a level as to admit of the centering being put into position for the turning of the arch. When the arch was built and the centering removed, the dumpling, which had been utilized for transport, was excavated down to the floor-level from the ends, whence the stuff was conveyed away. By this economical method of procedure the only earth and gravel that required to be lifted was that which was excavated in forming the trenches for the side walls. It was raised by means of steam-cranes travelling on temporary rails laid by the sides of the excavations. Again, the centering for the arch was supported on the core, and was simple and less costly than ordinary centering. The complete arch is shown in section in fig. 23. Inverts, or inverted arches, were laid in across the bottom, between the footings of the walls, where, from the nature of the soil or from excessive lateral pressure, the floor was thought likely to rise. When there was not sufficient depth for a brick arched way the side walls were made, as shown in fig. 24, of brick and concrete, in bays 8 feet wide, of piers and recesses, spanned by cast-iron girders from 18 to 30 inches in depth, carrying jack-arches between them. The average cost of the arch-covered ways, 25 feet wide, was about £40 per lineal yard, as against £52 per yard for the girder-covered way.

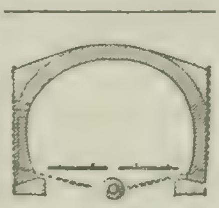

Fig. 23.

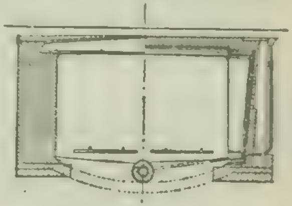

Fig. 24.

Fig. 23.—Metropolitan District Railway. Type section of covered way; brick arch.
Fig. 24.—Metropolitan District Railway. Type section of covered way.

Inner circle.

On the inner circle there are three tunnels,—the Clerkenwell tunnel, 728 yards long, of which the level of the rails was from 29 to 59 feet below the surface of the ground; the "widening" tunnel, 733 yards long, parallel to the Clerkenwell tunnel; and the tunnel under Campden Hill, 421 yards in length. Even when the utmost precautions are taken, tunnelling through a town is a risky operation. Settlements may occur years after the completion of the works; water mains may be broken in the streets and in the houses; stone staircases may fall down; and other unpleasant symptoms of instability may show themselves. The cost of the tunnel of 25 feet in width was at the rate of £63 per lineal yard. Open cuttings are 28½ feet in clear width on the original line of mixed gauge and 25 feet wide on the extensions. The retaining walls are of brick and concrete, in 11 feet bays, consisting of piers 3 feet wide on the face, and recesses between the piers 8 feet wide. They are inclined backwards with a batter of 1½ inches to 1 foot. The foundations are 5 feet below the level of the rails, and the thickness of the walls at the base is 40 per cent., or two-fifths of the height. Occasionally, where the depth is considerable, the thickness is less, and one or two rows of

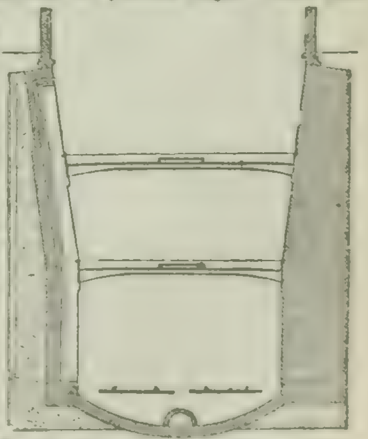

Fig. 25.—Metropolitan District Railway. Type section of open cutting.

cast-iron struts, according to the depth, are placed between the walls at the upper part to take the thrust. A section of open cutting with two rows of struts is shown in fig. 25. The cost of open cuttings 25 feet wide and 25 deep was, say, £67 per lineal yard, or with one row of cast-iron struts £55 per yard. With two rows of struts for a depth of 42 feet, the cost was £108 per lineal yard. It was the intention originally to make the stations as well as the railway strictly "underground," and those at Baker Street, Portland Road, and Gower Street were so constructed. At Baker Street a segmental arch of 45 feet span and 10 feet 4 inches of rise extends over the entire length of 300 feet of platform. The cost of such a station, including booking-offices, restorations, and other contingencies, amounted to £18,000. On the extensions the stations were, when the conditions admitted it, placed in open cuttings, roofed over, 300 feet long, with platforms 15 feet wide. The average cost exceeded that of the same length of ordinary covered way by from £14.000 to £22,000. Not only sewers but gas mains and water mains occasionally demanded very expensive diversions. In passing Broad Sanctuary 2000 feet of gas mains, ranging from 14 to 30 inches in diameter, were diverted; and in simply crossing High Street, Kensington, 600 feet of pipes of from 3 to 30 inches bore were diverted. In passing a sound building on a good foundation the work was executed in short lengths, with carefully timbered trenches quickly followed up by the concrete and brickwork of the retaining walls or covered way. Under the houses of Pembridge Square the side walls of the railway were constructed in short lengths, and to form the roof of the covered way main girders of 25 feet span were slipped between the walls of the houses at convenient places, between which jack-arches were built. At Park Crescent only a floor of old ship timber separates the kitchens from the railway. The permanent way originally consisted of wrought-iron flange rails with longitudinal sleepers and then of steel flange rails; but these have been gradually replaced by double-headed rails in chairs. Fig. 26 shows a section of the covered way under Queen Victoria Street, with the main sewer underneath and the galleries for pipes, &c., at the sides.

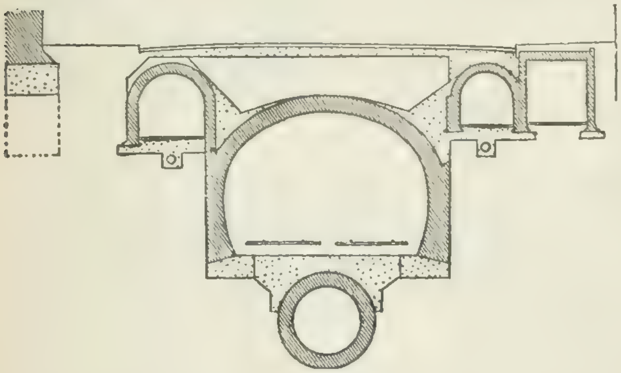

Fig. 26.

Glasgow City and District Railway. The Glasgow City and District Railway will supply important links of communication between the railways on the north side of the river Clyde. The line extends from College station, High Street, by George Street and Regent Street, crossing Dumbarton Road to the existing Stobcross line, over a length of nearly 2½ miles, almost wholly underground. Of this length 1700 yards, or nearly 1 mile, are tunnelled and 1000 yards are covered way. The tunnels are arched with four rings of brick in cement, to a clear height of 18½ feet at the crown and 27 feet in width, for two lines of way. The covered way is arched over with brick.

We may take the "elevated railroads" of New York as an instance of metropolitan railways for local service above ground. In 1867 the first attempt was made to improve existing means of transit between the residential and the business quarters of the city by the construction of an elevated railroad worked by a wire rope and a stationary engine. The railroad passed into other hands in 1872, and the New York Elevated Railroad Company was formed. The lines of this and of the Metropolitan Elevated Railroad Company are now worked together by the Manhattan Railway Company. From the southern terminus of the former railway at South Ferry diverge the lines by which the eastern and western sides of the city are traversed. Junctions are made with the Grand Central Depôt of the New York Central and other railroads, and with the New York City and Northern Railroad. In the beginning of 1880 the elevated system was worked over 34½ miles of line: 165.000 passengers on an average were carried per day,—the largest number carried in one day being 274,000. The trains run every two minutes in the morning and evening, when the fares are 5 cents or 2½d. for any distance; and in the quieter hours of the day every four or five minutes for a general fare of 10 cents or 5d. The working charges amount to about 63 per cent. of the gross earnings. On the New York Elevated Railroad the railway is supported on square wrought-iron lattice-work columns let into cast-iron base blocks founded on brickwork and concrete, at distances of from 37 to 44 feet apart. Where the street traffic is crowded a single row of columns is planted in the line of each curb, on the upper ends of which a pair of longitudinal girders are fixed to carry a line of way, 22½ feet high above the street level, as shown in fig. 27, at each side of the street. In other situations the two lines of way are supported at a height of 21 feet on longitudinal girders in the middle of the street, fixed to transverse girders, which span the street and are carried on columns at the curbs. A third arrangement is adopted where the columns are planted in the street at a distance transversely of 23½ feet, as in fig. 28, each carrying a line of rails at a height of 18 feet, and connected at intervals by arched bracing to steady the structure. In this illustration the street is occupied by a double line of tramway. The rails are of the Vignoles pattern, of Bessemer steel, weighing 50 ℔ per yard, spiked to cross timber sleepers, and guarded by two longitudinal timbers, one on each side of each rail. The sharpest curve on the main line has 90 feet of radius. The gradients conform, for the most part, to those of the streets, and the steepest gradient is 1 in 50 for a length of 800 yards. The traffic is worked with outside cylinder, four-coupled wheel, bogie-truck locomotives, weighing in working order 19½ tons. The driving-wheels are 3½ feet in diameter, and the cylinders 12 inches in diameter with a stroke of 16 inches. The cars are of the usual American type, entered from each end, 45 feet long and 8 wide, with seats for forty-two passengers. They are placed on two bogie trucks, and weigh 12 tons. The trains are provided with continuous air-brakes. The stations are about one-third of a mile apart; the platforms are 200 feet long and 13 wide. The cost per mile of double way is given by Mr R. E. Johnston as follows:—

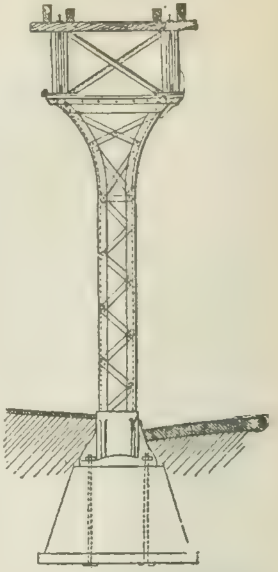

Fig. 27.—New York Elevated Railroad. Square lattice-work column.

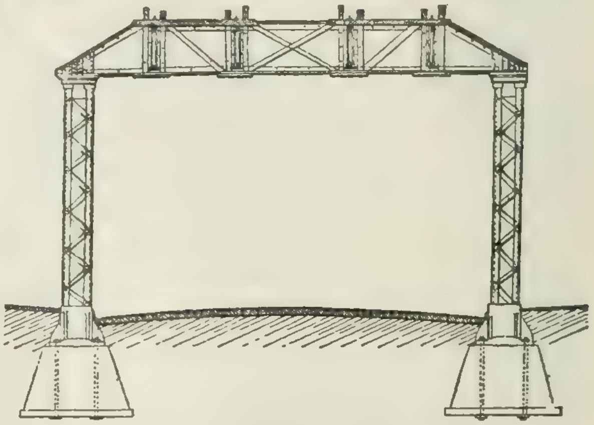

Fig. 28.—New York Elevated Railroad. Section.

Foundations, columns, girders, superstructure, and permanent way	£57.696
Stations	12,000
Five locomotives	4.000
Twelve cars	7.680
Total per mile	£81.376

No payment has been made for way-leave along the streets, nor for compensation to frontagers, though it is known that in the residential quarters traversed by the railroads rents have in many instances, at least, been depreciated to the extent of 50 per cent.

PERMANENT WAY.

The permanent way consists of rails, chairs, spikes, keys, and sleepers laid in a bed of ballast deposited on the formation. The sleepers or substructure should be bedded on broken stones, cinders, or gravel, at least 12 inches in depth under the sleepers, without any clay or other material in it that might interfere with the drainage of water through the ballast to the formation.

Gauge.—The measure of the standard or British national gauge of railways is 4 feet 8½ inches of width between the rails forming a line of rails or a way. There are many other gauges in existence in different parts of the world. In England the gauge of 7 feet, originally adopted on the Great Western Railway, was known as the "broad gauge" in contradistinction to the ordinary gauge of 4 feet 8½ inches, which was for a long time known as the "narrow gauge." But the 7 feet gauge has been to a great extent replaced by the 4 feet 8½ inch or national gauge, and it is being gradually replaced altogether. The lengths of line now (1885) laid on the two gauges on the Great Western Railway are as follows:—

	Miles.	Yards.
7 feet gauge	183	924
Mixed gauge	243	1034
4 feet 8½ inch gauge	1789	594
" " joint, half the length being taken as in the Great Western system	84	946
Total length of line	2300	1738

The name of "narrow gauge" has now ceased to be applicable to the standard gauge, and is reserved for gauges of much less width,—the metre gauge and others of from 2 to 3 or 3½ feet wide. Why a fractional measure of gauge should have been selected is a question which has puzzled many people. The fact seems to be that the track of the original carts or trains—5 feet wide outside the wheels—was taken as a standard for the gauge of rails, which was measured outside also. The width of the single rail at the top being originally 1¾ inches, the width for the two rails together is 3½ inches, which leaves 4 feet 8½ inches for the inside measure or true gauge. There are in the United Kingdom a few railways of gauge narrower than the standard gauge, of which instances occur in the following lines:—Festiniog, 1 foot 11½ inches; Talyllyn, 2 feet 6 inches; Dinas and Snowdon, Southwold, Isle of Man, Manx Northern, Ravenglass and Eskdale, Ballymena and Larne, each 3 feet. The following statement (Table XXVII.) comprises the gauges of the principal railway systems in the world:—

	ft.	in.		ft.	in.
Great Britain standard gauge	4	8½	United States, Prevailing gauges	4	8½
Ireland, standard gauge	5	3		4	9
Central Europe, prevailing gauge	4	8½		6	0
Russia, standard gauge	5	0		5	0
Norway	4	8½		3	0
	3	6		2	0
Spain and Portugal, standard gauge	5	6	Chili	5	6
Antwerp and Ghent	2	3		4	8½
India, prevailing gauge	5	6		4	2
,, metre gauge	3	3⅜		3	6
,, Arconum and Conjeveram Railway	3	6	Brazil	5	3
Japan	3	6		5	6
Egypt	4	8½	South Australia	5	3
Canada	5	6		3	6
	4	8½	Queensland	3	6
	3	6	New South Wales	4	8½
Mexico	4	8½	Victoria	5	3
	3	0	New Zealand	5	3
				3	6

The relative advantages of broad gauges and narrow gauges were exhaustively discussed at the Institution of Civil Engineers (in 1873), on the reading of Mr W. T. Thornton's paper on "The Relative Advantages of the 5 feet 6 inch Gauge and of the Metre Gauge for the State Railways of India." The fallacy pervading the arguments for narrow gauges is that they take the width between the rails as the basic unit of the system; whereas that is really little more than an incident, and the dimensions of the railway must in point of fact be governed by the size and weight of the vehicles which the traffic requires. Speaking generally, the national gauge of 4 feet 8½ inches is at least as good as any other for the purposes of general traffic. If the width of gauge were still an open question, it might be maintained that a gauge of 5 feet would be rather more convenient in view of the increasing size of the more powerful locomotives.

Rails.—"The experience of the last twenty-five years," said Mr George Parker Bidder, speaking in 1861, "has shown that one system has been adopted almost universally—the double-headed rails, upon chairs with cross sleepers, a plan which has been materially improved by fishing the joints." On the continent of Europe and in America, however, engineers have almost universally laid the flat-foot or flange rail; and in France double-headed rails, keyed in chairs, have been replaced by flange rails. On the Metropolitan and Metropolitan District Railways, on the contrary, the flange rails have been taken up and replaced by double-headed rails in chairs. The case may be briefly stated in the following terms. The double-headed rail system with chairs is the best where supplies of material and labour for maintenance and repair are always ready and available. The single-headed flange rail system is the best when the main thing to attain is simplicity in construction. Steel rails are now very generally used instead of iron; and indeed it may be affirmed that but for the introduction of that material for rails and also for the wheel tires of locomotives the railway system would have broken down under the enormous growth of traffic. Rails of wrought-iron on the early railways lasted about twenty-five years; those of later date have been worn out in from five to ten years and in certain situations in twelve months, mainly owing to increased traffic, heavier loads on the engine-wheels, increased speed, quicker stopping and quicker starting. Steel has come to the rescue both in the engine-wheels and in the rails. Loads of from 15 to 18 tons are now placed with impunity on the single wheels of engines as well as on coupled wheels, while it appears from the investigations of Mr R. Price Williams, a leading authority on permanent way, that a fully proportioned bull-headed rail of steel outlasts fifteen or eighteen iron rails. Steel rails are not merely stronger or harder but, owing to their texture, are worn away only by simple abrasion, whereas iron rails separate out into strands as soon as the outer coating that binds them together is worn off. Mr Alfred A. Langley laid down in 1874 samples of permanent way near Stepney station on the London and Blackwall Railway, where upwards of 300 trains a day passed over a single line of way. The weight of each train was on an average about 150 tons, making a total of about 45,000 tons daily over one line of rails. The rails are both of steel and of iron, weighing 80 lb per lineal yard and keyed in cast-iron chairs on cross rectangular sleepers. The greater number of the wrought-iron rails had to be turned after one year and three-quarters, during which period they had worn down about one-eighth of an inch; but the necessity for reversing did not arise from the wear itself, but because they gave way in places, either bulging or splitting. The steel rails had worn about one-sixteenth of an inch in the same period. About 27,000,000 tons had passed over the line.

The rails generally, indeed almost universally, used for the way of railways are the double-headed, the bull-headed, and the flange or Vignoles rails (in the United States, Germany, Canada, and Mexico), the double-headed and the bull-headed rails being keyed into cast-iron chairs spiked to sleepers, the flanged being laid upon and fastened direct to the sleepers. The principal advantage of the flange rail is the facility with which it can be attached to the sleeper with fastenings of a simple description. The disadvantages are that it cannot be turned or reversed when the head is worn, as the double-headed rail may be, and that the rigid attachment of the rail to the sleeper causes a greater degree of disturbance of the way and involves more labour for maintenance than in the case of the double-headed rail. The double-headed rail is made heavier for the same class of traffic than the flange rail; but it is also stronger and is easily bent to curves, although owing to the mode of attachment to the chairs by wooden keys there is a liability to a slight longitudinal movement of the rails, known as "creeping." The bull-headed rail possesses the advantages of the double-headed rail, except that, like the flange rail, it is not reversible. The bull-headed rail is laid on most of the railway lines of England and Scotland; the double-headed rail is also in use. In Ireland the bull-headed and the flange rails are used. Double-headed and bull-headed rails in English practice are rolled to a weight of from 82 to 86 lb per yard; the heads are made from 2¼ to 2⅝ inches wide; the webs are from five-eighths to thirteen-sixteenths of an inch in thickness; and the height of the rail varies from 5¼ to 5⅝ inches. The rails are now made of steel, in bars for the most part 30 feet in length, with the advantage in comparison with shorter lengths of a more solid road, fewer joints, and less cost for maintenance. They are fixed into massive cast-iron chairs, weighing from 31 to 55 lb each, by means of hard wood keys—oak. They are canted inwards in their seats at an angle usually of 1 in 20, the better to resist lateral blows from wheels. The chairs are made of considerable width on the more heavily worked lines—from 7 to 8 inches, against a minimum of 4½ inches on other lines. On some lines the seats of the chairs on which the rails rest are slightly rounded in the direction of the rail; this forms a compensation for slight deviations from the level in the sleepers, but is mainly useful in preventing indentation of the rails by the concussions to which they are subject—a matter of importance with double-headed rails which are by and by to be reversed. In such cases Mr T. E. Harrison places cushions of hard wood in the chair to support the rails, which are thus effectually protected from indentation; and, in addition, the trains run more smoothly. The oak keys by which the rails are fastened in the chairs are generally applied at the outer side of the rail, as the jar caused by the lateral percussion of the flanges of wheels is then less than when the key is placed inside; but on the Manchester, Sheffield and Lincolnshire Railway the key is put at the inner side of the rail, and there is this to be said in favour of the practice, that the rails are kept firmly to gauge and the key is less likely to shift. On some railways contrivances are employed to prevent the keys from shifting or creeping out of their proper position in the chair; these will be noticed in their places. The rails are laid end to end, one-eighth or three-sixteenths of an inch apart at ordinary temperatures, to allow for expansion in hot weather. The joints of the rails are united or fished with parallel steel plates lodged within the side channels of the rails and fastened with four bolts and nuts passed through the web of the rails, and, in order that the fish-plates may take a solid and steady bearing, the entering faces of the upper and lower members of the rails are in most instances formed straight and steep,—at an angle of about 2 to 1. For the same purpose the fish-plates are hollow at their inner faces, so as not to be in contact with the vertical members or web of the rails, and are slightly elastic in consequence. Vertical stiffness, also, is of prime importance in fish-plates, which act as beams fixed at the ends and uniformly loaded, being required to sustain the loads of trains passing over the joints. On some lines, accordingly, the fish-plates are made of greater depth, extending downwards along the lower table of the rail, and are even turned under it, whence they are called clip fish-plates. The chairs are laid on transverse timber sleepers, ordinarily cut from Baltic redwood to a scantling of 10 inches wide and 5 deep, and 9 feet in length,—speaking precisely, only 8 feet 11 inches in length, to secure the timber from import duty. They are most commonly submitted to a preserving process by the injection of about 2½ gallons of creasote into each sleeper. The chairs are fixed to the sleepers by iron spikes or oak trenails, or both, varying in number from two on the lines of lighter traffic to three or four on lines of heavier traffic. On the London and South-Western Railway and on the South-Eastern Railway a compound fastener is used,—a spike driven into a hollow trenail, after the latter is driven into the sleeper. There are usually eleven cross sleepers to each length of rails of 30 feet, making the average distance between the sleepers about 2 feet 9 inches from centre to centre. It is usual to space them apart more widely in the middle portion of the rail-bars (up to 3 feet) and more closely about the joints, with a view to equalizing the vertical resistance of the rails to rolling loads, by supplying a greater degree of support from the sleepers near the joints.

The standard models of permanent way on the double-headed rail and chair system adopted by Mr John Fowler for the New South Wales railways have been already noticed. The rails are shown in section in figs. 29 and 35. The sleepers are of colonial hard woods, chiefly iron-bark timber. They are laid 2 feet 6 inches apart between centres at the joints of the rails, and 3 feet 1 inch apart elsewhere. The upper and lower tables of the rails are curved or rounded in section to a radius of 5½ inches, the height of the rail. The entering or overhanging faces of the rail are inclined at a slope of about 1 in 2, forming straight and equally inclined bearings to receive the fish-plates. The rails, while in course of manufacture, are tested by selecting a few rails of each day's make, from which a portion 4½ feet in length is cut off and placed on iron supports 3½ feet apart, and is subjected to three blows from a weight of 1 ton falling 12 feet each time. The rails are to deflect not less than 6¼ inches and not more than 7½ under this test without showing any signs of fracture. The fish-bolts, as well as the spikes for fastening the chairs to the sleepers, are made of the finest quality of close fibrous iron. Fifty per cent. of the rails were ordered 24 feet in length, 40 per cent. 21, and 10 per cent. 18. The chairs (fig. 30) are 13½ inches long at the sole, 4½ wide, and 1½ thick at the seat of the rail. Test bars of the metal used for the chairs are cast to a scantling of 2 inches by 1 inch and 3½ feet long. They are placed on edge, on supports 3 feet apart, and are required to sustain a dead load of 30 cwt. suspended from the centre of the bar without fracture. The spikes are seven-eighths of an inch in diameter, tapered at the head to fifteen-sixteenths, with hemispherical or cup-heads forged from the solid bar. The above-described way, as laid in New South Wales, is bedded in ballast consisting of broken stone 12 inches in depth below the sleepers, broken to a gauge of 3 inches, boxed up with broken stone of a smaller size to a gauge of 2 inches for a depth of 8 inches. The total depth of the ballast from the crown of the formation is 22 inches. The surface of the formation below the ballast is rounded in cross-section, in order to drain off such water as penetrates through the ballast. Grips or furrows are cut and drains laid in where necessary, so that no water is allowed to remain on the line or under the ballast.

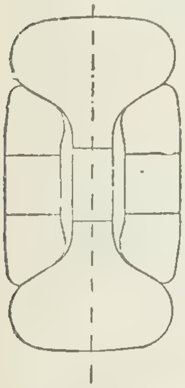
Fig. 29.

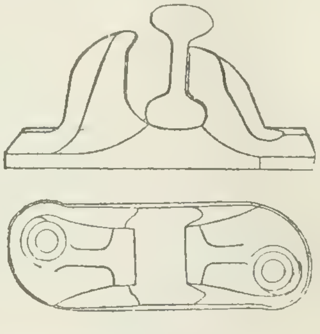
Fig. 30.

Fig. 29.—Double-headed rail; New South Wales Railway.
Fig. 30.—Chair; New South Wales Railway.

The South-Eastern double-headed rail (fig. 31) is keyed into chairs 4½ inches wide and 13¾ long at the sole. They are fixed to the sleeper by two spikes driven into two hollow oak trenails. The sleepers at the joints are laid 2 feet 4 inches apart between centres. The following are the quantities of material for 1 mile of way, single line:—

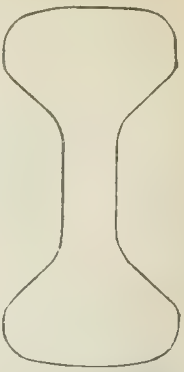
Fig. 31.—Double-headed rail, South-Eastern Railway.

			tons.	cwt.	qr.	lb.
Steel rails, 82 lb per yard	3521	yards	128	17	3	14
Fish plates	505	pairs	5	0	1	8
Fish bolts and nuts	2020		1	2	2	5
Chairs	4022		56	11	0	21
Chair spikes	8044		3	11	3	8
Keys	4022					
Sleepers, creasoted	2011					
Trenails	8044					

These quantities are considerably less than those of the Midland Railway (which are stated below), as may naturally be the case for a line chiefly of passenger traffic in comparison with one of heavy goods and mineral traffic. The double-headed rails of the North-Eastern Railway, 82 lb per yard, are bedded on blocks or cushions of oak placed in the bottom of the chairs, the advantages of which have already been noticed.

Bull-headed rails.

The type section of way of the Midland Railway is shown in fig. 32. The formation is inclined each way from the centre, making two straight slopes for drainage. The ballast is of strong gravel broken stone, and ashes or clinker,—chiefly gravel. It covers a width of 26½ feet for two lines of way. It is laid to a depth of 16 inches at the middle of the six-foot, and is formed level with the upper sides of the sleepers between the rails in the four-foot, with a medium depth of 16 inches, or 11 inches beneath the sleepers. At the outer sides of the rails the ballast is heaped level with the tops of the chairs, or, more precisely, the tops of the keys, and is sloped down to the formation at each outer side. The upper and lower surfaces of the rail (see fig. 33) are curved to a radius equal to the height of it, and the planks are flat,—adapted for taking up lateral blows and mitigating wear. The chairs are remarkable for large dimensions, being 7½ inches wide and 15½ long at the sole, which is 1¾ inches thick under the rail, and for their weight, 50 lb each. The cost of relaying 1 mile of single way on the Midland system just described, based on contract prices in 1884, amounts to £1572, 8s. 5d. Deducting credit for old material to the amount of £714, 8s. 3d., the net cost of relaying is £858, 0s. 2d. The particulars of quantities, cost, and credit are given in the following statement, prepared by Mr Alfred A. Langley, the engineer of the railway:—

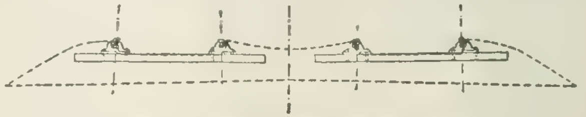
Fig. 32.—Type section of way of Midland Railway.

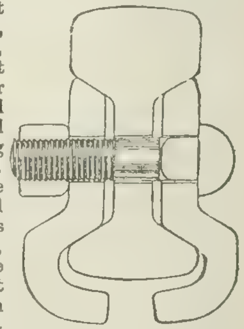
Fig. 33.—Bull-headed rail and fish-plate; Midland Railway.

Cost to relay 1 mile of Single Line with 30-feet Bull-headed Steel Rails, weighing 85 lb. per yard; eleven Sleepers to each 30 feet length.

	£	s.	d.
Steel rails, 3520 yards at 85 lb = 133½ tons, at £5	£667	10	0
Chairs, 3872 at 50 lb = 86½ tons, at £3	259	10	0
Fish-plates (steel clip), 352 pairs at 40 lb = 6¼ tons, at £8	50	0	0
Bolts and nuts, 1408 at 1½ lb = 1 ton, at £9, 10s.	9	10	0
Spikes, 7744, at 1¼ lb = 4¼ tons, at £7, 10s.	31	17	6
Trenails (solid oak), 7744, at £2, 10s. per thousand	19	7	2
Keys (oak), 3872, at £4 per thousand	15	9	9
Sleepers (creasoted), 1936, at 4s.	387	4	0
Labour, 1760 yards, at 1s. 6d.	132	0	0
Total cost of laying	£1572	8	5

Credits:—

	£	s.	d.
Steel rails, 3520 yards at 80 lb = 125¾ tons, at £5, 15s.	£471	11	3
Chairs, 3572, at 42 lb = 72¼ tons, at £2	145	0	0
Fish-plates (clip), 352 pairs at 35 lb = 5½ tons, at £3, 10s.	19	5	0
Wrought-iron scrap, 2 tons, at £3	6	0	0
Sleepers, 1936, at 9d. each	72	12	0
Total credits	£714	8	3
Net cost of relaying	£[illegible]	0	2

Not included in the above:—Ballast for 1 mile of single line, 4000 cubic yards, at 2s. = £400; ballast for 1 mile of double line, 7000 cubic yards, at 2s. = £700; ballast for a lift of about 3 inches, in relaying 1 mile of single line, 520 cubic yards, at 2s. = £52; engine hire, wages of ballast guards, use of waggons, &c., in relaying 1 mile of single line, £50. The lift of 3 inches signifies the wear and tear of ballast and the quantity required to be replaced.

The standard rail on the London and North-Western Railway is, like that of the Midland, bull-headed, but less high and wider at the head and the foot and thicker in the web. The chairs have the peculiarity of being ribbed horizontally on the inner face against which the oak key is driven, in order to grip the key. The sleepers at the joints are placed 2 feet 3 inches apart between centres. The Great Northern Company's standard rail contrasts with the two immediately preceding rails in being less high than either, and having a thinner web and a larger head than the others. There are peculiarities in the disposition of the way. The first is that the joints of the rails are supported in a chair directly under each joint, to which the fishes are bolted; the second is that the two rails forming a line of way break joint with each other, the joints alternating from side to side, and that, as a consequence, all the sleepers are placed equally apart. On this system, it is argued, the way is of as nearly uniform strength as it is possible to make it. The keys for fixing the rails are of compressed fir. The Great Western, the Metropolitan, and the Lancashire and Yorkshire rails are the heaviest of the bull-headed rails noticed in Table XXVIII. (see below),—weighing 86 lb per yard, having comparatively thin webs and great development of head (see fig. 34). In the Great Western chair the inner face of the jaw that holds the key is formed with an indentation, to aid in keeping the key in place,—the key being likely to expand into the vacancy. In the Metropolitan way the chairs are fastened to the sleepers by two through bolts and nuts to each chair. The rails of the Manchester, Sheffield, and Lincolnshire Railway are placed in chairs of great length, 16½ inches; and, contrary to usual practice, the oak keys for securing the rails in the chairs are fixed on the inner side of the rail, the rail taking its bearing directly upon the jaw of the chair. Thus the lateral strokes of the wheels on the rails are resisted directly by the jaw of the chair, and not through the medium of the key. There are twelve sleepers to each length of rail, averaging 2 feet 6 inches apart between centres, as against the usual number on other lines, eleven per rail-length of 30 feet. The sleepers, of Baltic redwood, are not creasoted nor preserved by any other process, except in one or two places where sand ballast is used.

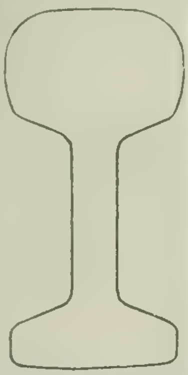

Fig. 34.—Bull-headed rail; Great Western Railway.

The leading particulars of standard double-headed and bull-headed rails, with chairs and sleepers, are given in Table XXVIII. (see below).

Specimen standard flange rails are illustrated in figs. 35 and 36 in cross section. Leading particulars of flange rails are given in Table XXIX. below.

In the case of the flange rail of the New South Wales Railway (fig. 35) the inward cant of the rails is provided for by planing out by machinery the beds of the rails at the upper sides of the sleepers to the angle 1 in 20; and that the rails may be kept in gauge the beds are notched into the surface by as much as the thickness of the flange of the rail. No holes of any kind, either punched or drilled, are made in the flanges of the rails; these are fastened to the sleepers by screws and spikes alternately, having projecting heads, by which the flange is clipped and held down. In order to check the tendency to creeping of the rails as well as of the fish-plates, it is intended to flange the fish-plates and to cut a notch at each end of them, in each of which a dog-spike is to be driven into the sleepers. The Great Northern of Ireland rail is similar to Mr Fowler's on the New South Wales Railway, but heavier. The Midland Great Western rail (fig. 36) is peculiarly formed, with a web of taper section, being nine-sixteenths of an inch thick at the head, and thickened to 1 inch at the flange. The bridge rail of the Great Western Railway (fig. 37) is laid on the model originally adopted by Mr Brunel. The rails are only 3 inches high, and are aided in resisting vertical stress by the continuous longitudinal sleepers of large scantling, 14 inches wide and 7 deep, on which they are laid, with pine packing 8 inches wide and 1 thick. The rails are laid so as to break joint with the sleepers, which are in lengths of 25 feet, whilst the rails are from 18 to 32 feet in length. The rails are fastened down by fang-bolts,

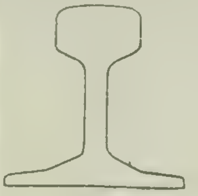

Fig. 35.

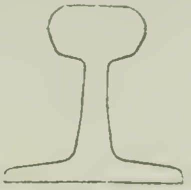

Fig. 36.

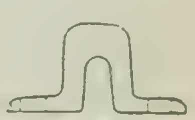

Fig. 37.

Fig. 35.—Flange rail; New South Wales Railway.
Fig. 36.—Flange rail; Midland Great Western Railway.
Fig. 37.—Bridge rail; Great Western Railway.

Table XXVIII.—*Standard Double-headed and Bull-headed Rails, with Chairs and Sleepers.*

Railway.	Weight of Rail per Yard.	Dimensions of Rail.				Fish-plates	Chairs.			Number of			Sleepers.	
		Height.	Width of Head.	Thickness of Web.	Length of Bars.		Weight.	Width of Sole.	Sole flat or rounded.	Spikes.	Trenails.	Total.	Section.	Distance apart
Double-headed rails—	lb.	Inches.	Inches.	Inch.	Feet.		lb.	Inches.					in. × in.	ft. in.
New South Wales	76	5¼	2¼	⅝	21, 24	plain	26	4½	flat	2		2	[illegible]	3 1
South-Eastern	82	5¼	2¼	¾	24	plain	31½	4½	flat	..	2	2	10 × 5	2 8
London and S.-Western	82	5¼	2¼	¾	30	clip	40	6½	flat	spiked	trenails		10 × 5	2 10
North-Eastern	82	5½	2½	11/16	30	plain	40	[illegible]	cushion	4	..		10 × 5	2 9
Great N. of Scotland	72	4⅞	2½	¾	30	plain	35	5⅝	flat	[illegible]	..		10 × 4½	2 10
Bull-headed rails—														
Midland	85	5⅝	2⅝	¾	30	clip	50	7¼	rounded	2	2	4	10 × 5	3 0
London and N.-Western	84	5½	2¾	11/16	30	clip	45	7¾	rounded	2	2	4	[illegible]	3 1
Great Northern	82	5 1/16	2⅝	11/16	30	plain	40	joints 7, 7¾	flat		3	3	10 × 5	2 8½
Great Western	86	5 1/16	2¾	11/16	26, 29, 32	plain	..	7½	rounded	2	..	2	12 × 6	2 9
Metropolitan	86	5 1/16	2½	11/16	24	clip	39	6	flat	bolts and nuts		2	12 × 6	..
Manchester, Sheffield, and Lincolnshire	80	5⅜	2½	⅝	30	plain	40, 51	6	flat	3	..	3	10 × 5	2 6 (av.)
Lancashire and Yorkshire	86	5¼	2⅝ full	¾ bare	30	plain	55	7¾	flat	2	2	4	10 × 5	2 9½
Great N. of Scotland	80	5	2¼	¾	30	plain	35	5⅝	flat	3	..	3	10 × 4½	2 9½
Great N. of Ireland	75	4¼	2¼	11/16	26	clip	..	6½	flat	[illegible]	..	[illegible]	10 × 5	[illegible] 0

Table XXIX.—*Specimen Standard Flange Rails; in Cross Section.*

Railway.	Rail.	Weight of Rail per yd.	Dimensions of Rail.					Fish-plates.	Sleepers.	
			Height.	Width of Head.	Width of Flange.	Thickness of Web.	Length of Bars.		Section.	Distance apart.
		lb.	Inches.	Inches.	Inches.	Inch.	Feet.		Inches × inches.	ft. in.
New South Wales	flange	71½	4¾	2¼	4¾	9/16	24	plain	10 × 5	[illegible] 1
Great Northern of Ireland	,,	79	4¾	2¼	5	11/16	26	plain flanged	10 × 5	3 0
Midland Great Western	,,	79	4 11/16	2⅝	5	9/16 to 1	[illegible] 26½	flanged	10 × 5	..
Great Southern and Western	,,	74	4 9/16	2⅜	5	9/16	24	,,	[illegible]	....
Great Western	bridge	68	3	2⅜	6½	2 webs, ¾	18 to 32	joint-plate	14 × 7 (longitudinal)	[illegible]

which pass through their flanges and the sleeper together. At the joints they are fortified by square iron plates laid under the joints, through which fang-bolts are passed. The longitudinals are connected and kept to gauge by transoms or cross-ties at intervals.

The minimum weight of ordinary flange rails is about 45 ℔ per lineal yard. If the weight is less than this for main lines the upper bearing surface is objectionably narrow, and it is scarcely high enough above the sleepers. The maximum weight of flange rails is about 80 ℔ per lineal yard. Flange rails, like headed rails, are laid on transverse sleepers, to which they are fixed, most commonly by means of screws, spikes, or flange bolts and nuts. In all cases it is preferable to effect the fastening of steel rails without piercing them in the flange, as they are materially weakened by such perforations.

In the United States (also very largely in Germany, Canada, and Mexico) the Vignoles rail is universally used for railways, varying in weight from 67 or 70 ℔ per yard on a few leading lines to 30 ℔ on narrow-gauge railways. No railroads with any considerable traffic are now laid down with rails of less weight than 60 ℔ per yard. The Pennsylvania Railroad, laid to a gauge of 4 feet 9 inches, is constructed of flange rails of two sections, one of 60 ℔ per yard 4¼ inches high, the other of 67 ℔ 4½ inches high, in lengths of 30 feet. The fishes or splices are 2 feet in length, held by four bolts and nuts. The outer splice is formed with a horizontal flange or "tongue," which overhangs the flange of the rail and is spiked to the sleeper. Allowance for expansion when the rails are laid in winter is provided by laying the rails five-sixteenths of an inch apart, endwise; in summer a space of only one-sixteenth of an inch in width is allowed. The cross sleepers are 8 inches wide by 7 deep, and are 8½ feet in length; they are laid so closely that the maximum distance apart between centres does not exceed 2 feet. There are sixteen sleepers for each length of 30 feet, and the sleepers at the joints are laid with a clearance of over 10 inches between them. The rails are fastened by spikes to the sleepers at the inside and the outside. The width for the double line of way at the formation level is 31 feet 4 inches in cuttings; and on embankments the width of the formation is 24 feet 3 inches, sloping from the centre at the rate of 1 in 20. The ballast is laid to a depth of not less than 12 inches under the sleepers, and is filled in to the level of the upper surface of the sleepers. Where stone ballast is used it is broken uniformly to a gauge of 2½ inches in diameter. For double lines of way large stones are placed in the bottom, at the centre, between the lines to provide for drainage; but the stones are not placed under the ends of the sleepers; thus water is drained off rapidly.

Metallic Permanent Way.—Metallic permanent way, in which the sleepers are of iron, has been much employed in tropical countries, and is now to some extent adopted in France and in Germany. The oldest and most widely used system of metallic way is that of Mr H. Greaves, who in 1846 introduced a spherical or bowl sleeper of cast-iron, having the chair for the rail cast on its summit (see fig. 38). Every second pair of sleepers are connected and held to gauge by transverse tie-bars, which pass through and are bolted to them. The form of the sleeper is strong, it holds well in the ground, the chair is not liable to be detached, the whole bearing surface is directly beneath the road, the ballast is kept dry and elastic, and there is a simple means of packing the sleeper through holes in the top, with a pointed rammer from the surface, so that the sleeper and the rail can be forced upwards without disturbing the general bed of ballast. They may also be lowered by taking out a portion of ballast from the interior. Another system, Mr W. Bridges Adams's "suspended girder rail," is shown in fig. 39. The rail is 7 inches deep, weighing 65 ℔ per lineal yard, and is suspended by continuous angle-wires, or side wings bolted to it, and bedded in the ballast; and, as the bearing surface on the ballast was approximated to the bearing surface of the rail, a great degree of stability was anticipated. Wrought-iron transverse sleepers were first tried in Belgium in 1862, then in France and in Portugal, and afterwards in Germany. There are various systems, most of which were unsatisfactory, but the Vautherin sleeper, first tried in 1864 on the Lyons railway, has been successful. It is hollow in section, of the form A truncated, supposing the upper part of the letter to be removed, presenting a flat bearing surface, 3¼ inches wide, for a flange rail. It is 8 feet in length and 9 inches wide over the flanges forming the base. It is three-eighths of an inch thick at the centre and is only half that thickness in the wings. The rail is fixed to the sleeper with gibs and cotters. It has been reported that the motion over the Vautherin sleepers is much easier than that over sleepers of oak, and that in consequence the cost of maintenance is comparatively low. It is stated that amongst a number of rails laid for trial under similar conditions, some of them on wooden sleepers and some of them on Vautherin sleepers, the number of defective rails amounted to only 2½ per cent. of those laid on Vautherin sleepers against 13 per cent. of those laid on wood. It was found that if the Vautherin sleepers were not at least 8 feet in length they failed at the ends, and that even for this length it was expedient to strengthen them at the angles. It was also found that large and hard ballast, or broken stones or broken slag, aggravated the tendency to give way. Ballast of ashes produced a similar bad effect, and also caused the sleepers to rust. On the contrary, ballast of gravel, of a marly character, adapted itself admirably to the form of the sleeper. The system of fastening the rails to the sleepers by gibs and cotters has been abandoned in favour of clips and hook-bolts. The Hartwich system of iron way need not be described here, having always given bad results. The Hilf system of iron way consists of two parts,—an iron longitudinal sleeper and a flange rail of steel. It is simple, easily laid and maintained, and economical. The sleeper is in section like the letter E, bevelled at the angles, having an upper flat surface and three flanges downwards. It is 12 inches wide and about 2½ deep; and it can be rolled to lengths of 30 feet and only one-third of an inch in thickness, and to a weight of 59 ℔ per yard. The rail is 4·32 inches high, with 2·32 inches width of table, 3·40 width of flange base, and four-tenths of an inch thickness of web. It is rolled in lengths of 30 feet and weighs 51½ ℔ per yard. It is fish-jointed and is fixed to the sleeper with two rows of bolts and nuts at intervals of from 30 to 40 inches. The gauge is preserved by means of 1-inch tie-rods, screwed at both ends with nuts. One tie-rod is sufficient for each length of rail. The combined rail and sleeper, placed on supports 54 inches apart, can carry 18 tons at their middle, without impairing their elastic strength.

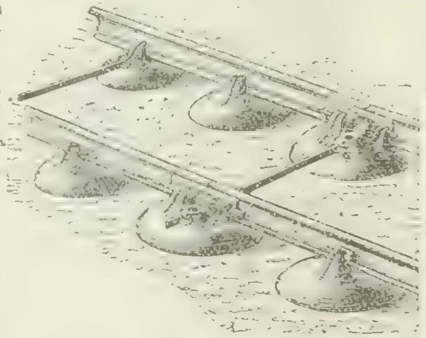

Fig. 38.—Greaves's cast-iron sleepers.

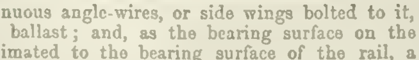

Fig. 39.—Suspended girder rail.

Locomotive Power.

Locomotives may broadly be reduced to two classes, according to the situation of the working cylinders. In the first class these are within the framing, under the boiler, with the main driving axle cranked at two points to receive the power from the two cylinders; in the second class they are outside the framing, and connected, not to the axle, which is straight, but to crank-pins fixed between the spokes of the wheels, in connexion with the nave. From these distinguishing features the two types of engines are known respectively as "inside cylinder locomotives" and "outside cylinder locomotives." In the latter the general contour of the cylinders is usually visible at the fore-end of the machine. The tenders have six or four wheels, according to the taste of the designer, and they are supplied with powerful brakes, worked by screws, with blocks of wood placed against each wheel. A water-tank forms the upper part of the tender, namely, the two sides and the back, usually in the form of a horse-shoe, holding from 1000 to 3000 gallons; and in the hollow of the shoe the fuel is deposited, of which a full charge may weigh from 30 cwt. to 3½ tons. The engine and the tender are sustained on springs placed over the axle-bearings. Again, there is the general classification of locomotives into passenger engines and goods and mineral engines. As the power of the engine is brought into action through the grip of the driving wheels upon the rails, it is necessary, for the exertion of maximum power in goods engines, to make two or more pairs of the wheels of one size, and transmit the driving force from the central pair of wheels to the front and back pairs by means of coupling-rods attached to crank-pins at the naves of the wheels. Such engines are called "six-coupled," and for them the most convenient combination is with inside cylinders. When the cylinders are outside it is usual to couple only the hind pair of wheels to the driving wheels, making a "four-coupled" engine, the leading or front wheels being of smaller diameter than the driving-wheels, and so leaving room for the convenient placement of the cylinders. The six-coupled engine can take the heaviest train on a good straight railway,—that is, one free for the most part from curves; but four-coupled engines work more economically on lines with frequent curves, and may be made so as to take, in average practice, as great a load as six-coupled engines. Passenger locomotives have usually been constructed with a single pair of driving-wheels, for free running at high speeds; but as traffic became heavier four-coupled-wheel passenger engines came into vogue; and express trains are now for the most part worked with four-coupled engines. In recent years the forepart of engines has in many cases been placed on a four-wheeled truck connected by a central bolt or pivot to the frame of the engine, so that the fore-wheels can swing to the curves of the line. On the Metropolitan, Metropolitan District, and North London Railways entirely, and on many large railway systems partially, where sharp curves are frequent, bogie-engines are employed, and with great advantage in facilitating traction. Another device for the same purpose is the use of radial axles,—that is, axles either at the forepart or the back of the engine, which by their axle-boxes slide laterally between circularly formed guides on entering and on leaving curved parts of the way, and so maintain a radial position at right angles to the line of rails.

American practice, many years since, arrived at two leading types of locomotive for passenger and for goods traffic. The passenger locomotive has eight wheels, of which four in front are framed in a bogie, and the four wheels behind are coupled drivers. This is the type to which English practice has been approximating. The tender is carried on eight wheels, disposed under two trucks or bogies, fore and aft. Goods locomotives are made with eight wheels and with ten wheels, of which, in each case, the leading pair of wheels are connected with a swing bolster and radius bar, to conform laterally and radially to curves.

As the speed increases a more than proportional increase in the engine-power is necessary to draw a given train. Thus, if an engine and tender, weighing together 40 tons and exerting a given tractive force, takes, say, forty loaded carriages, weighing 360 tons, at 20 miles per hour on a level, the loads which it could take if it exerted the same tractive power at higher speeds would be only as follows:—

At 20 miles per hour,	40 carriages, weighing	360 tons
,, 30 ,, ,,	30 ,, ,,	200 ,,
,, 40 ,, ,,	21 ,, ,,	144 ,,
,, 50 ,, ,,	15 ,, ,,	106 ,,
,, 60 ,, ,,	11 ,, ,,	75 ,,

The influence of gradients also is very important. If an engine and tender, weighing together 40 tons, is capable of drawing a maximum train of, say, forty-two loaded carriages, weighing 420 tons, at 20 miles per hour on a level, it would only draw the following loads at the same speed on the following inclines:—

Level	42 carriages, weighing	420 tons.
Incline 1 in 600,	34 ,,	340 ,,
,, ,, 300,	27 ,,	270 ,,
,, ,, 150,	20 ,,	200 ,,
,, ,, 100,	15 ,,	150 ,,
,, ,, 75,	12 ,,	120 ,,
,, ,, 50,	9 ,,	90 ,,
,, ,, 40,	6 ,,	65 ,,
,, ,, 30,	5 ,,	45 ,,
,, ,, 20,	3 ,,	24 ,,
,, ,, 10,	*nil* ,,	*nil* ,,

This is the reason why the older railways were made nearly level at an enormous cost,—the elder Stephenson's policy being to incur a large expenditure in construction in order to avoid otherwise heavy inclines and heavy expenses. The ruling gradient of the Liverpool and Manchester Railway was fixed at 1 in 900, excepting, of course, the inevitable inclines at Rainhill summit, for working which special provision was made; that of the next great line, the London and Birmingham, was fixed at 1 in 330; on the Great Western Railway, one of the earliest made lines, the ruling inclination is 1 in 1320 for the greater part of the way. Locke, as already explained, initiated the system of cheaply constructed railways, as the facilities for increasing the power of locomotives became better understood; he constructed lines with long steep gradients, some of them 1 in 70, 1 in 75, 1 in 80. The Great Northern Railway, of comparatively recent origin, was constructed on a ruling gradient of 1 in 200; and, in general, the more recently made lines have the steepest gradients. Steep railways are generally also lines of frequent curves, which is another cause of loss of locomotive power. Moreover, the ruling speeds, as they may be called, have in the course of years increased. Thus in every way more powerful engines are now needed than in the early days of railways.

The fundamental characteristics of English practice are fairly represented by a few types of locomotives. Take first an express passenger locomotive, which stands on a wheel base—the distance apart of the centres of the extreme axles—of 15 feet 4 inches. The cylinders are inside and are 16 inches in diameter, with a slide of 22 inches. The driving-wheels are 7 feet in diameter. The fire-grate has an area of 18 square feet, and the heating surface of the fire-box and flue-tubes taken together is 1339 square feet. The total weight of the engine in working order is 28 tons 6 cwt., of which nearly 12 tons are driving weight,—the weight at the driving-wheels. The tender stands on three pairs of wheels and weighs about 16 tons, with, in addition, 1780 gallons or 8 tons of water when filled, and 3 tons of coal.

The "Lady of the Lake" is an express passenger locomotive, one of a class which was designed by Mr John Ramsbottom with special regard to the running of express trains on the northern division of the London and North-Western Railway. The cylinders are "outside"; they are 16 inches in diameter, with 24 inches of stroke, and the driving-wheels are 7 feet 7 inches in diameter. The fire-grate has an area of 15 square feet, and there is over 1000 square feet of heating surface. The engine weighs 27 tons in working order and the tender 17½, together 44½ tons. The tender is fitted with Mr Ramsbottom's apparatus for picking up feed-water whilst running: a scoop is let down from the bottom of the tender and dips into water contained in a long open trough laid between the rails, from which it is scooped up into the tanks. The minimum speed at which this operation can be effected is 22 miles per hour. By the aid of the water-lifter this express engine has been enabled to run the whole distance from Holyhead to London—264 miles—in one continuous run, at an average speed of 42 miles per hour, taking a train of eight or nine carriages, and consuming 27 ℔ of coal as fuel per mile run.

An express passenger locomotive having 18-inch cylinders and four-coupled driving-wheels, 7 feet in diameter, with a four-wheel bogie in front under the smoke-box, was designed by Mr T. W. Johnson for the traffic of the Midland Railway. The engine stands on eight wheels, forming a base 21½ feet long. It weighs about 42 tons in working order, and with the tender, including coal and water, about 68 tons. The average load taken by engines of this class is fourteen carriages at the time-bill speed of 50 miles per hour, over gradients of from 1 in 120 to 1 in 130, with a consumption of 28 ℔ of coal per mile run. The engine can take as a maximum load seventeen carriages between Manchester and Derby, over ruling gradients of 1 in 90 and 1 in 100 for 10 miles, at a speed up the inclines of 35 miles per hour, and on levels and falling gradients at 50 miles per hour. The carriages weigh, with passengers, 11 tons each, making up a train of the gross weight of 187 tons.

The express passenger engines on the Great Northern Railway (fig. 40), designed by Mr Patrick Stirling, have outside cylinders, 18 inches in diameter, and a single pair of 8-feet driving-wheels. It is one of the most recent developments of the single-wheel engine. It is placed on eight wheels, of which the first four are framed in a bogie, or truck, pivoted on a centre under the smoke-box. The cylinders are placed outside, and between the wheels of the bogie at each side. They are 18 inches in diameter, with a stroke of 28 inches,—dimensions which, taken together, exceed in magnitude those of any other engine for English passenger-traffic. The driving-wheels are 8 feet 1 inch in diameter and the bogie-wheels 3 feet 11 inches. The engine weighs 38 tons in working order, the distribution of the weight being as follows:—

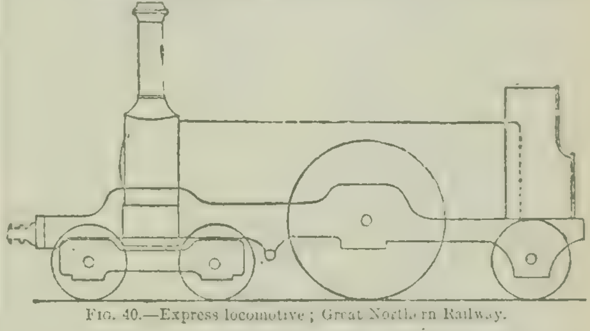

Fig. 40.—Express locomotive; Great Northern Railway.

Leading bogie-wheels	15 tons	7 tons
Hind ,, ,,		8 ,,
Driving-wheels		15 ,,
Hind wheels		8 ,,
Total weight in working order		38 ,,

The pivot of the bogie is 6 inches nearer the hind than the front axle,—these being 6½ feet apart. By this disposition the bogie appears to lead better than if the pivot were, as usual, equidistant between the axles. The working pressure in the boiler is 140 ℔ per square inch. There are 217 brass flue-tubes, 1$\frac{5}{8}$ inches in diameter, presenting a heating surface for evaporation of upwards of 1000 square feet. There is in all 1165 square feet of surface, and there is 17·6 square feet of grate surface. Mr Stirling, on the question of single-wheel *versus* coupled wheels for passenger locomotives, states that he constructed two classes of engines,—one class with four 6½-feet wheels coupled, the other with a single pair of 7-feet driving-wheels. The boilers of the two classes were alike; also the cylinders, which were 17 inches in diameter, with 24 inches of stroke. The pressure in the boilers was 140 ℔. With like trains the single-wheel engine had the better of it; in fact, it generally beat the coupled engine in time, running from King's Cross to Potter's Bar, a distance of nearly 13 miles, nearly all uphill, the gradients varying from 1 in 105 for 2 miles to 1 in 200. Engines of the class of the 8-feet-wheel engine travel between King's Cross and Leeds or York. The steepest gradients on the route are met with on leaving Leeds; ascending 1 in 50, besides the gradient 1 in 105 leaving King's Cross. Trains of from sixteen to twenty-two carriages are taken from King's Cross station with ease; and on several occasions twenty-eight carriages have been taken, and time has been kept. On one occasion a distance of 15 miles in twelve minutes was accomplished with a train of sixteen carriages, making a speed of 75 miles per hour. The engine has taken a train of thirty-three carriages full of passengers from Doncaster to Scarborough and back at an average speed of 45 miles per hour. It is capable of moving a gross weight, including engine, tender, and train, of 356 tons on a level at a speed of 45 miles per hour. The average results of the regular performance of seven engines of this class between Doncaster, Peterborough, and London for the third quarter of 1[illegible] show that a train of twelve six-wheeled carriages weighing 13 tons each was taken at a speed of from 50 to 53 miles per hour, for a consumption of 25¼ lb of coal per mile run and five pints of oil per 100 miles run.

Four-coupled locomotives, having the cylinders inside, and four wheels coupled "in front," with a pair of hind or trailing wheels, are known as "mixed engines,"—that is to say, engines adapted for either passenger traffic or goods traffic,—a generally useful type. In one example the cylinders are 16 inches in diameter, with a stroke of 22 inches; the coupled wheels are 5 feet in diameter. The weight of the engine is 24½ tons, of which 20 tons are driving weight.

The next engine to be noticed is a generally useful engine, four-coupled "behind," for passenger traffic, such, for instance, as that with inclined fire-grate and sloping fire-box designed by Mr J. J. Cudworth for service on the South-Eastern Railway. On a wheel-base of 15 feet the weight of the engine—30½ tons—is so distributed that 10½ tons fall at each pair of driving-wheels and 9½ tons at the leading wheels. The cylinders are inside, 16 inches in diameter, with 24 inches of stroke and 6-feet driving-wheels.

Another express passenger locomotive, having inside cylinders and four-coupled wheels behind, for service on the London and North-Western Railway, has cylinders 17 inches in diameter, with 24 inches of stroke, and 6 feet 7 inch driving wheels. The engine weighs 29¼ tons, of which 11 are at the middle wheels, 8¾ at the hind wheels, and 9½ at the front; thus the driving weight amounts to two-thirds of the total weight. This engine can move a gross weight of 293 tons, comprising engine, tender, and train, on a level at a speed of 45 miles per hour, with a working pressure of 12[illegible] lb per square inch in the boiler. With trains averaging ten carriages the consumption of coal is 29¼ lb per mile run.

A tank locomotive is an engine which carries its supply of fuel and water with it on its own frame, dispensing with the tender. Such engines are much used for short traffic, as well as for shunting and marshalling trains.

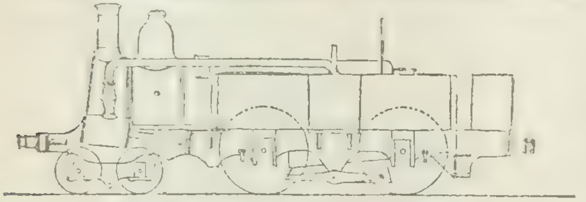

Fig. 41.—Tank locomotive; Metropolitan Railway.

The four-coupled tank engine (fig. 41) used for the passenger traffic of the Metropolitan Railway has four wheels coupled behind and a bogie in front. This engine weighs in working order 45¼ tons, of which about 35 tons are utilized as driving weight, making 17½ tons for one pair of wheels,—about the greatest load on one pair of wheels anywhere. The regular duty of this engine is to take a train of six carriages capable of holding in all 432 passengers, and weighing in themselves 13 tons each, at an average speed, including stoppages, of 18 miles per hour, consuming 37 lb of Welsh coal per train mile run. Whilst passing through the tunnels or covered ways the exhaust steam from the engine is condensed in large tanks carried on the engine, filled with cold water. The quantity of condensing water consumed is 900 gallons for half the journey, or every 6½ miles; it is raised to 200° Fahr. temperature.

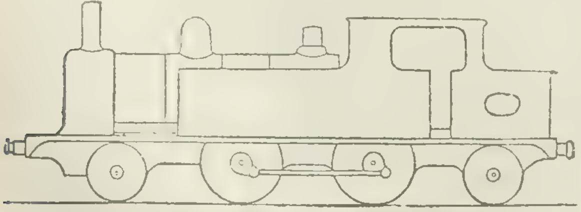

Fig. 42.—Tank locomotive; Great Eastern Railway.

The eight-wheeled tank engine (fig. 42) has been designed by Mr T. W. Worsdell to work the heavy suburban metropolitan traffic of the Great Eastern Railway,—the ordinary trains in this service being composed of fifteen or twenty close-coupled carriages, taken over steep gradients and sharp curves. For this purpose the fore and hind axles are radially mounted, as before explained, to take the curves with facility, the engine running either end first. The engine weighs 52 tons in working order, and of these 30 tons are driving weight placed on the two pairs of coupled driving-wheels. With large cylinders 18 inches in diameter, and driving-wheels only 5 feet 4 inches in diameter, the engine is adapted for starting promptly, which it is required to do in order to keep time between closely placed stations. Every stop is made by the Westinghouse brake, with which the engine is fitted

Locomotives for drawing heavy goods trains, though not heavier than the most powerful passenger locomotives, can take goods trains of great weight. Six-coupled goods engines, with 17-inch cylinders and driving-wheels 5 feet in diameter, weighing 32 tons in working order, can take a train weighing 360 tons on a level at a speed of 25 miles per hour, consuming from 40 to 45 lb of coal per mile run with trains. The Fairlie engine (fig. 43) is placed on two bogies or swivelling trucks, the foremost of which carries the cylinders and propelling gear and the hindmost the tank and coal-boxes.

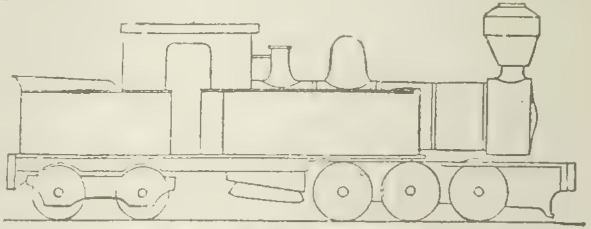

Fig. 43.—The Fairlie Locomotive.

Rates of speed

The longest distance run without stopping, combined with the highest speed, is performed on the Great Northern Railway, between Grantham and King's Cross, 105¼ miles, in 1 hour 58 minutes, at the rate of 53½ miles per hour. The Great Western Company run from Paddington to Swindon—77¼ miles—in 1 hour 27 minutes, being at the rate of 53¼ miles per hour. On the London and North-Western Railway the distance—77¼ miles—from Willesden to Rugby is run in 1 hour 28 minutes, at the rate of 52¾ miles per hour. The average rate of express and mail passenger trains on this line is 40 miles per hour or more. Parliamentary trains, calling at all stations, run at an average speed of from 19 to 28 miles per hour. Express goods trains attain a speed of from 20 to 25 miles per hour. The speed of coal trains is limited, as far as possible, to 15 miles per hour.

Coal trains.

The coal trains on the London and North-Western, Midland, and Great Northern Railways generally consist of from thirty to thirty-five waggons, weighing from 5 to 5½ tons each, and carrying a load of 8 tons of coal. At this rate the total load of coal for thirty-five waggons weighs 280 tons, and, adding the weight of the brake-van at the end of the train, 10 tons 17 cwt., the maximum gross weight of train is 483 tons 7 cwt., as on the Great Northern Railway. This train is taken by a goods engine with six-coupled wheels 5½ feet in diameter, having two steam cylinders 17½ inches in diameter, with a stroke of 26 inches, and a pressure of 140 lb per square inch in the boiler. The locomotive weighs in working order 36 tons 18 cwt., and the tender with fuel and water 30 tons 17 cwt., making together 67 tons 15 cwt. for the locomotive and tender. The gross weights are as follows:—

	Tons.	cwts.
Train, thirty-five vehicles (waggons, load, and brake-van) ..	483	7
Engine and tender, in full working order	67	15
Engine, tender, and train	551	2

These large coal trains are taken at a speed of 18 miles per hour, on ascending inclines of 1 in 178 at 10 miles per hour. The consumption of coal as fuel in the engine is at the rate of 45 lb per mile run, including the coal consumed in getting up steam. Mr Patrick Stirling, the locomotive engineer of the Great Northern Railway, has also designed and constructed still more powerful engines, having six-coupled 5-feet wheels, with cylinders 19 inches in diameter and of 28 inches stroke. These engines are capable of taking a train of forty-nine loaded coal-waggons, weighing with brake-van 672½ tons. Including the weight of the engine and tender the total gross load is, say, 740 tons, taken with a consumption of 50 lb of coal per mile run. This is probably the most extraordinary example of a dead pull on an ascending incline of 1 in 178. It is equivalent to a gross weight of 1816 tons on a level. It was found that this train was too long for some of the sidings, besides fouling both the level crossings in the city of Lincoln; hence the train was reduced in number to forty-five waggons. Six-coupled goods-engines of the usual proportions, working at full power, exert a tractive force of from 5 to 6 tons in the direction of the rails, equal to the movement of a gross weight of engine, tender, and train of from 1240 to 1500 tons on a level straight line at a speed of 15 miles per hour, or to from 386 to 463 tons on a level straight line at a speed of 60 miles per hour. A tractive force of 10 or 12 lb is capable of drawing 1 ton on a level at 10 miles per hour. At 60 miles per hour the required tractive force is about 45 lb for 1 ton of gross weight.

CARRIAGES AND WAGGONS.

The common varieties of vehicle employed in railway traffic are as follows:—(1) Passenger-train stock: first-class carriage, second-class carriage, third-class carriage, composite carriage, luggage brake-van, horse-box, carriage-truck. To these may be added the mail-carriage or travelling post-office. (2) Goods-train stock: platform-waggon, open or box waggon, high-sided round-end waggon, covered goods-waggon, cattle-waggon, sheep-waggon, coal-waggon, coke-waggon, brake-van. Besides these there are other waggons specially designed for special traffic, as gunpowder, salt, and lime, also ballast-waggons, for the private use of the engineer's department. Carriages are usually made of the same external length, width, and height. The under works of the stock may thus be identical in construction, and an economical uniformity of working and wearing parts is secured. Uniformity of waggons is still more important than in the case of carriages, as their total number and cost are much greater, and the supervision with which they are favoured is less minute; besides, the cost of maintenance is less than where many varieties of waggon exist on the same line. But, whatever may be the upper works, the under works of the whole of the waggon stock should be entirely uniform. One of the greatest evils of railway engineering has been want of uniformity in stock, partly due to different companies not arranging to have stock suitable for joint use on each other's lines and partly to inevitable changes of plan to meet the growing wants of traffic. Another source of mischief was the separation of the duties of engine and of carriage and waggon superintendence. The carriage superintendent, aiming at the utmost economy of maintenance in his department, continually added to the quantity and weight of material employed in the construction of the carrying stock, as the remedy for the observed failure of weak parts; and thus the stock, particularly waggons, was increased in strength rather by adding to the mass of matter than by studying to throw the same weight of timber and iron into superior combinations. Meantime the heavy trains, handed over to the locomotive department, led to the construction of heavier and more powerful locomotives, when the maximum was quickly reached, and strongly evinced by the damage done to the permanent way. It was found, moreover, that the older carriages suffered most in cases of collision; hence there was an additional inducement to add to the size and weight of carriages. But this line of development has been mainly determined by the demands of the public for greater convenience, speed, and safety, and from the growth of traffic, involving greater length and weight of trains.

The early first-class carriages weighed 3½ tons, the bodies or upper parts being 15 feet long, 6½ feet wide, and 4 feet 9 inches high, divided into three compartments, to hold six passengers each, or eighteen in all. They now weigh from 8 to 13 tons each, and are from 20 to 30 feet in length and from 8 to 8½ feet wide. Carriages have until recent years been placed almost all on four wheels; but six wheels on three axles are now generally in use. A modern first-class carriage, 28 to 30 feet long with four compartments, gives 7 to 7½ feet of total length for each compartment, as against 5 feet in the early carriages. Second and third class carriages, in length from 28 to 31 feet, are divided into five compartments, each from 5 feet 7 inches to 6 feet 2 inches long. Saloon carriages are occasionally used, so called because two or more of the ordinary compartments are merged in one. Second-class carriages originally were destitute of cushioning, hard and square, on the nearly obsolete policy of making them uncomfortable in the hope of inducing passengers to travel first class. The London, Brighton, and South Coast Railway Company in 1857-58 were the first to supply comfortably padded seats in their second-class carriages, and the receipts of that company were in 1858 materially augmented in consequence. Third-class carriages have been improved, under the stimulating example of the Midland Railway Company, who abandoned their second-class carriages, and raised their third-class stock to an equality with the second-class vehicles of other lines. But there are yet lines of railway on which the third-class carriages are little better than obsolete first and second class carriages converted into third-class.

Passenger luggage brake-vans are made open (for the most part) inside for passengers' luggage. They are fitted with a dog-box or small enclosure from side to side with doors at both ends, and with projecting sides, glazed, to accommodate the guard and afford a view of the train from end to end. A pair of doors are placed in each side for luggage. In some designs a separate compartment is partitioned off for the guard, in other cases a compartment of a passenger carriage is allotted for luggage and for the guard. The luggage van is fitted with a powerful brake: it should be fitted with three pairs of wheels. Horse-boxes are constructed to carry three horses.

The long double-bogie passenger-car universally in use in the United States, originally introduced by Ross Winans on the Baltimore and Ohio Railroad, is distinguished essentially from the carriages on British railways by the longitudinal passage in the centre of the body, reaching from end to end of the car, with seats at each side, and admitting of the free passage of the conductor throughout the train. The absence of doors at the sides permits of the enlargement of the body laterally. These cars are also distinguished by the use of two four-wheeled bogies or trucks on which the body is carried, and to which it is pivoted, allowing the car to pass with facility over quick curves. There is generally but one class of travellers; yet for the long journeys Pullman and other sleeping cars have come into use, at extra fares. From the Atlantic citie to the West there is a special "immigrant" class, as also over the Pacific railroads; and between the chief Western cities and the seaboard of late years a second-class system has been begun: passenger are usually carried in smoking cars at rates but little lower than first class fares, which on these lines are about 1d. per mile. Refreshment cars are also attached to trains. Ordinary passenger cars are 9½ to 10 feet wide and 44½ in length of body, or 49 feet over the extreme platforms. They are about 7½ feet high at the sides, inside the body, and nearly 10 feet high at the centre. The car is entered by steps at the ends. The middle passage is about 2 feet wide On each side there are fourteen seats, placed transversely, each 36 inches wide and holding two persons. The backs of the seats, which do not rise more than 34 inches above the floor, are mounted on swivels, by which the seat is made reversible. A window is placed next each seat, having a movable glass and a venetian blind. The cars are heated by stoves or steam heaters, burning coal, and are lighted by oil-lamps or candles, on some lines by compressed coal-gas. Each car is provided with a water-closet and a supply of iced water, and a vendor of books, papers, and cigars patrols the cars. There is a cord of communication with the engine-driver. The car, complete, weighs from 17 to 20 tons, and sleeping cars about one-half more.

The form of goods truck generally used for some years after the opening of the Liverpool and Manchester Railway in 1829 was simply a platform about 10 feet long, on four wheels, with sides varying from 4 to 10 inches in height, weighing from 2½ to 3½ tons. Many such waggons were employed for transporting heavy rough goods of 2 tons weight. The general unfitness of this style of waggon led to the adoption of portable sides and ends, which consisted of open crib-rails dropped into staples; and to these was added the costly tarpauling or sheet to cover the goods and bind them down. The waggon thus appointed, 13 or 14 feet in length and weighing about 3½ tons, was fit to carry 4 or 5 tons of ordinary goods. But loose or removable parts of waggons are liable to be lost or get out of order, and are costly to maintain, while a new tarpauling may be spoiled on the first day of using it by injury from projecting angles of goods under cover. Crib-rails and tarpaulings, therefore, have been to some extent superseded by built covered waggons from 14 to 16 feet long and 7½ feet wide, with sliding or hinged doors and roofs, so that with the crane-chairs a bale of goods, however heavy, can be deposited at or moved from any part of the interior of the waggon, and the goods may be perfectly enclosed and protected from damage by fire, wind, or rain. Covered waggons weigh from 4 to 6½ tons, and they can carry, according to their dimensions, from 6 to 8 tons of goods. The cost of maintenance of ordinary open waggons is said to amount to from 7 to 10 per cent of the first cost, whilst that of covered waggons is said to be only 4 per cent. It may be stated generally that waggons if properly made will carry 60 per cent. more than their own weight of goods, but that ill-designed badly-made waggons will carry no more than their own weight of goods. The great demand for weight in waggons arose, as much as from anything else, from the absence of spring-buffers at the ends, which exposed them daily to rude and trying collisions. By and by buffing-springs were introduced at one end of the waggon, the other being left "dead," and at length, cheap and convenient buffers having been devised, springs came to be placed at both ends of new stock. Waggons, as formerly made, were in long trains likewise subjected to violent shocks in starting into motion, and therefore the draw-bars also were placed upon springs. Some companies have gone further and placed the guard or side chains upon springs. Thus the waggon has come to be defended by springs at all points, and there is no doubt that the extra cost so incurred has been amply covered by savings on repairs and diminished breakages of goods. Spiral springs for buffing and drawing, made of round or of oval steel, fixed externally to the ends of waggons, have been much employed; but laminated springs, placed under the floor, are taking their place. Broad-gauge (7-feet gauge) waggons have been constructed sufficiently strong to carry 20 tons of load on six wheels; but they were not generally made to carry more than 10 tons. Even 10 tons is considered in some quarters to be excessive as a maximum waggon-load on the ordinary or 4 feet 8½ inch gauge. On the Midland Railway, for instance the standard coal-waggon is constructed to carry 8 tons. The heavier the load for which mineral vehicles are constructed, the greater is the tear and wear of the stock, insomuch that the waggons on that line which stood to their work best were the old 6-ton waggons.

Railway carriages are composed of two distinct parts,—the underframe or substructure, and the body or superstructure. The underframe has to carry the body and to resist the stress of work. It should be on axles placed well apart, and should be firmly framed together, of hard wood, with iron tie-rods, brackets, knees, straps, bolts, and nuts. Powerful laminated springs are lodged within the frame to take the pull of the train through the central drawbars and to intercept and absorb the thrusts of the buffers at the ends through the buffing-rods. On the Midland Railway four-wheeled carriages are (1885) being gradually superseded by six wheeled and long bogie carriages. Four varieties of bogie carriage and three varieties of six-wheeled carriage are constructed for the service. First-class compartments are constructed to seat six persons, three on each side; third-class compartments seat ten persons, five on each side. A uniform width of 8 feet outside, or 7½ inside, is adopted for all carriages; and, as a rule, first-class compartments are 7¼ feet long between the partitions, and third-class compartments 6 feet long. The roof is 7 feet 4 inches above the floor at the centre, and the clear height of the doorway is 6 feet. The wheels are 3 feet 7½ inches in diameter. Leading particulars of the several kinds of carriage now constructed on the Midland Railway are given in Table XXX. as follows:—

Carriage.	Length of Body.	Compartments.	Number of Passengers.	Weight.		Price.
	Feet.			Tons.	cwt.	
6-wheeled bogie composite	54	3 first class, 4 third class, 1 luggage = 8	58	23	0	£1097
4-wheeled bogie composite	45	3 ,, 3 ,, 1 ,, = 7	48	18	10	768
4-wheeled bogie third class	43	7 third class	70	17	15	620
4-wheeled bogie composite	40	2 first class, 3 third class, 1 luggage = 6	42	17	5	654
6-wheeled first class	30	4 first class	24	10	19	516
6-wheeled composite	31	2 first class, 2 third class, 1 luggage = 5	32	11	10	450
6-wheeled third class	31	5 third class	50	10	7	390

Each of these carriages is fitted with a vacuum brake. In the beginning of 1885 there were 837 bogie carriages at work on the Midland Railway, inclusive of 34 Pullman cars. The bogie cars, in virtue of their ability to swing their bogies to the curves on the line, run more freely than ordinary carriages, which have parallel axles. Six-wheeled carriages are enabled to run the more freely by an allowance of lateral play for the axle-boxes of the middle axle between the axle-guards, whereby the wheels adapt themselves freely to the rails on curves. The Pullman cars in use on the Midland Railway were sent from America. They are of two kinds,—the drawing-room for day service and the sleeping-car. The body of the cars is 51½ feet in length externally and 8 feet 9 inches wide. Inside the body is 8 feet 2 inches wide, and 8 feet 6½ inches high above the floor. The total length, including the gangways at the ends, is 58 feet. Each car is mounted on two four-wheeled bogies. There are seats for twenty-seven persons in the drawing-room car, with lavatories and heating apparatus, and twenty-two beds are made up in each sleeping-car. The cars weigh 21½ tons and their cost is £2700 each.

The carriage stock of the Metropolitan Railway was designed to carry large numbers. The bodies of the carriages are 39½ feet in length and 8½ feet wide outside, running on eight wheels, of which the extreme axles radiate, or are movable laterally to suit the curves of the way. The first-class carriages are divided into six compartments, providing seats for forty-eight passengers. The second and third class carriages have eight compartments, holding altogether eighty passengers in each. These carriages weigh 13 tons each.

The waggon stock of the Midland Railway is of several classes. All the standard goods and mineral waggons, as well as cattle-waggons, are constructed to carry 8 tons. Leading dimensions, weights, and prices are given below in Table XXXI.:—

Waggon.	External Dimensions over Corner Pillars.				Internal Dimensions.						Load to carry.	Weight of Waggon.		Price.
	Length.		Width.		Length.		Width.		Height above Floor.					
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	tons	tns.	cwt.	£
Covered goods	14	11	7	5	14	2	6	10	5	10½	8	5	3	72
High-sided for goods or coal	14	11	7	5	14	6	7	0	2	10	[illegible]	5	2	68
Low-sided	14	11	7	5	14	6	7	0	1	9	8	4	14	61
Cattle waggons	18	6	8	0	17	9	7	4	7	0½	8	6	0	86

The covered goods waggons are made with a doorway at each side, 5 feet wide and 5 high, and a sliding door to each doorway. The high-sided waggons are made with a doorway and hinged door in each side, and two trap-doors in the bottom. In the low-sided waggons each side is a door for its whole length. The cattle-waggons are made with doorways in each side, to each of which there are two doors hinged to each doorpost, and a letting-down door hinged to the lower side-rail. All the waggons are fitted with transverse buffing and draw springs.

Lighting of Carriages.—The North London Railway Company, it is believed, were the first to use gas instead of oil for lighting carriage stock. Thirty gas-lights in a train are supplied from two reservoirs or gasholders in the brake-vans, which hold 200 cubic feet of ordinary coal-gas, supplied from the mains,—enough to serve the train for from two hours to two and a half hours. The gas is conducted by pipes over the roofs of the carriages, with a branch to each compartment. Ordinary coal-gas has also been used on the metropolitan railways. Pintsch's system of lighting carriages by compressed oil-gas is extensively in use on Continental railways, where it has been in operation for upwards of ten years. In 1876-77 the system was tried successfully on the Metropolitan Railway, when it appeared that 1000 cubic feet of the compressed gas could do the work of 6500 cubic feet of coal-gas, at a cost of scarcely one farthing per burner per hour, against one-third of a penny for coal-gas lamps, and from ½d. to ¾d. for oil-lamps. The gas is distilled from cheap oils, as the waste-products from the manufacture of paraffin, soft lignite, or shale. The gas is pumped from the gasholder into reservoirs, in which it is compressed to about one-tenth of its ordinary volume. From these it is drawn off into a reservoir stowed under each carriage at a pressure of six atmospheres, or 90 ℔ per square inch. The Pintsch system is in use on railways in England and Scotland on nearly 3000 vehicles, and is being extended to other stock; the number of vehicles thus lighted in all the railways of Europe is about 18,000. Besides, the system is employed for the head-lights of locomotives.

Intercommunication signals.

Intercommunication signals for railway trains are provided between driver and guard, driver and passengers, or passengers and guard. Electric means of communication have been proposed and tried, but mechanical appliances are most commonly employed. There is the ordinary guard's cord, extending along the train outside, placed so as to be accessible from the window; then there are the same cord, with an attachment coming inside the window, the English cord, connected with a bell in the driving cab, a line inside the carriage connected with the steam-whistle, and so on. The acoustic signals appear to belong to the last type; but none of these systems is comparable with the through middle passage of the American cars already noticed.

Continuous brakes.

Continuous Brakes.—No department of railway practice has in recent years received closer attention and more minute study than that of continuous brakes,—brakes applied to the several vehicles in a train. With the amount of brake-power that had for many years been supplied to passenger trains—hand-brakes on tenders and guards' vans—a train running at from 45 to 50 miles per hour on a straight level line could not be pulled up within from 800 to 1200 yards; and even that inadequate amount of brake-power was in the hands of several men. It was clear that the problem of arresting a train in the shortest distance could only be solved by bringing a power to bear on every part of the train in the shortest possible time. But the difficulty consisted in establishing continuity of action, so that the engine-driver or the guard should be enabled to apply the brake-blocks on a series of vehicles in one operation. Mechanical means were first tried, in the systems of Fay and Newall, in which the brakes are worked by a continuous rod passed under the vehicles. These systems were found to be available only on sections of not more than four or five vehicles, and were not worked by the driver but by the guard. In September 1858 a circular was issued by the Board of Trade to the railway companies, calling attention to the advantages to be derived from having their trains controlled by a sufficient amount of brake-power. Subsequently many inventions were tried,—brakes worked by fluid pressure, others worked by chains; but no practical solution of the problem appears to have been arrived at until Mr Westinghouse of Pittsburgh, U.S.A., invented a really continuous brake worked by compressed air, which was quickly adopted in the United States, and was tried a few years later on several railways in England. It is still (1885) employed exclusively on the Metropolitan District Railway.

Although the Westinghouse brake was greatly in advance of previously existing systems and answered ordinary requirements remarkably well, it became evident that for the worst types of accidents something more was wanted. The brake as first produced was non-automatic, being worked from the engine only, not by the guard. And, since the power had to travel from the engine along the whole length of the train, there was a loss of valuable seconds of time whilst the brake-blocks were being applied. Mr Westinghouse therefore designed a system by which each vehicle was supplied with a complete brake apparatus, carrying its own store of power in the form of an auxiliary reservoir of compressed air, in addition to the brake cylinder already there. By the action of the "triple valve"—a later introduction—which is fitted to each smaller reservoir on the branch by which it is connected to the main or brake-pipe, the brakes can be instantly applied. A store of compressed air is maintained throughout the train in the continuous pipe and auxiliary reservoirs; and so long as the pressure in these is maintained the brakes are kept off. By a reduction of the pressure in the pipe the triple valve is brought into action, and the compressed air in the reservoir flows into the brake-cylinder and applies the brake. The brake can be at once released by restoring the pressure in the brake-pipe, when the compressed air in the cylinder escapes into the atmosphere. In the event of a train being parted and the brake-pipe severed, the escape of air reduces the pressure in the pipe, and the brakes are instantly self-applied. They have thus become known as "automatic" brakes. The compressed air by the agency of which the Westinghouse automatic brake is worked is stored in a main reservoir on the engine, as well as in the local reservoirs under the carriages, at a pressure of from 70 to 80 lb per square inch. The air is compressed by means of a steam-pump attached to the engine and worked by steam from the boiler. The compressed air is supplied through the brake-pipe, which passes through the whole length of the train to the secondary reservoirs. A brake-cylinder is fixed near each secondary reservoir, and the charge enters the cylinder at the middle of its length between the pistons, which are driven apart, one towards each end of the cylinder, and act, through piston-rods and levers, upon the brake-blocks which are applied to the wheels. The pistons are maintained in their central positions in the brake-cylinder, when out of action, by spiral springs which abut on the ends of the cylinders; and so the brake-blocks are kept clear of the wheels. The general arrangement of the brake-apparatus applied to a carriage is shown in fig. 44; and the reservoir and brake-cylinder, with their connexions to each other and to the main pipe, and the intermediary triple valve in section, are shown on a larger scale in fig 45. The triple valve, by means of which instant automatic action throughout the train is produced, consists of a piston in a short cylinder, carrying a slide valve,—the piston and the valve moving together. A vehicle out of order can be cut out of the system by turning a tap, and brakes which have been applied by the parting of a train can be released by opening a valve on the cylinder.

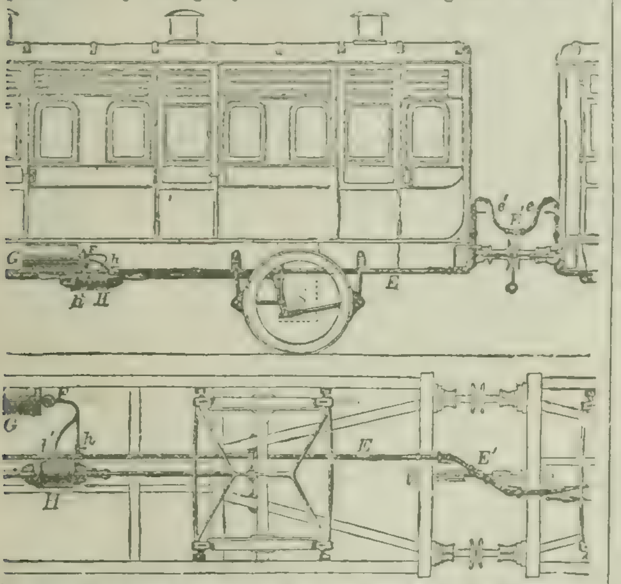

Fig. 44.—E, the brake-pipe, extends the whole length of the train, connected between the vehicles by a coupling E′, with flexible pipes e′, e; F, the triple valve at the end of the reservoir G; H, the brake cylinder, with pistons and rods connected with the brake-levers and the blocks suspended on frames; h, a branch pipe from the brake-pipe or main to the triple valve and reservoir; h′, a branch pipe from the reservoir and triple valve to the brake-cylinder.

In 1874 a royal commission on railway accidents was appointed, and in June 1875 brake trials were made at Newark. On a level road a train, weighing 208·6 tons, running at a speed of 51½ miles per hour, and fitted with the Westinghouse automatic pressure-brake—there tested for the first time on an English railway—was brought to a stand in a distance of 825 feet in the course of 18 seconds,—the equivalent distance for an initial speed of 50 miles per hour being 777 feet. In trials on the North-Eastern Railway in July 1879, a train, fitted with the Westinghouse brake, weighing 208 tons, and running at a speed of 51 miles per hour, was stopped in a distance of 621 feet in 14¾ seconds,—the equivalent distance for a speed of 50 miles per hour being 594 feet. In August 1877 the Board of Trade urged the railway companies to united and harmonious action, and stated the requirements which in their opinion were essential in a good continuous brake: it should be—efficient in stopping trains; instantaneous in action and easily applied by engine-drivers or guards; in case of accident instantaneously self-acting; capable of being put on or taken off with facility, on the engine, tender, and every vehicle of a train; regularly used in daily working; and the materials employed easily maintained and kept in order. That a brake should be instantaneous in action is evident on considering that at a speed of 50 miles per hour a train advances through 73⅓ feet in a second of time. A striking example of the value of seconds under such circumstances is quoted in the *Report*, contrasting the working of the Westinghouse compressed-air brake and the Westinghouse vacuum-brake. The rates of speed were nearly the same,—about 52 miles per hour, or 76 feet per second. The train with the former brake ran 825 feet, whilst that with the latter ran 1533 feet. Now, it took 7¾ seconds to put on the vacuum-brakes and 1½ seconds to put on the pressure-brakes. The difference, 6¼ seconds, at 76 feet per second, makes a space of 475 feet traversed by the train before the brake came into action. In consequence of these steps taken by the Board of Trade all the large railway companies have now (1885) adopted continuous brakes, though some of these do not comply with the conditions of the Board of Trade. The principal question is not now that of automatic *versus* non-automatic, but of automatic pressure-brakes *versus* automatic vacuum-brakes. In the latter, as the name indicates, the work is done by the atmospheric pressure against the pressure of a comparative vacuum. At 31st December 1878 only 21 per cent. of the total carriage stock was fitted with brakes of some form, of which 12·8 per cent. were automatic; whilst at 30th June 1884 of the total carriage stock 76 per cent. was fitted with continuous brakes, of which 58 per cent. were automatic. It appears that there are in the United Kingdom considerably more Westinghouse automatic brakes in operation than any other single system. The same brake is very largely used in America and on the Continent, and at the end of 1884 it had been adopted to the extent of upwards of 15,000 sets for locomotives and 78,000 for carriages.

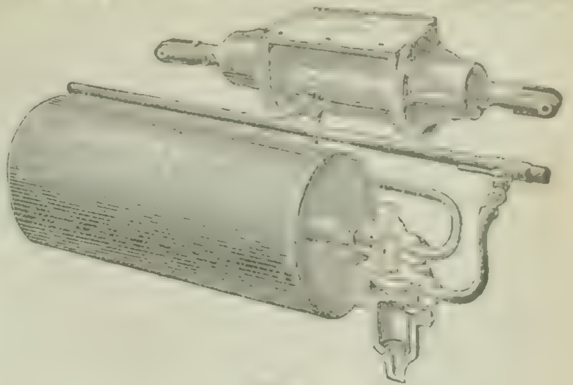

Fig. 45.

ELECTRICITY.

The employment of electricity in the working of railways has already been referred to in the application of block-signalling to the direction of the traffic, in the working of junctions, the protection of stations and sidings, and the repetition of signals.

The first attempt to apply electric power for propulsion on railways was made by Mr R. Davidson, who in September 1842 tried on the Edinburgh and Glasgow Railway an electro-magnetic locomotive, running on four wheels and weighing 5 tons. A speed of 4 miles per hour was attained. Electric power was applied in 1881 by Messrs Siemens and Halske of Berlin on an electric railway, the Lichterfelde line, near Berlin; and since then they have constructed an electric line 1½ miles long, from Charlottenburg to the Spandauer Bock, and a short line in Costverloren Park near Amsterdam. They also applied the system to a railway in the mines at Zankerode in Saxony. At the International Electric Exhibition in Paris (1881) an electric line was worked by Messrs Siemens Brothers which carried an average of over 13,000 passengers per week; and in September 1883 a railway of 3 feet gauge, 6 miles in length, was opened between Portrush and Bushmills in the north of Ireland. The gradients are very heavy, having a slope of 1 in 35 at many parts. The curves are very quick, following the line of the road. The conductor employed consists of a third rail, weighing 19 lb to the yard, and laid close to the fence. Electricity is transmitted through the conductor, by means of steel brushes, to the Siemens motors by which the car is propelled. The dynamo-machines by which the electricity is generated are driven by the power of a natural waterfall of 26 feet in the river Bush. Two turbines are driven by the fall of water at a speed of 225 revolutions per minute; each is capable of yielding 50 horse-power. The electric car can run on the level at the rate of 12 miles per hour.

Several large metropolitan and other stations are lighted by electricity. At the Waterloo station of the London and South-Western Railway, for example, the new main line suburban passenger station, about $1\frac{3}{4}$ acres in area, has been lighted by the Anglo-American Brush Light system since February 1881, sixteen arc-lamps of 2000 candle-power each being employed. The Windsor line station at the same terminus, about $1\frac{1}{2}$ acres in area, has been lighted by the Edison Company's system since January 1883 with 200 glow-lamps of 16 candle-power each. The large goods-yard on the same railway, about 18 acres in extent, at Nine Elms, has been lighted since January 1883 by fourteen arc-lamps of 4000 candle-power each. The lighting of railway trains by electricity has been successfully effected on the Great Eastern Railway since October 1884. The power is derived from a dynamo-machine driven by a compact rotary engine, placed together in a small case on the top of the locomotive, and worked by steam from the boiler. Sixty electric lights are generated, each of them sufficient to light thoroughly a compartment of a carriage, and supply light for a train of at least twelve vehicles. Trains on other lines also are lighted by electricity.

ACCIDENTS.

Accidents on railways arise from three causes,—inattention of servants, defective material either in the works or the rolling stock, and excessive speed. But the adoption of the absolute block system, with the use of interlocked points and signals and continuous brakes, has led to an absolute diminution of the number of accidents, whilst the amount of traffic has been greatly increased. In 1883 the total number of train accidents on railways in the United Kingdom, reported on to the Board of Trade, was 94 on 18,681 miles open, against 241 accidents ten years earlier on 16,082 miles open. The increased efficiency of management is strikingly brought out by Table XXXII.:—

Class of Accident to Engines and Trains	Number of Accidents.	
	1873.	1883.
1. Meeting with or leaving the rails in consequence of obstructions, or from defects in the way or works....	24	12
2. Failure of boilers, axles, wheels, tires, &c..............	23	7
3. Entering stations at too great speed..................	5	12
4. Collisions between trains following on the same line of rails, except at junctions, stations, or sidings	13	3
5. Collisions at junctions	20	8
6. Collisions within fixed signals at stations or sidings	98	44
7. Collisions between engines or trains meeting in opposite directions	8	..
8. Collisions at level crossings of two railways	3	..
9. Derailment of engines or trains wrongly run or turned into sidings, or otherwise through facing points	36	6
10. On inclines,—want of control..........................	11	2
Total of train accidents	241	94
11. Miscellaneous,—not train accidents	6	7
Total	247	101

During the period 1873-1883 there was therefore a material improvement not only in the character of the way and works but also in that of the rolling stock. Accidents from entering stations at too great a speed have been augmented in number,—a result naturally arising from the greater speeds and volumes of traffic. Ten of these (for 1873 and 1883) were due to want of control of the trains, and seven others to want of continuous brakes. Collisions have been diminished to a marked extent; and nearly all of those in 1883 took place at junctions, stations, and sidings, mostly within fixed signals. Many of these collisions could have been obviated if proper interlocking and block working had been in use, together with continuous brakes on the trains. Of the 94 investigated train accidents 75 took place on the lines of fifteen companies, working in the aggregate 12,850 miles, and having run upwards of 216 millions of miles with trains,—showing that one accident happened for every 171 miles of railway, or for every 3 millions nearly of miles run. One person in every 625 employed in the traffic—locomotive, carriage, engineers', and stores departments—in 1883 was killed in the service. The employés who stand at the extremes of the scale of fatality are guards: of brakesmen and goods-guards 1 in 97 lost their lives, and of passenger-guards only 1 in 5902. Pointsmen and signalmen occupy a medium position in the scale, 1 in 890 losing their lives; of engine-drivers 1 in 643 was killed, and of firemen 1 in 553. Of persons other than passengers or servants of railway companies who suffered in accidents, trespassers, including suicides, as usual form the largest number,—354 killed and 165 injured. Of passengers 125 were killed and 1416 were injured—together, 1541 persons, or 1 in about 444,000 of the total number of passengers in 1883.

RAILWAY LAW.

Legislative measures.

Parliament soon began to exercise control over railways by means of standing orders; and in 1832 a passenger duty of ½d. per mile for every four passengers carried was levied on railway companies. In 1842 a Government department was instituted whereby the Board of Trade was empowered to appoint inspectors of railways, to postpone the opening of railways, to disallow bye-laws, and to institute legal proceedings against companies for infringing the law. The Board of Trade was further empowered to direct companies to make returns of accidents, of traffic, and of tolls levied. The passenger duty was fixed at 5 per cent. of the gross receipts from passengers. In 1846 the Commissioners of Railways, five in number, were appointed, to whom the jurisdiction of the Board of Trade was transferred, but in 1851 it was re-transferred to the Board of Trade. The Railway and Canal Traffic Act, 1854, requires railway companies to provide "reasonable facilities" for receiving, forwarding, and delivering their own traffic and the traffic of other companies, and to abstain from "unreasonable" preference. It appears to have been of small practical utility until 1873. The Regulation of Railways Act, 1873, establishes a new tribunal, "The Railway Commissioners," not more than three in number, one to be of experience in the law and one of experience in railway business. The principal duty of the commissioners is to enforce the observance of the "reasonable facilities" section of the Act of 1854. The commissioners have power to enjoin the forwarding of through traffic at through rates, the power being set in motion by the companies only. The commissioners are empowered whenever there is a dispute between two companies that can be referred to arbitration to decide such dispute. The Employers' Liability Act, 1880, provides that where personal injury is caused to a workman by reason of the negligence of any person in the service of the employer, who has the charge or control of any signal, points, locomotive engine, or train upon a railway, he or his representatives shall have the same right of compensation or remedy against the employer as if the workman had not been in the service of the employer nor engaged in his work. The amount of compensation is not to exceed three years' earnings of the workman. (D. K. C.)

FOREIGN AND CONTINENTAL.

France.

Europe.—A few unimportant tramways were opened in France in 1826-32. In 1833 the Government began a comprehensive system of surveys, and laid down the general plan of railway development for the whole country; and in 1842 Thiers devised a scheme by which the state was to furnish half the cost (about £10,000 per mile), while private companies were to lay the lines at their own expense and equip and work them for a term of years. In 1857 six great companies were working their lines with profit; but the state found it necessary (1859) to guarantee them the interest on the additional lines which were needed. By subsequent legislation the construction of local railways on a cheaper scale was encouraged, and in 1875-76 unsuccessful efforts were made by speculators to unite these local lines into systems which should compete with the old companies and break their monopoly. Since that date some have been absorbed by the great companies; others have passed into the hands of the state. After more than one scheme for a comprehensive system of state railways had been formed by leading statesmen and then for one reason or another abandoned, in 1884 agreements were made by which some 7000 miles of railway were to be constructed in addition to the 17,000 miles then in operation, the money to be supplied by the six great companies and ultimately repaid by the state, which meanwhile guaranteed the shareholders of each company a dividend equal to the average of recent years (in no case so low as 7 per cent.). The profitable system of monopoly has not been favourable to the development of enterprise in railway management in France. Scarcely any of the so-called express trains run at as high a speed as 40 miles an hour. The time allowed for the despatch of goods is very long. The average rates (0·78d. per passenger-mile, 0·82d. per ton-mile) are somewhat higher than those of Germany. The long-distance traffic especially has received but little encouragement. On the other hand, many of the technical arrangements of the French lines are excellent. Although the state owns so few railroads, it has reserved extensive rights of regulation, both in matters of business and in engineering; there is a body of Government engineers organized with almost military precision.

Soon after 1830 plans were laid for a Belgian system to be owned and managed by the state, and work was actively begun in 1833. The Government lines were arranged in the form of a cross, the point of intersection being at Malines. By this means the Government was able to develop the traffic of Belgium itself, and at the same time to secure a large share of the transit trade between Germany and England which had formerly gone *via* Holland. Having obtained control of the main lines with a length of about 300 miles the Government left the rest to private enterprise. Between 1850 and 1870 the private lines had increased from less than 200 to 1400 miles and competition between the state and private railways soon became active, and for ten years after 1856 rates were in consequence reduced to the lowest possible point. The state railways, however, had certain advantages: they had been well laid out and economically constructed; their organization was admirable and the very keenness of private competition was sufficient to guard against serious abuses. Nevertheless about 1870 the Government decided to purchase most of the competing lines, and by 1874 it owned more than half the railways of the country. It now (1885) owns three-quarters; there is only one large private system which could by any possibility compete, and with this there is a joint-purse agreement. The charges in general have not been raised as a result of the new policy, and they are still the lowest in Europe.

The first lines in Holland were constructed by private companies in 1840-56. In 1860 a state system was begun, which included at one time nearly two-thirds of the mileage of the kingdom. It was not, however, managed by the state directly, but leased to a private company. But the financial results were not satisfactory to either party, and the commission of 1881-82 reported strongly against the arrangement. The absence of connexions or of mutual accommodation between the different systems elicited severe criticism.

many.

The first German line was opened in 1835. While most of the states were too small to have a comprehensive policy, Prussia from the very outset encouraged railway development, giving pecuniary assistance, and in return reserving important rights of state control. About 1848 the Government began to construct railways of its own, at the same time purchasing shares of stock in private companies. After 1870 the same policy, which had been for a time suspended, was again pushed forward in the direction of creating a German imperial system; but the jealousy of the smaller states proved fatal to its success. The Prussian Government, however, began to extend its own system on a large scale. In 1878 it owned only 3000 miles of railroad and managed 2000 more, while 6000 were in the hands of private companies. Now (1885) there are 13,000 miles of state railways and only about 1000 in private hands. The prices paid by the Government were, as a rule, high (in one instance the sellers secured an income of more than 16 per cent.), but the lines are nevertheless managed with reasonable profit to the state. The passenger-train service is prompt and comfortable. The speed attained is greater than elsewhere in Continental Europe, the maximum being about 45 miles. The passenger rates are low, averaging not quite 0·7d. per mile for all passengers carried. There are comparatively few accidents. The freight service is rather slow, and the charges are not relatively so low as those for passengers. On the other hand, they have for the most part avoided preferential rates; something very like a system of equal mileage rates prevails, though not always quite consistently carried out. In addition to this rate there is a fixed terminal or "Grundsatz"; but it is put, almost purposely, too low, so as not to interfere with the very short-distance traffic. The result is that the mileage rate is relatively too high, and for the long-distance traffic it reaches a very high figure. Down to 1880 this result was evaded by a system of special tariffs for export, import, or transit traffic, but during the last five years a strong effort has been made to do away with them. It has not been altogether successful, owing to the competition of water-routes.

ustria-Hungary.

In Austria a tramway line for general traffic was chartered in 1824 and opened in 1828. But until 1838 the Government positively discouraged the introduction of railways. The policy then adopted, however, guaranteed to each railway a monopoly in its own district during the (comparatively short) period for which its charter was to run. At the same time the state made lines of its own on a large scale. The revolution of 1848 led to financial straits; and in the years following most of the state railways, at least in Austria itself, were sold to private companies for about one-half their real value. But in Hungary the reality of a state railway system was more steadily maintained. The growth of the Austrian system was slow until after the war of 1866; then it began to develop rapidly. The railway speculation which ended in the crisis of 1873, being perhaps more recklessly carried on in Austria than anywhere else in the world, resulted in very severe distress. Since 1876 there have been consistent efforts to increase the importance of the state railway system both by the purchase of old lines and the construction of new ones. At present there are in Austria 2000 miles of state-managed railroad, and not quite 6000 managed by private companies; while in Hungary there are 2000 miles of state railroad and 3000 in private hands. The policy of the state management has been to reduce rates, especially for passengers; but they are still higher than in Germany. In 1883 the average receipt per mile for each passenger was 0·84d.; while the average receipt per ton of freight was 1·09d. Per train-mile the receipts were about 9s.; but the traffic was so light in many parts of the country that the average profit on the investment was only 4⅔ per cent. The Austrian railways belong to the German Verein, and are like the German lines in most of their methods and principles of administration. They have carried the system of traffic agreements, even between the state and private companies, into the same detail; but they have not adopted the system of equal mileage rates in their tariffs; on the contrary, they have (like Belgium) adopted a sliding scale, diminishing for longer distances. Probably no other country is so situated that it has to deal with such perplexing problems of railway tariff policy as Austria. Nearly all the Austrian railways are of standard gauge; but the problem of the economical construction and management of local lines has received most careful attention from the authorities; and the law specially encourages the construction of cheap railways in mountainous districts or for purely local traffic. About fifty such railways were chartered between 1880 and 1883.

The first lines in Switzerland were merely local, and the summer passenger traffic formed a main source of income. It was not until Austria had completed two routes across the Alps and France one that the first Swiss route, the St Gotthard, was projected. It is, however, the greatest work of them all, the main tunnel being over 9¼ miles in length. In spite of the character of the country, the Swiss railways are nearly all of standard gauge. They are entirely owned by private companies, though many of them have received aid from the cantons. The rates for freight are somewhat high. There are now about 2000 miles in all.

After 1860 the railways of Italy developed rapidly. There were four main systems—the upper Italian, the Roman, the Calabrian, and the southern system (along the Adriatic). Although this last had in many respects the least promising field, it was the most enterprising and the most successful. The other systems had been arranged more in accordance with the old political divisions than in accordance with the wants of trade. In spite of liberal subsidies from the Government they did not prosper. The lines of Calabria (and Sicily) were the most unfortunate; and the Government in 1870 was compelled to take the railways of this section into its own hands. The gross receipts have been constantly less than the working expenses. In 1873 the Government contracted to purchase the Roman railways for the same general reasons. The financial difficulties were such that the contract was not carried out till 1880-82. Meantime similar contracts, though for very different reasons, had been made for the purchase of the other two systems. But a special commission, which thoroughly studied the question during 1878-81, reported that the Italian Government had better not undertake to work its lines, even though it virtually owned them. Eventually they were leased for a term of sixty years to two main companies, each controlling about 3000 miles of line, with a third, much smaller, in Sicily. The state is to receive about 27½ per cent. of the gross receipts, the companies 62½ per cent.; the remainder is to be divided in a somewhat complicated system of reserve funds. On the whole, the railways of Italy leave much to be desired both in construction and equipment. The rates are reasonable, particularly for local traffic; but the service is always slow, and often quite inadequate to the wants of trade.

The first railway line in Spain was opened in 1848, and the period of most rapid development was from 1855 to 1865. The Government encouraged railways by most liberal subsidies, which had the effect of bringing forward a number of purely speculative undertakings. The indirect results were bad; and for this, as well as other reasons, the years 1869-75 formed a time of most serious depression. Since then matters have improved greatly, on account both of changes in legislation made about 1870 and of the improvement in the country itself. There are now about 5000 miles of railway. One-fourth of the money spent has been advanced by the Government; and of late years the financial results have been reasonably good. The ratio of working expenses to gross earnings is about 45 per cent. The charges for passengers are rather low; but those for freight are extremely high. The gauge is 5½ feet.

The first Portuguese line was constructed by the state in 185 or 1854. The Government now owns about half the roads of the country,—one system in the north and another in the south, each somewhat less than 200 miles long. The central lines are owned by a company, chartered in 1859, which has been for many years managed by a body of French directors, from whose control it has but recently been freed. The financial results have been far from satisfactory. The railways are built on a 5½ feet gauge.

In Denmark and in Norway railway development has been slow. The greater part of the lines are owned and managed by Government. Most of the Norwegian lines are laid on a gauge of 3½ feet. The running is slow and the traffic very light. Sweden possesses something over 4000 miles in all, of which the state owns about one-third. The capital averages less than £7000 per mile,—lower than in almost any other country of the world. The railways are in the hands of a number of local companies, which control on an average hardly 30 miles each.

In Russia a short railway—little more than an experiment—was constructed in the neighbourhood of St Petersburg in 1835-37. The first line of any length was opened in 1851 between St Petersburg and Moscow. This was built by the state, but afterwards sold to a private company. After the close of the Crimean War railway construction was more rapid. The lines were laid down by the Government surveyors, but were constructed and managed by private companies, receiving, however, much help from the Government. Of the 15,000 miles in operation hardly a tenth part belongs to the state, even including the 700 miles of state railway in Finland. Yet about half the capital employed in railway construction has been furnished by the state. Since 1880 the construction of railways in European Russia has moved slowly. Of greater importance has been the development of the Asiatic lines. The first of these, in the Caucasus, was opened in 1872 to a length of nearly 200 miles. The Trans-Caspian military railway was begun in 1880; the connection between the Caspian and the Black Sea was completed in 1883. The Siberian railway is being pushed forward as rapidly as the finances of the empire will allow. The administration is in most respects modelled upon that adopted by Germany and Austria. The plan of the Russian railways has been dictated by military rather than industrial considerations. The gauge is 5 feet.

Isolated lines were constructed in Turkey in 1860 and 1866. The first general plan for a system of importance dates from 1869, and was modified in 1872. Foreign companies furnished the capital and received a subsidy from the Government. In return they were to make certain annual payments; but the clauses providing for this were so carelessly drawn that the companies seem to have had an interest in delaying the completion of the work. Some of the lines were lost in the cession of territory which followed the war of 1878. There are now open for traffic about 1000 miles of railway in European Turkey, and 200 more in Asia Minor.

There is a fairly developed system of railways (1000 miles or more) in Roumania, owned by the state; and there are a few lines in Servia. Arrangements seem to be completed by which through communication in these countries will soon be established on a large scale, if the authorities in Turkey and Bulgaria do not fail in their duty. The Government of Greece is also engaged in extending its railway system, which has hitherto amounted to nothing. (A. T. H.)

America.—In the Dominion of Canada 9113 miles of railway and 6735 of tramway, together 15,848, were open in the end of 1883. The accounts show that the total outlay for construction amounted to about 73 millions sterling, being at the rate of £4610 per mile. The gross earnings for the year 1883 amounted to upwards of 6 millions sterling, of which 72·3 per cent. was absorbed as working expenses, leaving £1,693,000 net earnings, which amounted to only 2·3 per cent. on the capital cost. The earlier railways were laid to gauges of 5½ and 3½ feet, but the inconveniences of break of gauge with the railways of the United States led to the relaying of all the lines to the standard gauge, except those of Newfoundland and Prince Edward's Island, which remain on the 3½ feet gauge. The principal system is the Grand Trunk Railway, comprising the original Grand Trunk and the Great Western, which were consolidated in 1882, making a total length of 2358 miles of line. The first section of the system—Portland to Montreal—was opened in 1853, the first line opened in Canada. In June 1884 of the (estimated) 2899 miles of the Canadian Pacific Railway, connecting the Pacific with the Atlantic, 2105 miles were open and in operation.

In Mexico the first railway constructed and opened was the Mexican Railway, between Mexico city and Vera Cruz, 264 miles, with a branch 29 miles, the first section from Vera Cruz to Paso del Macho being opened in 1865. This railway, with one or more others in Mexico, was constructed to the 4 feet 8½ inch gauge, but others, including the Mexican National Railway, 910 miles long, are laid to the 3 feet gauge. The Mexican Central Railroad, 1224 miles long, was completed in 1884.

The Panama Railroad, Colombia, between Aspinwall and Panama, 47½ miles in length, was opened in January 1855. The rails are laid to a gauge of 5 feet. Railways were in progress in 1883-84 in several of the other states of Colombia, all of them to a gauge of 3 feet.

In Guatemala the first line of railway from San José to Esquintla, 43 miles in length, laid to a gauge of 3 feet, was opened in June 1880. A line from Champerico to Ritalhulca, 30 miles long, was opened in December 1883; and another from San José to the capital, 69 miles long, is now finished.

In the empire of Brazil the Maná Railway was the first line opened, early in the decade 1850-60. It is a short line of single way, 11 miles long, between the head of the bay of Rio de Janeiro and the foot of the serra. It was laid to a gauge of 5½ feet; but other lines in Brazil are laid to a gauge of 5 feet 3 inches. The empire possessed in January 1884 railways of a total length of 3500 miles open for traffic, besides 1500 miles in course of construction. The state owns nine lines, having 1300 miles open, the principal of which is the Dom Pedro II., intended to connect the eastern and western provinces of the empire.

Chili was one of the first states in South America to initiate the construction of railways. The Copiapo Railway, laid to the 4 feet 8½ inch gauge, was opened about 1850; and an Act was passed in 1852 authorizing the construction of a line to connect Santiago with Valparaiso, 114 miles distant. In 1855 the first 8 miles were opened for traffic, and in 1863 the line was opened throughout. It was constructed to a gauge of 5½ feet. In 1883 the total length of lines open for traffic was 1378 miles.

In Peru a system of railways has been in course of construction since 1852, chiefly at the expense of the state. In 1878 there were open for traffic, or in course of construction, twenty-two lines belonging to the state and to private individuals, 2030 miles in length, representing a cost of about 36 millions sterling.

Africa.—The railways of Lower Egypt have been laid out primarily to connect Alexandria, Cairo, and Suez, with branches to Mansurah and elsewhere in the Delta. The line first laid out, between Alexandria and Cairo, 130 miles long, was opened in January 1856. The junction line from Bennah to Suez is 101¾ miles in length; the total length of railways open for traffic in Egypt at the end of 1883 was 941 miles, laid to the 4 feet 8½ inch gauge.

There are three systems of railway at the Cape of Good Hope,—the Western from Cape Town, the Midland from Port Elizabeth, and the Eastern from East London. In January 1884 there were 1213 miles open for traffic.

In the colony of Natal there were at the end of 1883 105 miles of railway open, and 120 were then in course of construction.

In the Island of Mauritius there are two lines of railway laid to the 4 feet 8½ inch gauge, with two branches, of a total length of 94 miles. The North line, starting from Port Louis, is 31 miles long, and was opened in 1864; the Midland line, passing through the centre of the island, is 35 miles long, and was opened in 1865.

Asia.—In 1845 the East Indian and the Great Indian Peninsula Railway Companies were formed. Four years later the Government entered into arrangements with these two companies for the construction of railways in the presidencies of Bengal and Bombay, guaranteeing for ninety-nine years a dividend of from 4½ to 5 per cent. upon the estimated cost of these and succeeding railways. They adopted one uniform gauge of 5 feet 6 inches. Down to 1869 this policy of guarantee and uniform gauge was adhered to. But in 1869, under the rule of Lord Lawrence, the Government altered the standard gauge for new lines to one metre, or 3 feet 3⅜ inches, and used the lightest rails and rolling-stock compatible with the requirements of Indian traffic. There are now five different railway gauges in India, namely, the 5½ feet, the 3 feet 3⅜ inch, the 4 feet, the 2½ feet, and the 2 feet. The first piece of railway opened in India was a section of the Great Indian Peninsula Railway, 20½ miles long, from Bombay to Tannah, in 1853. At the end of March 1884 there were 1288 miles of that railway open for traffic. The East Indian Railway was opened for a length of 38 miles in 1854; there are now 1509 miles open. In 1869 this railway was transferred to Government, though it is still worked by the company. Of the Madras Railway 65 miles were opened in 1856; there are now 861 open. The first of the imperial state railways was opened (114 miles) in 1873. At the end of March 1884 the number of miles of line open for traffic was as follows (Table XXXIII.):—

	Miles open, March 1884.	Cost per Mile, December 1883.
East Indian Railway	1,509	£22,400
Guaranteed railways	4,641	15,000
Assisted companies	256	Darjiling-Himalayan 4,700
State railways—Imperial	2,649	10,200
Provincial	1,273	6,800
Native States	504	5,600
Total for all railways	10,832	£13,700

The number of passengers carried increased from 24,280,459 in 1874 to 65,098,953 in 1883.

In Ceylon the railways have been constructed by the Government. The main line, from Colombo to Kandy, 74½ miles long, was opened for traffic in 1867; and the branch to Navalapitiya, 17 miles long, was opened in 1874. The Kalutara Railway, 27½ miles long, was finally opened in 1879. There were 164 miles open at the end of 1884, and 16 in course of construction.

The only railway ever laid in China ran along a strip of land about 9 miles long, between Shanghai and Woosung, opened in 1876. In October 1877 the line was removed and the traffic came to an end in consequence of official jealousy, although the railway was very popular with the natives.

The first railway that was opened in Japan was the Tokio-Yokohama line, 18 miles in length, commenced in 1869 and opened for traffic in 1872, laid to a gauge of 3½ feet. At June 1884 there were open for traffic 236 miles of railway.

Australia.—The four leading colonies of Australia have their capitals connected by railways, and each has its own gauge.

The railways of New South Wales are divided into three systems, all of which take their departure from Sydney, the capital,—the northern, the western, and the southern system. The first piece of line, 15 miles in length, was opened in 1855; and at the end of 1883 there were 1320 miles open for traffic, and 597 in course of construction. The lines are laid to a uniform gauge of 4 feet 8½ inches.

Victoria has a uniform gauge of 5 feet 3 inches. The railways all belong to the state. There were 1562 miles of railway open at the end of 1883, besides which 130 were in progress.

Queensland.

In Queensland a system of light substantial railways has been laid out on the 3½ feet gauge, mainly from motives of [illegible] to moderate the difficulties of carrying the line over the main range to the tableland of the Darling Downs. The first section of the Southern and Western Railway was opened in 1867. At the end of 1883 there were 1038 miles of railway open for traffic, and 454 were in course of construction.

In South Australia a gauge of 5 feet 3 inches was at first adopted. The Adelaide and Port Adelaide Railway, 7½ miles long, was opened in 1856, and the Adelaide and Kapunda Railway, connecting the capital with the chief copper mines, 50½ miles long, was opened in 1857. At the same time railways on a 3½ feet gauge were also constructed; the first of these, between Port Wakefield and Blyth, was partly opened in May 1867. The Port Augusta and Port Darwin Railway, destined to connect the Indian Ocean with the Southern Ocean, will, when completed, be about 2000 miles in length. The colony had 991 miles of railway open for traffic at the end of 1883, with 225 in course of construction. In view of the inconveniences of a break of gauge, the progress of the broader gauge lines was staved northwards, after the junctions had been effected, and new main lines into the interior are constructed on the 3½ feet gauge.

Western Australia.

In Western Australia there were only 55 miles of railway open for traffic at the end of 1883 and 68 in course of construction.

At the end of 1883 Tasmania had 167 miles of railway completed, and in 1884 207 miles in course of construction.

New Zealand.

New Zealand.—The first railways in New Zealand were constructed in the province of Canterbury: the Lyttelton and Christchurch Railway, connecting the port town with the capital of the province, 6 miles long, was commenced in 1860, and opened in 1867, laid to a gauge of 5 feet 3 inches. The Great Southern Railway, a portion of the trunk line to the south, of the same gauge, was opened, also in 1867, to the river Selwyn, distant 23 miles from Christchurch. A comprehensive system of railways connecting the chief towns of the colony was commenced at the expense of the Government in 1872, for which the 3½ feet gauge was adopted as the standard. The first lines so constructed were the Wellington and Woodville Railway and the Napier and Manawatu Railway. At the end of 1883 there were 469 miles open for traffic in the North Island and 926 in the South Island, besides 91 of private lines, making in all 1486 miles. (D. K. C.)

United States.

Construction.

Construction.—The low cost of American railways has been due largely to a close adaptation of the alignment to the natural surface by the use of grades and curves. The importance of saving in materials, labour, and cost has been very much greater than in Europe, because labour and nearly all materials but timber were much costlier, and especially because the interest on money was very much higher,—until about 1875, on the average probably 9 or 10 per cent. The use of the "truck" or "bogie" under locomotives and cars made it possible for the Baltimore and Ohio Railroad, the first long line in a mountainous country, to be constructed with curves of 600 feet radius, and on temporary lines on the same railway with curves of 300 and 278 feet radius. Curves of 955 and even 716 feet radius are common through difficult country; curves of 573 feet radius occur on some important lines; and 410 to 383 feet radii are not uncommon in mountainous regions. On the United States military railroads in 1864 an immense traffic passed safely over temporary lines with a curve of 50 feet radius. Early experiments as to the real power of the locomotive to surmount gradients led to the adoption of 110 and 116 feet per mile for ascents 17 miles long, and to the successful use on a temporary track over a tunnel (in 1852) of gradients of 1 in 10, over which a locomotive weighing 25 tons hauled regularly one-car trains weighing 58¾ tons, including its own weight. A gradient of 1 in 12½, 7 miles long, in a mining branch in Colorado is now regularly worked. In the construction proper a noticeable peculiarity has been the free use of open trestle-work of timber, to save both masonry and earth or rock excavation. Some of these timber structures have been of enormous proportions, as the Portage Viaduct (see vol. iv. p. 328) over the Genesee River, 234 feet high and 800 feet long, in 50 feet spans, built in eighteen months (1858), at a cost of only $140,000, and containing 125,000 cubic feet of timber and 80 tons of bolts. Structures of timber exceeding 100 feet in height have been rare, but of all dimensions below that exceedingly common, the usual intent and practice having been to replace them as they became unserviceable with masonry embankments. Although their use has not unfrequently been abused by permitting them to become unsafe from decay, they have in the main been thoroughly solid and substantial. For bridge spans of 30 to 250 feet the wooden "Howe truss" bridge, a type peculiar to America, was early invented and almost universally used where wrought-iron trusses would be now used both in Europe and America. The piers and abutments for such trusses were usually of stone, but not unfrequently of timber also. These wooden trusses are now being rapidly replaced with iron, the leading types being the Whipple, Post, Fink, and Bollman trusses (see BRIDGES, vol. iv. p. 322 *sq.*). The sleepers (in America called ties or cross-ties) are usually of hard wood (white oak), hewn on top and bottom, with the natural surface of the tree on the sides. The usual dimensions are 6 (sometimes 7) inches thick, 8 (sometimes 8½ or 9) feet long, and 8 to 10 or even 12 inches face. The usual rule is to place them 2 feet or less apart, and 2640 to 2700 to the mile. The large bearing surface thus afforded has especially favoured the use of the flat-based or Vignoles rail, and it is in exclusive use throughout North and for the most part South America. The rails now most largely rolled weigh from 56 to 65 ℔ per yard. On the light-traffic lines of the south and west there are still many 50 ℔ rails, and in the north and east rails of 70, 72, 75, and 80 ℔ sections are in limited but increasing use. An average for the whole United States would now be somewhat under 60 ℔. The close propinquity of the sleepers gives much greater stiffness to the rail than comparative weights alone would indicate, a 60 ℔ rail being fully equivalent in stiffness and strength to an 80 ℔ rail supported on chairs 3 feet between centres. The ballast and drainage of American railroads have often been very defective, with the view to effecting a large saving in first cost. Improvements in this as in other respects have taken place in recent years, and many thousand miles are now maintained at a high standard of excellence. Right of way, usually in a continuous strip 100 feet wide (wider where necessary, but never narrower), has been largely given, or purchased at very low rates. The widths of road-bed (almost always first graded for a single track) are usually 18 to 20 feet in excavation and 14 feet on embankments, with 1½ to 1 slopes. Side slopes of 1 to 1 have been largely used in regions not exposed to frost. Parallel tracks are placed 13 feet between centres.

Development.

Railway development in the United States has had to adapt itself to the needs of a new and rapidly growing country, a large part of which was first made available for settlement by railways. Three locomotives were imported from England in 1829, and the first trial in America took place on 8th August 1829 at Honesdale, Pennsylvania. The first railway constructed to be worked by locomotives was the South Carolina Railroad (1828-30), though trials of an experimental locomotive had been made before on the Baltimore and Ohio Railroad, which continued to be worked by horse power until 1832. The mileage of railway construction about kept pace with that of the United Kingdom until 1850; at the beginning of 1885 it amounted to 125,379 miles. The mileage completed amounted to 40 miles at the end of 1830, to 3361 miles in 1841, and to 5206 miles in 1847, of which 1340 miles had been opened within six years. Then there was a sudden and great increase, the yearly additions for seven years being 1056 miles in 1848, 1048 in 1849, 1261 in 1850, 1274 in 1851, 2288 in 1852, 2170 in 1853, 3442 miles in 1854. The Civil War checked railway construction, only 3257 miles being opened during the five years ending with 1865, when the aggregate amounted to 32,996 miles. But during the seven years ending with 1872 the mileage of the country was nearly doubled, the yearly additions being 1403 miles in 1866, 2541 in 1867, 2468 in 1868, 4103 in 1869, 5658 in 1870, 6660 in 1871, 7439 in 1872, a total of 30,272 miles in seven years. At the close of this period of construction there was a mile of railway to every 666 inhabitants. It was followed by great financial disasters and industrial stagnation, and by a period of comparative inactivity in railway extension, only 5217 miles being opened in 1873, and only 14,057 in the five years ending with 1878 (2428 in the last-named year). During the five years ending with 1883 40,000 miles were opened, of which 11,568 fell to 1882. At the end of 1884 the population per mile of railway was 458. There was no railway west of the Mississippi until 1853, and then only 38 miles: in 1860 there were 1930 miles (24,990 on the east), and in 1865 3007 miles (29,988 on the east). Since 1865 46,600 miles have been built west of the Mississippi. About one-half of the population of the United States is in the territory lying north of the Potomac and Ohio and east of the Mississippi, including sixteen States with an aggregate area of 418,495 square miles, 29,000,000 inhabitants, and 55,725 miles of railway. France and Germany together have nearly the same area (416,205 square miles), 83,000,000 inhabitants, and 40,682 miles of railway. The United States has one mile of railway to 7·5 square miles of territory and 520 inhabitants, and Europe 1 mile of railway to 10·2 square miles and 2040 inhabitants. The two States of New York and Pennsylvania, whose area is about equal to that of Great Britain, have one mile of railway to 6·2 square miles, against one to 5·9 in Great Britain; and Massachusetts and New Jersey, with one-third more area than Belgium (which has more railway in proportion to area than any other European country), have 4 square miles of area per mile of railway, while Belgium has 4·2. In the Southern States the railways are much less numerous and have lighter [illegible]. The prevailing [illegible] rather to and from the north-eastern Atlantic States north of the Potomac. The eastern "trunk lines," as they are called, extending from the west to the north-eastern seaports (and also to Canada), have a heavier goods traffic than any other lines of considerable length in the world. The companies owning these lines also own or control in some way extensive systems reaching as far west as Chicago, and in several cases to the Mississippi at St Louis. Two great systems centre on the Pacific coast. Chicago is the chief traffic centre of the interior.

The railways having at first to serve a thinly peopled but rapidly growing country, American engineers devised methods of construction and working which produced a line at very small cost, lacking very many of the appliances considered necessary in Europe, but capable of being extended and developed as the country itself became more settled and prosperous. At first many lines cost only £2000 per mile, and much better lines are now being built for £3000 per mile or less. Even when fully developed they are still usually very much less costly than European railways. Some of the large systems have cost, on the average, only from £7000 to £8000 per mile. The average reported cost in 1884 of the 125,000 miles of railway in the United States was £11,400 per mile; but the actual average cost is probably much less.

In the United States coal for fuel and timber for building and other purposes are carried by railway 1500 miles or more from the place of production. Cattle are carried 2000 miles and more, and wheat and other grains worth but half as much per ton, in immense quantities, 1500 to 1800 miles. This is possible only by rates which in most countries would be thought ruinously low. But in recently settled parts of the United States the population are often dependent upon the railway for almost everything they consume; and almost everything they produce, except their bread and meat, has to be carried by the same means. Thus the traffic per inhabitant is very much larger than in most old countries. Hence too manufactured goods can often be carried 1000 or 1500 miles at a cost very little more than that at the place of manufacture or importation. In one year the five eastern trunk lines received at their western termini (about 450 miles from New York) for transportation eastwards 8,200,000 tons of goods, equal to more than 26,000 tons daily. This has greatly promoted the formation of large railway systems and the construction of branches and extensions by railway companies near unsettled districts. A company with a line 500 miles long is induced to make extensions not only by the profit to be made on the new line, which in a new country may be almost nothing for several years, but also by the profit made by carrying the traffic of the new line over the 500 miles of old railway. Comparing the traffic per inhabitant in the United States, Germany, and Austria-Hungary in 1883, we get (Table XXXIV.):—

	United States.	Germany.	Austria-Hungary
Passenger-miles .	158	99	39
Ton-miles	772	217	112

Thus each American travels three-fifths more and has 3½ times as much goods transportation done for him as the average German.

The railways of America have enjoyed great liberty in fixing their rates, which, however, have been somewhat restricted by new legislation in several States since 1870, notably one limiting the New York Central to 2 cents (1d.) per mile for all classes of passengers. The average rates for goods have been reduced very much since the Civil War and even since 1875. Passenger rates have also been reduced, but not nearly so much. Table XXXV. shows, in pence, the average goods rates per ton on a few important railways:—

Year.	New York Central.	Pennsylvania.	Lake Shore & Michigan Southern.	Chicago and North-Western.	Union Pacific
1867	1·540	0·167	..	1·943	..
1870	1·0[illegible]4	0·865	1·050	1·724	.
1875	0·711	0·[illegible]0	0·645	1·184	1·155
1880	0·190	0·491	0·423	0·861	1·055
1884	0·164	0·113	0·388	0·604	0·781

From the whole country the averages in 1884 were—rate per mile, 0·629d.; per ton of goods, 0·502d.; per passenger, 1·178d. This on the average goods rate from 1880 to 1884 was a reduction of 13 per cent., amounting to more than £13,000,000 on the traffic of 1884. The passenger rates of the above-named railways have been in pence per mile (Table XXXVI.):—

Year	New York Central.	Pennsylvania.	Lake Shore & Michigan Southern.	Chicago and North-Western.	Union Pacific.
1870	1·045	1·245	1·306	1·645	
1875	1·070	1·175	1·189	1·500	1·640
1880	0·995	1·127	1·068	1·335	1·065
1884	0·970	1·211	1·085	1·190	1·485

The classification of passengers is but little developed in America. For local journeys there are usually but one class and one rate of fare; but on several important lines additional charges are made for certain special kinds of accommodation. Railway "wars" often bring down the through fares to a ridiculously low figure: for instance, the first-class fare for 960 miles, New York to Chicago, has been £2 or less, and the immigrant fare during the spring and summer of 1884 was 4s. The rates on goods are innumerable and are often changed. Table XXXVII. gives examples of the great fluctuations in these rates, the figures being the number of cents per 100 ℔ of first-class (the highest class) freight:—

	1869.	1870.	1871.	1875.	1882.	1884.
Highest rate.... ..	188	180	150	100	75	75
Lowest rate	25	50	30	30	30	40

The rates which the railways have endeavoured to maintain on this traffic since 1877 have been, with but slight changes, 75 cents for first-class freight, 60 for second, 45 for third, 35 for fourth, and 25 cents for fifth. The highest of these is at the rate of 1·644 cents per American ton per mile (=0·92d. per English ton per mile); the lowest is 0·548 cent (=0·307d.) The "basis rate" is that on grain and flour from Chicago to New York,—grain, flour, and meats forming about four-fifths of the whole traffic eastwards. Twenty cents (=0·492 cent or 0·275d. per ton per mile) is considered a remunerative rate. Another "basis rate" is that from Chicago south-west to Kansas City, which governs rates from places about 500 miles from Chicago west and south-west. This rate is usually nearly the same as that from Chicago north-west to St Paul, 400 miles, governing a large amount of traffic in that direction. Between the Missouri river and the Pacific coast is another territory with another basis; and in the south, rates from the Atlantic ports to inland towns are governed by one general rule, as also those from places in the upper Mississippi valley (like St Louis, Chicago, Cincinnati, and Louisville) to the same or other interior towns of the south. Traffic is facilitated on the longer routes by organizations known as "fast freight lines," whose cars run over several connecting railways. When first established these lines were independent corporations, owning their cars, collecting the charges for transportation, and paying dividends out of their profits. Now all but a few are simply co-operative agencies of the several associated railway companies, which contribute cars in certain agreed proportions, and share the expenses of the joint agencies, each company receiving the earnings for the freight passing over its railway precisely as for any through freight.

Corporation management

The laws governing the formation of railway corporations and authorizing railway construction differ in different States, but in most it is open to any association of men with the necessary capital to form a company and construct a railway anywhere. Generally the laws relating to raising and extending capital and the disposition of income are very lax, and under them great abuses have occurred. All but a very small number of the railways have been projected and constructed by private enterprise; but many companies have received aid from towns, cities, counties, or States, and the Federal Government and the State of Texas (the only State owning the public land within its borders) have subsidized many railways, mostly west of the Mississippi, by immense grants of public lands, in the aggregate amounting to 200,000,000 acres. The Federal Government also lent its bonds to the amount of £13,000,000 to aid in the construction of a few lines between the Missouri and the Pacific coast. Between 1830 and 1840 several States undertook to construct railways on their own account; but most of these attempts ended in disaster, and the railways were completed by companies, if completed at all. There remain, however, two State railways, one 138 miles long owned by Georgia, which it leases to a corporation for working, and the other by Massachusetts, mostly in the long Hoosac tunnel. Owing to the pernicious system of raising capital for railway construction from the sale of bonds, secured only by the property bought by the proceeds, before the end of 1874 108 railway companies were insolvent, and interest was unpaid on more than £100,000,000 ($497,897,660) of mortgage bonds which they had issued. Indeed, of the total nominal railway capital of the United States very nearly one-half is represented by bonds. One great company which has paid dividends for many years has £9,500,000 of stock to £20,000,000 of debt. The management of railway companies in the United States is often autocratic to the last degree. When once directors have been elected by the vote of the majority of the shareholders, they take the most important steps without ever consulting the shareholders, and in their annual reports they give only such information as they please, subject to no examination by independent auditors. This state of things naturally leads to grave abuses, to directoral mismanagement and dishonest speculation in bonds and shares. In some cases, however, the authority of the directors is limited by the charter or constitution of the company.

There are very few, if any, lines which have trains whose speed equals that of the fast English trains, the fastest being betwe

New York and Philadelphia, 90 miles in 112 minutes. The 440 miles from New York to Buffalo are run in 10⅔ hours, and the 960 miles from New York to Chicago in 25 hours. A great obstacle to fast running is the original vice of construction with level highway and railway crossings. Only few lines are provided with the block signals and interlocking apparatus required with numerous fast trains; but the use of continuous air-brakes is general. There has been more success in designing appliances to mitigate the effect of accidents than in inventions for avoiding them altogether. Accidents are very numerous, the casualties being more frequent in proportion to traffic than in the principal European countries. The number of accidents to passengers, however, is insignificant when compared with that of accidents to employés and persons walking over crossing-lines. In 1880 the numbers killed and injured were (Table XXXVIII.):—

	Passengers.	Employés.	Others.	Unknown.	Total.
Killed	143	923	1472	3	2541
Injured	544	3617	1451	62	5674
Total....... ..	687	4540	2923	65	8215

This gives one passenger killed for every 43,280,000 miles travelled, and one injured to every 11,375,000. In the United Kingdom there were one passenger killed for every 960,000 miles run by passenger trains, and one injured for every 254,000 miles.

Though American railways have steeper grades and sharper curves than in Europe, the loads carried in freight trains are sometimes exceptionally large: trains of 45 or 50 eight-wheeled cars each loaded with nearly 18 tons are common. The average load on the principal lines has been doubled since 1870, largely by the adoption of heavier and more powerful locomotives and by the better management of trains, and to some extent by a better condition of permanent way. This has had much to do with the great reduction in the rates charged. The cost of working American railways is usually a larger proportion of the earnings than in Europe. An American railway which spends 60, 66⅔, or 75 per cent. of its earnings for working expenses would in England be called costly to work. The expense per ton per mile on several railways in recent years has been, in cents per ton of 2000 ℔ (Table XXXIX.):—

All U.S.	New York Central.	Erie.	Pennsylvania.	Lake Shore.	Wabash.	Illinois Central.
0·76	0·600	0·529	0·473	0·413	0·694	0·639

The expense per passenger mile, which is larger than in Europe, since the traffic is nearly all first-class, is shown, in cents, in Table XL.:—

All U.S.	New York Central.	Erie.	Pennsylvania.	Lake Shore.	Wabash.	Illinois Central.
1·710	1·159	1·372	1·733	1·168	1·804	1·075

American railways also contrive to do their work with a very small number of men. In 1880 86,781 miles of railway were worked with a force of 418,957 men, or 4·7 men per mile, against 367,793 in the United Kingdom on 18,681 miles, or 19·7 per mile, and 316,570 in Germany, or 14·3 per mile. The greater thinness of traffic on American lines accounts for but part of this, for the number of train-miles per year per man employed in different countries is 929 in the United States, 350 in the United Kingdom, 476 in Germany, 395 in Austria-Hungary. A better measure of the work done per man is the number of passenger and ton miles for each man employed (which cannot be given for the United Kingdom): this is shown in Table XLI.:—

Per Employé.	United States.	Germany.	Austria-Hungary.
Passenger-miles	[illegible]	[illegible]	11,111
Ton-miles	70,587	31,060	[illegible]

The principal statistics of the railways of the United States in recent years are shown in Table XLII.:—

	1884.	1883.	1882.	1880.
Miles of railway......	125,152	120,552	114,461	87,801
Rolling Stock—				
No. of locomotives .	24,587	23,823	22,114	17,412
No. of passenger carriages	17,093	16,889	15,551	12,330
Luggage, mail, and express cars	5,911	5,948	[illegible]	4,475
Freight cars	798,399	[illegible]	710,451	455,450
Traffic per mile of railway				
Train-miles—Passenger	1,825	1,757	1,728	[illegible]
Goods ..	2,958	3,274	3,186	[illegible]
Total ..	4,783	5,031	4,914	4,435
Passenger-miles......	77,568	79,872	78,105	65,392
Ton-miles............	[illegible]	[illegible]	366,480	329,027
	£	£	£	£
Capital	1,535,279,311	1,495,573,156	1,403,350,022	1,085,144,512
Cost	1,384,910,888	1,336,951,209	1,207,018,029	1,036,489,161
Earnings from—	£	£	£	£
Passengers	41,358,140	41,367,451	37,627,492	28,820,342
Goods	100,573,982	108,901,966	97,155,664	83,229,152
Other sources........	10,729,200	11,153,139	10,814,306	4,040,625
Total	152,661,322	161,422,556	145,597,462	116,090,119
Working expenses	[illegible]	103,105,038	92,633,708	[illegible]
Per cent. of earnings	[illegible]	63·78	63·61	60·78
Net earnings	53,302,782	58,317,518	52,963,754	45,530,095
Per passenger train-mile—	s. d.	s. d.	s. d.	s. d.
Gross earnings	4 2	4 7½	4 9	4 11½
Expenses	3 2¼	3 4	3 5¼	3 2
Net earnings	0 11¼	1 3½	1 3¾	1 9½
Per goods train-mile—	s. d.	s. d.	s. d.	s. d.
Gross earnings	6 3	6 6	6 7½	6 10½
Expenses	4 2¼	4 4	4 5½	4 1
Net earnings	2 0¾	2 2	2 2	2 9½
Per passenger mile—	d.	d.	d.	d.
Receipts	1·178	1·211	1·257	1·165
Expenditure	0·912	0·881	0·914	0·839
Profit	0·266	0·330	0·343	0·326
Per ton-mile—	d.	d.	d.	d.
Receipts	0·629	0·692	0·692	0·722
Expenditure	0·425	0·413	0·441	0·426
Profit	0·204	0·279	[illegible]	0·296
Average No. of miles travelled—				
Passengers	26¼	27½	25⅝	23
Goods	114⅔	110	109	112

(A. M. W.—D. W. D.)

RAIMBACH, Abraham (1776-1843), line-engraver, a Swiss by descent, was born in London in 1776. Educated at Archbishop Tenison's Library School, he was an apprentice to J. Hall the engraver from 1789 to 1796. For nine years part of his working-time was devoted to the study of drawing in the Royal Academy and to executing occasional engravings for the booksellers, whilst his leisure hours were employed in painting portraits in miniature. Having formed an intimacy with Sir David Wilkie, Raimbach in 1812 began to engrave some of that master's best pictures. The Village Politicians, the Rent-Day, the Cut Finger, Blind-Man's Buff, the Errand-Boy, Distraining for Rent, the Parish Beadle, and the Spanish Mother and Child raised him in the estimation of connoisseurs, the French especially holding him in great honour. It is said that he never employed any assistants, but executed the whole of his plates with his own hand. At his death, in 1843, he held a gold medal awarded to him for his Village Politicians at the Paris Exhibition of 1814. He was elected corresponding member of the Institute of France in 1835.

RAIMONDI, Marcantonio. See Marcantonio.

RAIN. See Meteorology, vol. xvi. pp. 128, 150-4, 180, and Geology, vol. x. p. 267 *sq.*

RAINBAND. Every transparent substance is perfectly opaque to some particular kinds of light. A certain shade of orange light is absorbed by the vapour of water, and, when sunlight which has traversed a stratum containing this vapour is decomposed in a spectroscope, the blank caused by the missing rays appears as a black band or group of fine lines. This is called the *rainband*, because from its intensity the amount of moisture in the atmosphere may be guessed at, and the occurrence of rain predicted with considerable certainty. It has long been known that the spectrum of sunlight shows lines of telluric as well as of solar origin. The former constitute the absorption-spectrum of the atmosphere (see Spectro-

SCOPY); some are produced by the permanent gases, others by aqueous vapour, which is always present, though in variable amount. The absorption-spectrum of water-vapour has been minutely studied and carefully mapped by Janssen and by Cornu. In Ångström's table of normal solar spectra there are numerous groups of lines which appeared most conspicuous when the sun was close to the horizon, and many of these are coincident with the absorption-lines of water-vapour. They are found principally in the red and yellow, and the main group is seen a little to the red side of the *D* line. In small spectroscopes the water-vapour lines appear fused together into a band on the red side of *D*, or even as a mere widening of that line There are several variable bands in the spectrum which come to a maximum of intensity when the sun is on the horizon. These are due to absorption by the permanent gases; the one which in a small instrument appears to separate the yellow from the green is frequently mistaken for the water-vapour band, and this is the cause of many incorrect "rainband predictions." In 1872 Professor Piazzi Smyth noticed a change in the water-vapour lines before and after a sirocco in Palermo, and the same phenomenon was brought before him very strikingly in France before great rains in 1875 (*Edin. Ast. Obs.*, vol. xiv.), when he named the main group of water-vapour lines the "rainband."

The rainband may be observed with any spectroscope, but direct-vision instruments of medium size are most convenient. It is important that the spectroscope should have as great dispersion as possible and good definition, especially at the red end. To make an observation the slit, which must be kept perfectly clean, should be narrowed down until the spectral lines are sharp and clear. The instrument should be carefully focused to get the maximum absorption effect; but all observers lay stress on noting whether the intensity of the band decreases rapidly or gradually as the altitude is increased. When a dark band is observed at the horizon and at the zenith, heavy rain is almost certain to follow immediately. It is of little importance whether the sky be clear or covered with high clouds at the point of observation; low clouds or haze make the result untrustworthy by shortening the line of sight, thus reducing the strength of the band and equalizing it in all directions. The utility of the spectroscope in meteorology depends on its power of investigating the hygrometrical conditions of the whole slice of atmosphere looked through, and it affords a means of ascertaining the difference of humidity in different directions. The hygrometer only indicates the state, as regards moisture, of the few yards of air surrounding it. The great difficulty in the way of obtaining accurate results with the rainband spectroscope has been the mental scale of comparison employed by most observers. Although some have found it easy to estimate the intensity of the band from 0 to 20, it is beyond the power of many to describe it in figures even from 0 to 5. Professor Piazzi Smyth noted its strength relatively to that of the dry-air band between the green and yellow. The fixed solar lines *E*, *b*, and *F* have been used as a closer approximation to a scale in instruments not powerful enough to separate the rainband from the *D* line. This compound line appears to vary from something less intense than *E* in very dry weather to something considerably darker than *F* when rain is imminent. Seven degrees can be discerned, and these may be represented by using the sign = to mean "of equal intensity with," > to mean "darker than," and < "less dark than," as, $<E$, $=E$, $>E<b$, $=b$, $>b<F$, $=F$, and $>F$. When the thin solar lines in the green are seen very distinctly there is less probability of rain falling than when they are indistinct or invisible.

The following table gives an idea of the intensities corresponding to rain-probabilities at Edinburgh.

Intensity of rainband with *D*.	Temperature.	Prediction.
$<b$.	Any.	No rain.
$=b$.	Below 40° Fahr.	Probably rain.
$=b$.	Above 40° Fahr.	Probably no rain.
$>b<F$ (thin lines distinct).	Below 60° Fahr.	,, ,,
$>b<F$ (,, indistinct).	,, ,,	Probably rain.
$>b<F$	Above 60° Fahr.	Probably no rain.
$=F$.	Any.	Rain.
$>F$.	,,	Much rain.

It appears that the average percentage of fulfilments of predictions of "rain" and "no rain," made for a period of twelve hours after one observation in the morning, which may be expected in Scotland is about 75. In less variable climates, such as those of the south of Europe and parts of the United States, a much higher degree of accuracy has been attained. The precise strength of rainband which corresponds to the probability of a fall of rain within a definite time depends on the temperature and also on the place of observation; in every case it must be determined by the observer for himself. Very dark rainbands are found to precede rain in more than 95 per. cent. of the cases everywhere; entire, or almost entire, absence of the band presages a dry day with equal probability. With a spectroscope powerful enough to split *D* a mental numerical scale must be used in default of a suitable micrometer, and by practice the observer will be able to draw up a table for its conversion into probabilities of rain

The production of an artificial absorption-line the intensity of which could be varied by known degrees suggested itself to more than one observer as the principle for a rainband-micrometer. A wedge of didymium glass comes very near success in this direction, but the absorption-line is awkwardly situated. Professor Cook of Dartmouth College, the leading meteorological spectroscopist in the United States, has constructed a micrometer for a spectroscope of sufficient power to separate the rainband into lines. A silk fibre is fixed to a frame capable of being moved to and fro in the tube of the spectroscope by a micrometer screw. When brought into focus the fibre appears as two sharp lines, which become fainter and wider as it is withdrawn. When the lines appear of equal intensity with the most prominent line of the rainband (*a* of the *D* group in Janssen's map) the micrometer is read; forty shades of intensity may be indicated by it. The unit proposed for graduating such micrometers on a uniform scale is the intensity of the faintest and least refrangible of a group of three lines in the red (*w. l.* 6207) of the spectrum produced by a 1 centimètre column of the gas given off by heated lead nitrate (mixture of nitrogen peroxide and oxygen) at 25° C. and 760 mm. The spectroscope when reinforced by this micrometer has been found to indicate with unfailing accuracy the existence in certain parts of the sky of banks of invisible cloud, which become visible when a fall of temperature and other necessary conditions allow the vapour to condense. In settled weather such masses of vapour are not to be found, the micrometer readings being the same in all directions at the same altitude. Sometimes the rainband grows gradually darker for several days before a period of steady and long-continued rain, while sudden violent showers may give very short notice.

The spectroscopic history of a thunderstorm observed on 9th June 1884 by Professor Cook is extremely interesting. During its approach the water-vapour line observed at 10° north of the zenith towards the storm was darker by ten degrees of the scale than that observed 10° south of the zenith, although to the eye the clouds presented exactly the same appearance at both places. On this occasion the strength of the line varied as follows:—

Hour.	At zenith.	At 30°.	At 20°.	At 10°.	At horizon.
8 a.m. ..	13	21	32	43	45
9 ,, ..	14	23	34	44	46
10 ,, ..	14	25	36	45	47
11 ,, ..	15	27	37	46	48
11.45 a.m.	50	.	..	..	Rain commenced 11.30.
12 noon..	32	..	.	..	Rain ceased 12.10.
12.45 p.m.	40	..	..	..	,, recommenced 12.20.
1.30 ,,	15	..	..	..	Rain ceased at 1. Total rainfall, 1·6 inches in $1\frac{1}{2}$ hours.

Some relation has been traced between the variations of the rainband and the appearance of auroræ, but this matter is not yet fully investigated. (H. R. M.)

RAINBOW. See LIGHT, vol. xiv. p. 595 *sq.*

RAINGAUGE (PLUVIOMETER, HYETOMETER, UDOMETER). The value of the measurement of rainfall (see METEOROLOGY) has long been understood, although it is only within the last hundred years that trustworthy results have been obtained. Marriotte is claimed as the originator of the raingauge in 1677. The simplest form is an open vessel of uniform diameter exposed to the rain, in which the depth of water collected during any interval of time may be measured. In order to reduce evaporation the mouth of the gauge is usually a funnel of the same diameter as the vessel; and some means, such as an external narrow glass tube graduated in inches and parts to show the height of the water inside, or a float bearing a graduated rod, or, in more delicate forms, a movable scale which may be set by a vernier to the surface of the water, is adopted to facilitate measurement. Raingauges on this plan cannot be very accurate; their one advantage is that the area of the collecting surface does not require to be known. The disadvantages are that so much water is required to wet the sides of the vessel as to make the instrument read too low when a side tube is used, and the tube is liable to be broken in frost; when a float and rod are employed, the rod projecting above the funnel catches rain and the resulting reading is too high. Almost all raingauges now used have a circular funnel of known diameter, which conducts the rain-water to a receiver, from which it may be poured into a special narrow measuring-glass so graduated that what would cover a space of the area of the funnel to the depth of 1 inch fills a portion of the glass large enough to be easily graduated into 100 parts. The funnel may have any diameter from 3 to 24 inches without introducing a greater discrepancy than 1 or 2 per cent. of the amount of rain collected, but 5 and 8 inches are the diameters usually employed, and the measuring-glasses are graduated accordingly. Advantage is sometimes taken of the fact that for a funnel 4·697 inches in diameter 1 fluid ounce of water collected represents one-tenth of an inch of rain, since the area is 17·33 square inches, and a fluid ounce at 60° Fahr. contains 1·733 cubic inches of water.

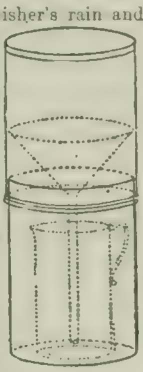
Fig. 1.

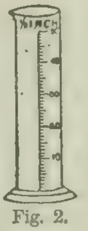

Fig. 2.

Fig. 1.—Glaisher's rain and snow gauge.

Fig. 2.—Graduated measuring glass.

The best form of instrument, Glaisher's rain and snow gauge recommended by the Royal Meteorological Society, is a cylindrical copper vessel 8 inches in diameter and 18 inches high, in which the funnel is placed about halfway down (see fig. 1). The Scottish Meteorological Society largely employ Howard's raingauge, a plain glass bottle holding about half a gallon and provided with a long 5-inch copper funnel, which has a collar fitting over the neck of the bottle to prevent rain from being blown in laterally by the wind. In some forms the funnel leads to a long glass tube divided into inches, tenths, and hundredths of rainfall. Mr Symon's storm raingauge on this principle is intended to be read from a distance, and is only graduated into tenths of an inch. The water collected by a raingauge may be weighed instead of measured, but the latter process being much more simple is always adopted, at a slight expense of accuracy, however, as the variation of volume with temperature is not taken into account. Precipitation and evaporation being complementary phenomena, an atmometer or evaporation-gauge ought, strictly speaking, to accompany each raingauge. But none of the instruments yet devised can be regarded as satisfactory, accordingly a number of devices have been introduced to calculate or to minimize the evaporation from raingauges. Dr Garnett in 1795 proposed to use two gauges of unequal size, and recently Prof. Michie Smith has introduced a simplification by making the area of one gauge exactly double that of the other If the evaporation is the same from each, the difference between the readings of the two gauges gives the true rainfall in the smaller. If A be the area of the funnel in the smaller, $2A$ that of the funnel in the larger, V a certain volume of water placed in each gauge, E the evaporation, and R the inches of rainfall, then $V+2AR-E-(V+AR-E)=AR$, however V and E may vary. The simplest and best method is to use a funnel terminating in a long straight tube, which reaches almost to the bottom of the receiving vessel. Gauges have been constructed for experimental purposes always to face the wind, and with openings capable of being fixed at any angle. For use at sea they may be swung on gimbals; but when so employed the record must be supplemented by the readings of a hydrometer so as to detect and allow for any admixture with sea-spray. Self-registering and self-recording raingauges, as frequently used in meteorological observatories, are constructed on two leading types. In Hermann's "hyetometrograph," 1789, a fixed funnel conducts the rain into one of twelve glasses placed on the circumference of a horizontal wheel, which is turned by clockwork so that each glass remains under the funnel for one hour. In Stutter's more recent instrument the receiving funnel delivers into a smaller funnel, which has a sloping tube and is carried round by clockwork so as to remain for one hour over each of twenty-four fixed glasses arranged in a circle. The second kind of self-registering instrument produces a continuous record of rainfall, indicating the hour of commencement and close of each shower, the amount of rain that has fallen, and the rate at which it fell. In Beckley's "pluviograph" a pencil, attached to a vessel which sinks as it receives the rain, describes a curve on a sheet of paper fixed round a rotating cylinder; when full the receiver empties itself by means of a siphon and the pencil is carried rapidly upwards, describing a straight vertical line.

The higher a raingauge is placed above the ground, or rather above a broad flat surface, the smaller is the rainfall registered, as the following figures indicate:—

Height of funnel above ground in feet..	0	1	10	20	40	200
Rain registered (average)	1·07	1·00	[illegible]	0·90	0·70	[illegible]

When the mouth of the gauge is on or within a few inches of the ground the insplashing of raindrops increases the amount of water. Minute rain-spherules, which usually float in horizontal or oblique planes, are most numerous near the ground, where consequently they coalesce to form regular drops which fall into the funnel. The raindrops also increase slightly in size by condensing moisture as they fall. But the greatest effect is probably produced by wind, which forms eddies round high and isolated objects, thus more or less interfering with the fall of rain into the gauge. It is obvious that all raingauges intended for comparison should be fixed at the same height, and in Great Britain the standard distance of the mouth of the funnel from the ground or from a broad flat surface is one foot. The situation of a raingauge should be perfectly open, especially in the direction of the prevailing rainbringing winds. In measuring rain it is essential to see that the funnel is not indented or deformed in any way, and that the collecting vessel is inaccessible to air or rain except through the funnel. The temperature of rain as it falls should be observed whenever it is possible to do so. The amount of solid matter collected in the raingauge should be ascertained and recorded as bearing on Mr Aitken's theory of rain (see EVAPORATION); and it should be examined microscopically for volcanic and cosmic dust. (H. R. M.)

RAIPUR, a district of India, in the Chhatisgarh division of the Central Provinces, lying between 19° 48′ and 21° 45′ N. lat. and 80° 28′ and 82° 38′ E. long., with an area of 11,855 square miles. It is bounded on the N. by Bilaspur, on the E. by Sambalpur and Patna, on the W. by Balaghat, Bhandara, and Chanda, and on the S. by Bastar and Jeypur. The district spreads out in a vast plateau closed in by ranges of hills branching from the great Vindhyan chain. It is drained by the Seonath and the Karun rivers, which subsequently unite and form the Mahanadi. Geologically the country consists in the hilly tracts of gneiss and quartzite; the sandstone rocks in the west are intersected with trap dykes. Iron ore is abundant, and red ochre of high repute is found. In the interior the principal strata are a soft sandstone slate (covered generally by a layer of laterite gravel) and blue limestone, which crops out in numerous places on the surface and is invariably found in the beds of the rivers. Throughout the plains the soil is generally fertile. The climate is generally good; the mean temperature is 78° and the average rainfall about 49 inches.

The population of Raipur in 1881 was 1,405,171 (males 696,242, females 708,929). By religion 856,492 were Hindus, 14,991 Mohammedans, and 821 Christians. The only town with a population exceeding 10,000 is RAIPUR (see below). Attached to the district are four feudatory states, viz., Chhuikhadan (with 32,979 inhabitants), Kanker (63,610), Khairagarh (166,138), and Nandgaon (164,339). Their combined area is 2658 square miles.

Of the total area under British administration only 3636 square miles are cultivated, and of the portion lying waste 4337 acres are returned as cultivable. The staple crop is rice; other crops are wheat, food-grains, oil-seeds, and cotton. The commerce of Raipur is of quite recent creation, for under the Mahrattas the transit dues that were levied prevented its development. The exports consist mainly of grain, cotton, and lac, while metals constitute the chief import. The gross revenue of the district for 1883-84 amounted to about £89,829, of which the land yielded £64,871.

Raipur was governed by the Haihai-Bansi dynasty of Ratanpur for many centuries until their deposition by the Mahrattas in 1741. The country was then already in a condition of decay, and soon afterwards it relapsed into absolute anarchy. In 1818 it was taken under British superintendence and made rapid progress. It fell with the rest of the Nagpur dominions to the British Government in 1854. Raipur suffered but little during the mutiny.

RAIPUR, chief town of the above district and headquarters of the Chhatisgarh division of the Central Provinces, is situated in 21° 15′ N. lat. and 81° 41′ E. long., on a plateau 950 feet above sea-level. In 1881 its population amounted to 24,948 (12,447 males and 12,501 females). The modern town dates from 1830, and carries on a flourishing trade in grain, lac, cotton, &c.

RAIS, RAIZ, or RETZ, GILLES DE (d. 1440), marshal of France, seigneur of Hautpart and of many other lordships, who was hanged and burned at Nantes in 1440, has left a name connected directly with one of the most horrible stories in history, and indirectly with other curious matter. Not much is known of Rais before the trial which made his name infamous. He was of the noblest blood of the marches of Brittany, being on the father's side of the Laval branch of the ducal family of Montfort, and being connected through his mother and by marriage with the houses of Craon, Thouars, and others. His possessions in the district from which he took his name, and which borders the estuary of the Loire on the south, as well as along the river, were great, and his chief seat was at Champtocé. He had served in the English wars with the credit of a brave knight, had a rather special reputation for devotion, had been marshal since 1429, and had held the alms-dish at the coronation of Charles VII. Suddenly he was arrested, tried, and, as above stated, executed on the evidence of accomplices and his own confession. The crimes with which he was charged extended over some fourteen years. During that period it was alleged that he had, through different agents, especially a woman called La Meffraie, kidnapped or enticed to his various abodes large numbers (Monstrelet says 160, others 140) of children. These children, after being subjected to every outrage of lust and cruelty, were sacrificed to the devil, their blood used for magical ceremonies, their bodies burned, and their bones buried in the precincts of Rais's castles. The ultimate purpose of this devil-worship was asserted to be the acquisition by Rais (who was assisted by divers sorcerers, especially an Italian imported for the purpose) of power and honours in the state. The depositions were very full and still exist, and on them and his confession Rais was executed. It is, however, somewhat suspicious that the bishop of Nantes, who promoted, and the duke of Brittany, who sanctioned the proceedings, were both bitter personal enemies of Rais, while the king, who was also concerned, had for a main part of his policy the putting down of feudal barons who, like Rais, held posts of vantage in the country. The two chief contemporary authors who mention the case, Monstrelet and Chastellain, speak of it with somewhat less horror than might, even allowing for possible political sympathies, have been expected. Monstrelet (who says that Rais was charged with the murder of pregnant women also) says that "many ladies and damsels" begged his body of the duke, and that great part of the nobles of Brittany, not only his relations, had great sorrow and sadness for his death. Chastellain introduces the ghost of Rais in rather striking fashion in his *Temple de Bocace* as "followed by a multitude of little children crying 'Vengeance.'" The affair affected public imagination as much because of the rarity of a criminal of such rank being brought to justice as of the heinousness of the crimes attributed to him. Locally it took a very strong hold of the popular mind, and a tradition not easy to trace connects it with the Bluebeard legend, which finally took shape in the hands of Perrault. This connexion, however, hardly bears examination. In the first place, there is no evidence that Rais ever was called Bluebeard, though a contemporary English adventurer who is mentioned by Holinshed was so called, and may have left a bad reputation in France. In the second, it is impossible to trace even the most superficial resemblance between the stories. In *Bluebeard* there are no children concerned, no unnatural crimes, no sorcery; it is merely one of the numerous stories of "punished curiosity" so frequent in folk-lore. As it stands the Rais story is too horrible to make much of a figure in literature; but it has attracted some students of *causes célèbres*, notably Dumas *fils* in his *Tristan le Roux*.

For authorities besides the passages of Monstrelet and Chastellain above quoted, Michelet, *Histoire de France*, and Vallet de Viriville, *Histoire de Charles VII.*, may be consulted. Mézeray's account, usually followed in books of reference, is loose; he had evidently not seen the records, nor even Monstrelet. But his assignment of a state crime against the duke as the real cause of death is very probable, though not formally correct.

RAISINS are the dried fruits of certain varieties of the grape vine, *Vitis vinifera*, which grow principally in the warm climate of the Mediterranean coasts and are comparatively rich in sugar. The use of dried grapes or raisins as food is of great antiquity (Numb. vi. 3; 1 Sam. xxv. 18, xxx. 12). In mediæval times raisins imported from Spain were a prized luxury in England, and to the present day Great Britain continues to be the best customer of the raisin-producing regions. "Raisins of the sun" are obtained by letting the fruit continue on the vines after it has come to maturity, where there is sufficient sunshine and heat in the autumn, till the clusters dry on the stocks. Another plan is partially to sever the stalk before the grapes are quite ripe, thus stopping the flow of the sap, and in that condition to leave them on the vines till they are sufficiently dry. The more usual process, however, is to cut off the fully ripe clusters and expose them, spread out, for several days to the rays of the sun, taking care that they are not injured by rain. In unfavourable weather they may be dried in a heated chamber, but are then inferior in quality. In some parts of Spain and France it is common to dip the gathered clusters in boiling water, or in a strong potash lye, a practice which softens the skin, favours drying, and gives the raisins a clear glossy appearance. Again, in Asia Minor the fruit is dipped into hot water on the surface of which swims a layer of olive oil, which communicates a bright lustre and softness to the skin. Some superior varieties are treated with very great care, retained on their stalks, and sent into the market as clusters for table use; but the greater part are separated from the stalks in the process of drying and the stalks winnowed out of the fruit. Raisins come from numerous Mediterranean localities, and present at least three distinct varieties,—(1) ordinary or large raisins, (2) sultana seedless raisins, and (3) currants or Corinthian raisins (see vol. vi. p. 715). The greater proportion of the common large raisins of English commerce comes from the provinces of Malaga, Valencia, and Alicante in Spain; these are known by the common name of Malaga raisins. Those of the finest quality, called Malaga clusters, are prepared from a variety of muscatel grape, and preserved on the stalks for table use. This variety, as well as Malaga layers, so called from the manner of packing, are exclusively used as dessert fruit. Raisins of a somewhat inferior quality, known as "lexias," from the same provinces, are used for cooking and baking purposes. Smyrna raisins also come to some extent into the English market. The best quality, known as Elemé, is a large fruit, having a reddish yellow skin with a sweet pleasant flavour. Large-seeded dark-coloured raisins are produced in some of the islands of the Greek Archipelago and in Crete, but they are little seen in the British markets. In Italy the finest raisins are produced in Calabria, inferior qualities in central Italy and in Sicily. From the Lipari Islands a certain quantity of cluster raisins of good quality is sent to England. In the south of France raisins of high excellence—Provence raisins in clusters—are obtained at Roquevaire, Lunel, and Frontignan. Sultana seedless raisins are the produce of a small variety of yellow grape, cultivated exclusively in the neighbourhood of Smyrna. The vines are grown on a soil of decomposed hippurite limestone, on sloping ground rising to a height of 400 feet above the sea, and all attempts to cultivate sultanas in other raisin-growing localities have failed, the grapes quickly reverting to a seed-bearing character. The dried fruit has a fine golden-yellow colour, with a thin, delicate, translucent skin and a sweet aromatic flavour. A very fine seedless oblong raisin of the sultana type with a brownish skin is cultivated in the neighbourhood of Damascus, but it is rarely seen in the Western markets.

Raisins are chiefly valuable on account of the large proportion of grape sugar and cream of tartar which they contain. In old dry raisins these substances are found in hard nodular masses. The seeds contain from 15 to 18 per cent. of a bland fixed oil and about 5 per cent. of tannin. The imports into the United Kingdom average in value about £1,000,000 yearly, the quantity imported in 1883 having been 588,309 cwt., valued at £1,057,934.

RÁJÁ (English form RAJAH), Sanskrit nom. sing. of the stem *rájan* (in modern Indian vernaculars *rájá*, *rájah*, *rája*, *rájan*, *rázu*, *irásen*, also the forms *rái*, *ráo*, *ráná* are traceable to the same stem) = king, prince, chief, from the root *ráj*, to be resplendent. In the oldest times the headman of any petty tribe was called rájá from the fact of his being conspicuous for the number of golden ornaments with which he was decked out. Then rájá became the common designation for a king, whether of a small tribe or of a large state. The constitution of all states was monarchical, mostly hereditary, occasionally also electoral, but in no case absolute, for the people had a voice in the government. On the other hand, the king was greatly hampered in his action by his duties towards the priestly caste. Even in that later stage of Indian civilization which we find portrayed in the code of Manu the king appears as subordinate to the priest, though his prerogative is in all other respects paramount, especially in the matter of revenue. Theoretically this system has been continued ever since; but practically the rájá's powers have been gradually extended, some of them being distributed by him at his pleasure among various officials, who were rewarded, not by regular salaries, but by grants and the profits of oppression.[1] It thus appears that the title is, strictly speaking, only applicable to Hindu potentates, but in practice it is not unfrequently used to indicate a ruling chief irrespective of his nationality or creed.

The rights and privileges assigned to rájás by treaty and usage are manifold and varied. But all rájás are precluded from waging war against an external foe save with the permission of the British Government, and so none can be said to be independent in the fullest sense of the word. At the same time there are several princes in India who titularly hold that status, in so far, that is, as they possess the right to administer their kingdom according to their own notions of justice and equity; but even in these instances, and they are few, British residents are attached to the various courts, charged to advise in the interests of good government and righteous dealing. Such officers seldom fail to secure a powerful influence, and it is not often that their counsel is disregarded or their representations pass unheeded. More than this, when flagrant injustice occurs the British Government is occasionally compelled to interfere, and instances are not wanting when a rájá has been deposed, notwithstanding a clause in his treaty forbidding the intervention of the British Government in the affairs of his state. Such cases, which are not frequent, are justified by political necessity. In many instances native chiefs are allowed by treaty to maintain a military force, but at the present time the troops principally serve to gratify the cravings of Eastern potentates for the outward and visible signs of power.

Rájás of lesser note retain a semblance of power so far as concerns questions of minor importance, but in grave cases involving issues of life and death the officer attached to the court reviews and, should it be necessary, modifies or reverses the decrees which may be passed. Chieftains in this category do not even enjoy the appearance of independence, though in many instances they are allowed to keep a body of military retainers.

Other rájás are merely large and wealthy landholders with no sovereign rights or privileges, resembling in many respects the territorial magnates of Great Britain; while in some instances the term is simply a title of distinction unconnected with the possession of land or power.

Scarcely less complex and varied are the conditions which regulate succession to the rájships of India: in some instances adoption is admitted, in other cases collateral succession is accepted, while again there are occasions when the customs of the family are a potent factor in the choice of an heir. It might have been supposed perhaps that the salute could be fairly taken as indicative of the status of the chief to whom it is assigned; but in reality such an assumption would be most misleading, for not unfrequently the number of guns was fixed in bygone years, and the lapse of time has made numerous and essential changes in the status of the various chieftains. So much is this the case that it has never been settled authoritatively what chiefs are entitled to claim the Western prefix of "highness."

RAJAMAHENDRI (Rajamahendravaram, Rajahmundry), a town of India, in the Godavari district, Madras presidency, situated on high ground on the left bank of the Godavari river in 17° N. lat. and 81° 49′ E. long., and 365 miles north-east of Madras. Its population in 1881 numbered 24,555 (male 12,290, females 12,265). Rajamahendri was formerly the headquarters of a separate district of the same name, but is now incorporated with Godavari.

Tradition divides the merit of founding this city between the Orissa and Chalukya princes. There appears little doubt that the city of the Vengi kings was identical with the site of the present town, and that this also was the seat of the Orissa power in the south. In 1471 Rajamahendri was wrested from Orissa by the Mohammedans, but early in the 16th century it was retaken by Krishna Rájá and restored to Orissa. It continued under Hindu rule till 1572, when it yielded to the Moslems of the Deccan under Rafat Khán. For the next century and a half it was the scene of perpetual fighting, and at last fell to Golconda, and became one of the four nawabships of that government. Rajamahendri passed into the possession of the French in 1753, but they were driven out by the British under Colonel Forde in 1758. The French, however, recaptured it, but, finding that the treasure had been removed, they evacuated it almost immediately.

RÁJPUTÁNA, an immense tract of country in India, consisting of twenty states, having each its own autonomy and separate chief, besides the small British division of Ajmere, which is situated almost in the centre of the province. These territories lie between 23° and 30° N. lat. and between 69 30′ and 78° 15′ E. long., and their combined area is approximately estimated at 130,000 square miles. Rájputána extends from the province of Sind on the west to the North-Western Provinces on the east, skirting the Bombay presidency on the south, and stretching to the Punjab on the north. It is traversed from south-west to north-east by the Rájputána State Railway, and from the south to that railway at Ajmere by the Malwa Railway from Khandwa on the Great Indian Peninsula line through Indore. The country is divided by the Aravalli Mountains into two unequal parts (of which the north-western is much the larger), and consists to a great extent of sandy, arid, and unproductive wastes, but it improves gradually to comparatively habitable and fertile tracts towards the north-east. This division includes the Thur or great sandy desert of northern India, covered everywhere by long parallel dunes, varying from 50 to 100 feet high, with few wells and streams, and almost destitute of vegetation. The south-eastern division is considerably more elevated and fertile, is diversified in character, and contains extensive hill-ranges and long stretches of rocky wold and woodland; it is watered by the drainage of the Vindhyás, carried north-east by the Chambal and Banas rivers. In many parts there are wide vales, fertile plateaus, and great stretches of excellent soil, with forests and artificial lakes; but even in this division the surface, for the most part, is stony, rugged, under jungle, and infertile, except close to the river banks.

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[1] See for the Vedic period, H. Zimmer, *Altindisches Leben*, Berlin, 1879, p. 162 *sq.*; for later times, M. Duncker, *Geschichte des Alterthums*, iii. 152 *sq.*, and Tod's *Antiquities of Rajasthan*, passim.

The chief rivers of Rájputána are the Loni, the Chambal, and the Banas. The first of these, the only river of any consequence in the north-western division, flows for 200 miles from the Pukar valley, close to Ajmere to the Runn of Cutch. In the south-eastern division the river system is important. The Chambal is by far the largest river in Rájputána, through which it flows for about one-third of its course, while it forms its boundary for another third. The source of the river is in the highlands of the Vindhyás, upwards of 2000 feet above the sea; it enters the province at Chaurasgarh in Mewar and soon becomes a considerable stream, collecting in its course the waters of other rivers, and finally discharging itself into the Jumna after a course of 560 miles. Next in importance ranks the Banas, which rises in the south-west near Kankraoli in Mewar. It collects nearly all the drainage of the Mewar plateau with that of the eastern slopes and hill-tracts of the Aravallis, and joins the Chambal a little beyond the north-eastern extremity of the Bundi state, after a course of about 300 miles. Other rivers are the W. Banas and the Sabarmati, which rise among the south-west hills of Mewar and take a south-westerly course. The river Mahi, which passes through the states of Partabgarh and Banswara, receiving the Som, drains the south-west corner of Rájputána through Gujrát into the gulfs of Cutch and Cambay. Rájputána possesses no natural freshwater lakes, but there are several important artificial lakes, all of which have been constructed with the object of storing water. The only basin of any extent is the Sambhar salt lake, of about 50 miles in circuit.

Geologically considered the country may be divided into three regions,—a central, and the largest, comprising the whole width of the Aravalli system, formed of very old sub-metamorphic and gneissic rocks; an eastern region, with sharply defined boundary, along which the most ancient formations are abruptly replaced by the great basin of the Vindhyán strata, or are overlaid by the still more extensive spread of the Deccan trap, forming the plateau of Malwa; and a western region, of very ill-defined margin, in which, besides some rocks of undetermined age, it is more or less known or suspected that Tertiary and Secondary strata stretch across from Sind, beneath the sands of the desert, towards the flanks of the Aravallis. Rájputána produces a variety of metals. Ore of cobalt is obtained in no other locality in India, and although zinc blend has been found elsewhere it is known to have been extracted only in this province. Copper and lead are found in several parts of the Aravalli range and of the minor ridges in Ulwur and Shekhawati, and iron ores abound in several states. Alum and blue vitriol (sulphate of copper) are manufactured from decomposed schists at Khetri in Shekhawati. Good building materials are obtained from many of the rocks of the country, amongst which the Raialo limestone (a fine-grained crystalline marble) and the Jaisalmir (Jeysulmere) limestone stand pre-eminent.

Rájputána is of great archæologic interest, and possesses some fine religious buildings in ruins and others in excellent preservation. Amongst the latter are the mosque at Ajmere and the temples on Abu. But the finest and most characteristic features of architecture in the country are shown in the forts and palaces of the chiefs and in their cenotaphs.

Herds of camels, horses, and sheep are found wherever there is pasturage, and in the desert and in the southern part of the country wild asses, nylghau, and antelopes, besides lions, leopards, tigers, wolves, hyænas, jackals, and foxes, are met with.

The climate throughout Rájputána is very dry and hot during summer; while in the winter it is much colder in the north than in the lower districts, with hard frost and ice on the Bikanir borders. The rainfall is very unequally distributed: in the western part, which comes near to the limits of the rainless region of Asia, it is very scanty, and scarcely averages more than 5 inches; in the south-west the fall is more copious, sometimes exceeding 100 inches at Abu; but, except in the south-west highlands of the Aravallis, rain is most abundant in the south-east. Notwithstanding all its drawbacks, Rájputána is reckoned one of the healthiest countries in India, at least for the native inhabitants.

Population.—The census of 1881, which was the first general enumeration of population in Rájputána since England's connexion with India, gave a total number (including Ajmere division) of 10,729,114. Of these 166,343 were Bhíls; but no accurate census could be taken of these people owing to their repugnance to be counted. Exclusive of Bhíls, the population numbered 10,562,771 (5,710,337 males, 4,852,434 females). The following statement gives the area and population of the several states and of the British division of Ajmere:—

States.	Area in square miles.	Population.	States.	Area in square miles.	Population.
Ajmere-Mhairwara (British)	2,711	460,722	Kishengurh	724	112,633
Banswara	1,500	152,045	Kotah	3,797	517,275
Bhurtpur	1,974	645,540	Lawa	18	2,682
Bikanir	22,340	509,021	Marwar or Jodhpur	37,000	1,750,403
Bundi	2,300	254,701	Mewar or Udaipur	12,670	1,494,220
Dholpur	1,200	249,657	Partabgarh	1,460	79,568
Dungarpur .. .	1,000	153,381	Shahpura	400	51,750
Jaipur..........	14,465	2,534,357	Sirohi	3,020	142,903
Jaisalmir (Jeysulmere)	16,447	108,143	Tonk	2,509	338,029
Jhalawar	2,694	340,488	Ulwur (Alwar) ..	3,024	682,926
Karauli	1,208	148,670	Total....	132,461	10,729,114

The great mass of the people are Hindus, numbering in 1881 (excluding Bhíls) 9,215,272, as against 919,556 Mohammedans and 3519 Christians. Among the Hindus the paucity of Rájputs is remarkable. It is commonly supposed that, because nearly the whole country is ruled by Rájputs, therefore the population consists mainly of Rájput tribes; but these are merely the dominant race, and the territory is called Rájputána because it is politically possessed by Rájputs. The whole number of this race is roughly estimated at 700,000, and nowhere do they form a majority of the whole population in a state; but they are strongest, numerically, in the northern states and in Mewar. By rigid precedence the Brahmans occupy the first rank; they are numerous and influential, and with them may be classed the peculiar and important caste of Charans or Bhats, the keepers of secular tradition and of the genealogies. Next come the mercantile castes, mostly belonging to the Jaina sect of Hinduism; these are followed by the powerful cultivating tribes, such as the Jats and Gujars, and then come the non-Hindu or so-called aboriginal tribes, chief of whom are the Minas, Bhíls, and Mhairs.

The mass of the people are occupied in agriculture. In the large towns banking and commerce flourish to a degree beyond what would be expected for so backward a country. In the north the staple products for export are salt, grain, wool, and cotton, in the south opium and cotton; while the imports consist of sugar, hardware, and piece goods. Rájputána is very poor in industrial production. The principal manufactures are salt, cotton, and woollen goods, carvings in ivory, and working in metals, &c., all of which handicrafts are chiefly carried on in the eastern states. The system of agriculture is very simple; in the country west of the Aravallis only one crop is raised in the year, while in other parts south and east of the Aravallis two crops are raised annually, and various kinds of cereals, pulses, and fibres are grown.

History.—Only faint outlines can be traced of the condition of Rájputána previous to the invasion of Upper India by the Mohammedans, and these indicate that the country was subject for the most part to two or three very powerful tribal dynasties. Chief of these were the Rahtors, who ruled at Kanauj; the Chauhans of Ajmere; the Solankhyas of Anhilwara, in Gujrát; the Gehlots with the Sesodia sept, still in Mewar or Udaipur; and the Kachwaha clan, still in Jaipur. These tribal dynasties of Rájputs were gradually supplanted by the Moslem invaders of the 11th century and weakened by internal feuds. At the beginning of the 16th century the Rájput power began to revive, but only to be overthrown by Baber at Fatehpur Sikri in 1527. The clans were finally either conquered, overawed, or conciliated by Akbar—all except the distant Sesodia clan, which, however, submitted to Jahangir in 1616. From Akbar's accession to Aurangzeb's death, a period of 151 years, the mogul was India's master. Aurangzeb's death and the invasion of Nadir Sháh led to a triple alliance among the three leading chiefs, which internal jealousy so weakened that the Mahrattas, having been called in by the Rahtors to aid them, took possession of Ajmere about 1756; thenceforward Rájputána became involved in the general disorganization of India. By 1803 nearly the whole of Rájputána had been virtually subdued by the Mahrattas. The victories of Generals Wellesley and Lake, however, saved the Rájputs; but on Wellington's departure from India the floodgates of anarchy were reopened for ten years. On the outbreak of the Pindari War in 1817 the British Government offered its protection. The Pindaris were put down, Amir Khán submitting and signing a treaty which constituted him the first ruler of the existing state of Tonk. By the end of 1818 similar treaties had been executed by the other Rájput states with the paramount power. Sindhia gave up the district of Ajmere to the British, and the pressure of the great Mahratta powers upon Rájputána was permanently withdrawn. Since then the political history of Rájputána has been comparatively uneventful. The great storm of the mutinies of 1857, though dangerous while it lasted, was short. The capture of the town of Kotah, which had been held by the mutineers of that state, in March 1858, marked the extinction of armed rebellion in the province. (W. T. R.)

RÁJSHÁHÍ or **Rajeshaye**, a district of India, in the lieutenant-governorship of Bengal, forming the south western corner of the Rájshâhí with Kuch Behar division.[1] It lies between 24° 3′ and 24° 59′ N. lat. and between 88° 21′ and 89° 24′ E. long., and is bounded on the N. by the districts of Dinájpur and Bogra, on the E. by Bogra and Pabna, on the S. by the Ganges and Nuddea district, and on the W. by Maldah and Murshidábád. The area of 2359 square miles is one alluvial plain seamed with old river-beds and studded with marshes. The Ganges and the Mahánandá are its principal rivers; the former constitutes a great natural boundary-line to the south and south-west, and the latter, which rises in the Himálayas, borders the district on the west for a few miles before joining the Ganges. Other rivers are the Narad and Baral, important offshoots of the Ganges; the Atrai, a channel of the Tista; and the Jamuna, a tributary of the Atrai. Both the Atrai and the Jamuna belong to the Brahmaputra system and are navigable throughout the year for small cargo boats. The drainage of Rájshâhí is not carried off by means of its rivers, but through the chains of marshes and swamps, the most important of which is the Chalan "bil" or lake, which discharges itself into the Brahmaputra. The climate of Rájshâhí does not differ from that of other districts of Lower Bengal; its average rainfall for the five years ending 1882/83 equalled 68 inches. The Northern Bengal State Railway intersects the district from north to south.

Population.—The census of 1881 gave a population, almost entirely rural, of 1,338,638 (males 660,226, females 678,412). Of this number 288,749 were returned as Hindus, 1,049,700 as Mohammedans, and only 121 as Christians. The only town with over 10,000 inhabitants was Rampur Beauleah (19,228), which is the chief town and administrative headquarters of the district. This town is situated on the north bank of the Ganges in 24° 22′ N. lat. and 88° 39′ E. long.; it is of modern growth and is built for the most part on river alluvia. It was formerly the seat of the Dutch and East India Company's factories, and is still a centre of the silk and indigo trade.

Rice is the staple crop of the district; other cereal crops are wheat, barley, and Indian corn, which are grown to a small extent; among miscellaneous crops are indigo, sugar-cane, mulberry, and tobacco. Ganja is also grown in a small tract to the north of the district. Silk spinning and weaving and the preparation of indigo are the chief manufactures, but these are now both declining. The total revenue of Rájshâhí in 1883-84 amounted to £123,098, towards which the land-tax contributed £88,584.

History.—When the East India Company took over the administration of Bengal in 1765 Rájshâhí was one of the largest and most important districts in the province. It appears to have extended from Bhagulpur on the west to Dacca on the east, and to have included an important subdivision called Nij-Chakla Rájshâhí on the south of the Ganges, which extended over a great portion of what now lies within the districts of Murshidábád, Nuddea, Jessore, Birbhum, and Burdwan. The total area was estimated at 12,909 square miles, or more than five times the size of the present district. Having been found much too large to be effectually administered by one central authority, Rájshâhí was stripped by Government in 1793 of a considerable portion of its outlying territory, and a natural boundary-line was drawn to the west, south, and east along the Ganges and Brahmaputra. Its north-western limits were reduced in 1813, when the present district of Maldah was constituted. The erection of Bogra into a separate jurisdiction in 1821 still further reduced its area; and in 1832 the limits of Rájshâhí were finally fixed very much at their present lines by the constitution of Pabna into an independent jurisdiction.

RÁKÓCZY, the name of an old and wealthy family of upper Hungary. Sigismund was on 11th February 1607 elected prince of Transylvania, but in the following year abdicated in favour of Gabriel Báthori, to whom succeeded Bethlen Gábor. Bethlen died in 1629, and George I. (1591-1648), son of Sigismund, born in 1591, was, after the demission of Gábor's widow, Catherine of Brandenburg, 26th November 1631, elected prince of Transylvania by the estates. In 1645 he joined the Swedes in an attempt to deliver Hungary from the yoke of Austria and secure religious liberty to the Protestants, but when the emperor Ferdinand showed a disposition to enter into a treaty with him he became oblivious of the cause of which he had been the professed champion. By the treaty of Linz he was formally recognized as prince of Transylvania. He died on 24th October 1648. George II. (1615-1660), son of the preceding, was chosen by the estates to succeed him as prince of Transylvania. Having been disappointed in his hopes of the crown of Poland on the death of Casimir V., he entered into an alliance with John Casimir and invaded the country, but was completely defeated on 16th July 1657. His procedure against Poland provoked the hostility of the Turks, with whom he was engaged in continual war until his death at Grosswardein on 26th June 1660, from wounds received at the battle of Klausenburg. Francis I. (1642-1676), son of the preceding, did not succeed his father as prince of Transylvania. Having become connected with a plot for the overthrow of the Austrian Government, his life was only saved through the intervention of his mother, who was a Catholic, and he had to pay a fine of 400,000 florins. He edited a volume of prayers, which had an extensive circulation in Hungary. He died on 8th July 1676. Francis Leopold (1676-1735), son of the preceding, was at the age of twelve along with his mother made prisoner by the Austrians, and by them was educated in a Jesuit college in Bohemia. After his marriage with a princess of Hesse he returned to Hungary, where the greater portion of his estates was restored to him. On account of his connexion with a conspiracy of the malcontent party he was in 1701 arrested and brought to Vienna, but making his escape he went to Poland, where he spent several years in exile. In 1703 he headed a new insurrection, which had achieved considerable success before the death of the emperor Leopold in the end of 1705. Owing to the milder attitude of Joseph I., matters for a time assumed a more peaceful appearance. In 1707 Rákóczy was elected prince of Transylvania, and on 31st May of this year the independence of Hungary was proclaimed. From this time, however, the fortunes of the Hungarian cause began to decline, and Rákóczy finally in despair, having refused an amnesty and offers of pardon, retired to the frontiers of Poland, after which, on 1st May 1711, peace was concluded at Szatmár. Rákóczy refused to own it, and retired to France and subsequently to Turkey, where he died at Rodosto on 8th April 1735. (See Hungary, vol. xii. pp. 369-370.)

RALEIGH, a city of the United States, the capital of North Carolina and the seat of justice of Wake county, is situated in 35° 47′ N. lat. and 78° 48′ W. long., a little to the north-east of the geographical centre of the State, and occupies a kind of high ground in the upper valley of the Neuse, a river flowing south-east towards Pamlico Sound. It is the meeting-place of three railways—the Raleigh and Gaston, the Raleigh and Augusta, and the Richmond and Danville lines—and its railway distance from Portsmouth is 177 miles and from Washington 230. Raleigh is laid out round a park of 10 acres called Union Square and divided into four sections by four broad streets which strike out symmetrically from this centre; the fine old trees which were spared by the original settlers give it the sobriquet of "City of Oaks." Besides the State house or capitol (a substantial granite structure in Union Square), the public buildings comprise the county court-house, the governor's mansion, the United States court-house and post-office (1875), the State geological museum, a State insane asylum, institutions for the blind and the deaf and dumb, the penitentiary, and the Shaw institute for the higher education of coloured pupils. There are a normal school and a graded school system for both white and coloured pupils. Raleigh is a centre of the cotton and tobacco trades, has railway machine and car shops, and manufactures steam-engines, shuttle blocks and bobbins, ice, cotton-seed oil, fertilizers, hosiery, clothing, agricultural implements, carriages, carpentry, cigars, marble wares, &c. The population was 4780 in 1860, 7790 (4094 coloured) in 1870, and 9265 (4354 coloured) in 1880. Raleigh was selected as the seat of government in 1788, was laid out in 1792, and made a city in 1794.

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[1] The Rájshâhí with Kuch Behar division comprises the seven districts of Dinájpur, Rájshâhí, Rangpur, Bogra, Pabna, Dárjíling, Jalpáiguri, and the native state of Kuch Behar. Its total area is 18,735 square miles, and its population (1881) 8,336,399 (males 4,237,388, females 4,099,011).

RALEIGH, Sir Walter (1552-1618), admiral and courtier, was born at Hayes in Devonshire in 1552. After a short residence at Oriel College, Oxford, he took service in the autumn of 1569 with a body of volunteers serving in the French Huguenot army, and he probably did not return to England till 1576. During the course of these years he appears to have made himself master of seamanship, though no evidence of this is obtainable. In 1579 he was stopped by the council from taking part in a voyage planned by his half-brother Sir Humphrey Gilbert, and in 1580 he commanded an English company in Munster (Ireland). On 10th November he took part in the massacre at Smerwick. He remained in Ireland till December 1581, distinguished for his vigour and ability as well as for his readiness to treat Irish rebels as mere wild beasts, who were to be pitilessly exterminated, and whose leaders might be smitten down if necessary by assassination. In one way or another Raleigh's conduct gained the favourable notice of Elizabeth, especially as he had chosen to seek for the support of Leicester, in whose suite he is found at Antwerp in February 1582. For some years Raleigh shone as a courtier, receiving from time to time licences to export woollen cloths and to sell wine, after the system by which Elizabeth rewarded her favourites without expense to herself. In 1585 he became lord warden of the Stannaries, soon afterwards he was vice-admiral of Devon and Cornwall, and in 1587 was captain of the guard. But he was one of those who were dissatisfied unless they could pursue some public object in connexion with their chase after a private fortune. In 1583 he risked £2000 in the expedition in which Sir Humphrey Gilbert perished. In 1584 he obtained a charter of colonization, and sent Amadas and Barlow to examine the country which he named Virginia. In 1585 he despatched a fleet laden with colonists. They were, however, soon discouraged and were brought back to England by Drake in the following year. Shortly afterwards fifteen fresh colonists were landed, and another party in 1587. All these, however, perished, and, though Raleigh did all that was possible to succour them, the permanent colonizing of Virginia passed into other hands.

In 1584 Raleigh obtained a grant of an enormous tract of land in Munster, in one corner of which he introduced the cultivation of the potato. To people that land with English colonists was but the counterpart of the attempt to exterminate its original possessors. This view of the policy of England in Ireland was not confined to Raleigh, but it found in him its most eminent supporter. In his haste to be wealthy, his love of adventure, his practical insight into the difficulties of the world, and his unscrupulousness in dealing with peoples of different habits and beliefs from his own, Raleigh was a representative Elizabethan Englishman. He did his best, so far as a usually absentee landlord could do, to make his colonists prosperous and successful; but he underestimated the extraordinary vitality of the Irish race, and the resistance which was awakened by the harsh system of which he was the constant adviser at Elizabeth's court. Elizabeth, too, was unable to support him with the necessary force, and his whole attempt ended in failure. Raleigh's efforts were at least made on behalf of a race whose own civilization and national independence were at stake. The Elizabethan men were driven to take large views of their difficulties, and it was impossible for Raleigh to separate the question whether English forms of life should prevail in Munster from the question whether they should be maintained in England. Two conceptions of politics and religion stood face to face from the Atlantic to the Carpathians, and every one of vigour took a side. The balancing intellects were silenced, or, like Elizabeth's, were drawn in the wake of the champions of one party or the other. Wherever the strife was hottest Raleigh was sure to be found. If he could not succeed in Ireland he would fight it out with Spain. In 1588 he took an active part against the Armada, and is even supposed by some to have been the adviser of the successful tactics which avoided any attempt to board the Spanish galleons. In 1589 he shared in the unsuccessful expedition commanded by Drake and Norris, and for some time vessels fitted out by him were actively employed in making reprisals upon Spain.

Raleigh was a courtier as well as a soldier and a mariner and as early as 1589 he was brought into collision with the young earl of Essex, who challenged him, though the duel was prevented. Some passing anger of the queen drove him in this year to visit Ireland, where he renewed his friendship with Spenser, and, as is told in poetic language in *Colin Clout's come Home again*, took the poet back with him to England, introduced him to Elizabeth, and persuaded him to proceed to the immediate publication o a portion of the *Faerie Queen*. If Raleigh could plead for a poet, he could also plead for a Puritan, and in 1591 he joined Essex in begging for mercy for Udall. In the end of 1591 or the beginning of 1592 Raleigh seduced and subsequently married Elizabeth Throckmorton, and was consequently thrown into the Tower by Elizabeth who could not endure that the fantastic love-making to herself which she exacted from her courtiers should pass into real affection for a younger woman. Previously to his imprisonment Raleigh had been forbidden to sail in command of a fleet of which a great part had been fitted out at his own cost for service against Spain. The ships, however, sailed, and succeeded in capturing a prize of extraordinary value known at the time as the "Great Carrack." No one but Raleigh was capable of presiding over the work of securing the spoils. He was sent to Plymouth, still in the name of a prisoner, where his capacity for business and his power of winning the enthusiastic affection of his subordinates were alike put to the test. The queen at last consented to restore him to complete liberty, though she tried to cheat him of his fair share of the booty.

Raleigh resolved to use his regained liberty on an enterprise more romantic than the capture of a carrack. The fable of the existence of El Dorado was at that time fully believed in Spain, and in 1594 Raleigh sent out Captain Wheddon to acquire information about the lands near the Orinoco. In 1595 he sailed in person with five ships for Trinidad. On his arrival he found that the Spaniards, who had occupied a place called San Thomè at the junction of the Orinoco and the Caroni, had been obliged to abandon it. Raleigh ascended the river to the spot, heard more about El Dorado from the Indians, brought away some stones containing fragments of gold, and returned to England to prepare a more powerful expedition for the following year. When he came back he published an account of his voyage. The hope of enriching himself, and of giving to his country a source of wealth which would strike the balance in its favour in the struggle with Spain, exercised a strong fascination over the imaginative character of Raleigh. In the next year, 1596, however, he was wanted nearer home, and was compelled to content himself with sending one of his followers, Captain Keymis, to extend his knowledge of Guiana. He was himself called on to take the command of a squadron in the expedition sent against Spain under Lord Howard of Effingham and the earl of Essex. It was Raleigh who, on the arrival of the fleet off Cadiz, persuaded Howard and Essex to begin by an attack on the Spanish fleet, and who himself led the van in sailing into the harbour. Before long the Spanish fleet was thoroughly beaten, and all of it, except two vessels which were captured, was destroyed by the Spaniards themselves. Raleigh was wounded in the action, and the subsequent capture of Cadiz was carried out by others. In May 1597 Elizabeth, who was growing somewhat tired of the petulance of Essex, readmitted Raleigh to court. It was arranged that he should go as rear-admiral of a fleet, under the command of Essex, intended to cripple yet further the maritime power of Spain. The "island voyage," as it was called, was on the whole a failure, the only notable achievement being the capture of Fayal (Azores) by Raleigh in the absence of Essex. The generous nature of Essex was overmastered by vanity, and, falling under the sway of meaner men, he grew to regard Raleigh as a personal rival. He did not even mention the capture of Fayal in his official account of the voyage.

In 1598 Elizabeth, who was always ready to reward her courtiers at the expense of others, completed a bargain in Raleigh's favour. In 1591 he had obtained, through the queen's intervention, a lease for ninety-nine years of the manor of Sherborne from the bishop of Salisbury. In 1598 the see was vacant. Aspirants to the mitre were informed that only by converting the lease into a perpetual estate in Raleigh's favour could the object of their wishes be obtained. On these terms Dr Cotton became bishop of Salisbury and Raleigh possessor of Sherborne in full ownership. In 1600 Raleigh added to his other offices that of governor of Jersey. A temporary reconciliation between Raleigh and Essex was followed by a permanent estrangement when Essex was appointed to the government of Ireland, the personal feeling on both sides being probably strengthened by the divergence between their Irish policies,—Raleigh wishing to use force alone, whilst Essex wished to come to terms with Tyrone. When Essex rushed into his final act of rebellion he gave out as one of his reasons his fear of being murdered by Raleigh and Lord Cobham, who at this time were allied.

After the death of Essex the question of the succession assumed a pressing importance with the imminence of the close of Elizabeth's reign. Cecil, allying himself with the intriguing Lord Henry Howard, assured himself of James's favour, and poisoned his ear against Raleigh and Cobham. Into Raleigh's feelings at this time it is impossible to penetrate with certainty, but it can hardly be doubted that, though he professed himself ready to support James's claim, he did not throw his whole heart into the cause of the Scottish king. Raleigh was the man of the struggle against Spain, self-reliant and unrelenting, eager to push on the reprisals on Spain till the Spanish monarchy was utterly beaten down. James was a lover of peace, anxious to live on good terms with all his neighbours, and under the belief that by fair dealing the Catholic powers and the pope himself might be brought to accept loyally the hand which he was ready to hold out. Raleigh, in short, wished to emphasize the differences which divided Christendom; James wished to treat them as hardly existing at all. When James came to the throne, therefore, he was certain to come into conflict with Raleigh, and not being able to see the advantage of keeping about him men of different tempers he dismissed him from the captaincy of the guard, compelled him to surrender the wardenship of the Stannaries, suspended his patent of wine licences as a monopoly, and took from him the governorship of Jersey, though for this he gave him a pension to compensate for his loss. That which followed it is impossible to fathom to the bottom. Raleigh must have been very angry, and it is quite possible that he may have used violent language and have even spoken of a Spanish invasion as preferable to the rule of James, or have declared his preference of the title of Arabella Stuart to that of the existing sovereign. The main witness against him was Cobham, and Cobham made and retracted his charges with such levity that it is impossible to trust to his evidence. Raleigh, however, was imprisoned, and, after attempting to commit suicide, was brought to trial at Winchester in November 1603, when he was condemned to death. The king, however, commuted his sentence upon the scaffold to one of imprisonment.

During his imprisonment in the Tower Raleigh devoted himself to chemical experiments and to literary work. It was here that he composed so much of the *History of the World* as was ever finished, and that he also issued pamphlets on questions of passing politics. Here too he learned that misfortune continued to follow him, and that there was a flaw in the conveyance by which he had made over Sherborne to trustees to save it from the usual consequences of attainder, and that James had seized it for his favourite Carr, though he gave in compensation £8000 and a pension of £400 a year for the lives of Lady Raleigh and her eldest son.

Raleigh's thoughts had often turned to Guiana. An offer made by him in 1612 to send Keymis to the gold mine which he believed to exist near the Orinoco was rejected, but in 1616 he was himself released at the intercession of Villiers, on the understanding that he was to go in person to Guiana, and was to visit the gold mine. As a security that he would not encroach upon the territory of Spain, he was to remain unpardoned, so that his life might be at the king's mercy if he broke his promise. It is probably not doing injustice to Raleigh to suppose that he had no intention of keeping it if it proved inconvenient. As far as was then known, indeed, the spot where the mine was supposed to be might be reached without passing a Spanish settlement, though he was aware that the Spaniards claimed the whole country as their own. To seize Spanish territory and to fight the Spaniards in every possible way was, however, regarded by him as altogether righteous as well as politic, and he had no respect for James's scruples, which arose partly from weakness, but partly also from a respect for international obligations, which in the case of Spain was foreign to Raleigh's mind. Most likely Raleigh thought that all would be well if he brought home sufficient evidence that the mine was worth possessing. Before he sailed he suggested to James that he should be allowed to attack Genoa, a city in dependence on Spain, and when this plan was rejected he entered into communication with the French ambassador and sent to the admiral of France to ask permission to bring into a French harbour all that he might gain on his voyage. The expedition turned out badly. His sailors would not ascend the Orinoco unless he remained at the mouth to keep off the Spaniards. Those who ascended found a Spanish village in the way, and after a sharp fight drove the Spaniards out and burned the place. The mine, if it really existed, they never reached, and Raleigh had to return to England with failure on his head. He was soon arrested and lodged in the Tower.

Whether James would have pardoned Raleigh if he had brought home large quantities of gold cannot now be said Coming home as he did, he had to bear the blame of the attack on the Spanish village, which he had done nothing to avert in his orders to the party going up the river. He was brought before a commission of the privy council. Notes taken of the proceedings have only partially been preserved, but it appears that there was strong evidence that after his failure he had attempted to induce his captains to seize Spanish prizes, or, in other words, to commit what James held to be an act of piracy, though Raleigh, with his views of the rightfulness of fighting Spain in America whatever the Governments in Europe might do, would doubtless have qualified it by another name. At last the commission decided against him, and he was sent to execution formally on his old sentence at Winchester, in reality for having allowed his men to shed Spanish blood after engaging that he would not do so. He was executed on 29th October 1618. His attitude against Spain gave him popularity at a time when the attempt of James to draw closer the bonds between Spain and England was repudiated by the great majority of the nation. (S. R. G.)

RAMAH. See SAMUEL.

RAMÁYÁNA See SANSKRIT LITERATURE.

RAMBAN. R. MOSHEH BEN NAḤMAN, or NACHMANIDES, was born before 1200 at Gerona, where he was rabbi and physician, and died between 1268 and 1270 in Palestine, probably at Acre. Although a Sepharadi in the later and larger sense of the word, he was the disciple of the greatest Provençal rabbis, and became the most celebrated Talmudist and cabbalist of his age in his own country.

1. Of his extant commentaries on the Bible that on the Pentateuch is the most valuable. Three editions may be named. (1) *Ed. prin.*, *s. l. et a.*, but certainly before 1480. According to oral tradition the compositors set the type in a waggon whilst travelling in Italy from place to place for the purpose of selling printed books. (2) Lisbon, 1489. (3) Naples, 1490. This book has been translated at least twice into Latin (Schiller-Szinessy, *Catal.*, i. pp. 174-177). The authorship of the commentary on Job, ascribed to Nachmanides, has been questioned, but without good grounds (*op. cit.*, pp. 211-213). The commentaries, however, generally ascribed to him on Canticles and Ruth are certainly not his.

2. Of his many works on Rabbinic literature we mention only: (1) השגות, *Strictures* on MAIMONIDES's (*q.v.*) *Sepher Hammiṣvoth* (Constantinople, 1510, 4to; Venice, 1550, folio,—the latter in Giustiniani's edition of Maimonides's *Mishneh Torah*. A cheap edition came out at Warsaw in 1883). (2) מלחמות ה׳, *i.e.*, *Remarks* against Rabbenu Zerahyah's *Maor* (both printed now with the *Riph*) and Hassaba (both in *Temim De'im*, §§ 225, 226). (3) ספר הזכות, vindication of Al-Phasi against RABAD (*q.v.*—the third) (Vienna, 1805). (4) הלכות, חדושים, לקוטות, *Decisions, Novellæ, and Collectanea*; these are spread over almost the whole Talmud. The *Responsa* ascribed to him are by his disciple Rashba. (5) דרשה, a sermon on the superiority of the Mosaic Law (best edition by Jellinek, Vienna, 1872, 8vo). (6) *Letters* (*a*) on the Maimonidean controversy (cheapest edition, Vilna, 1821, 8vo); (*b*) to his son, on conduct (Lisbon ed. of the Pent. com.); (*c*) Iggereth Hakkodesh, on the ethics of matrimony (latest edition, Berlin, 1793, 8vo); MSS. lie in almost every public library in Europe, *e.g.*, Cambridge. (7) תורת האדם, on *Sickness, Death, &c.* (Constantinople, 1518, folio),—partly ascetic and contemplative, partly Rabbinic ordinances; its last chapter separately under the title of שער הגמול (Naples, 1490, 4to, and reprints). (8) His anti-Christian controversies are chiefly contained in his ויכוח, a *Disputation* with the convert Pablo Christiani, the teacher of Raymundus Martini, held before Jayme I., king of Aragon; it is translated into Latin, and will be found, with a mutilated and otherwise corrupt text, in Wagenseil's *Tela ignea Satanæ* (Altdorf, 1681, 4to), the best and cheapest edition of the text and of the explanation of Isa. lii. 13 to liii. 12 being that of Dr Steinschneider (Berlin, 1860. 8vo). (9) Cabbalistic matter is contained in all Ramban's works (notably, however, in the Pentateuch[1] and Job); he has also a commentary on the *Sepher Yeṣirah* (Mantua, 1562, 4to, and reprints). (10) Nachmanides was also a liturgical writer of eminence. There are extant by him a prose prayer for one going on a sea voyage (*Yephe Noph*, Venice, 1575, 4to), and a piece of religious poetry (*Melo Chofnayim*, Berlin, 1840, 8vo, pp. 39-41) for the *Malkhiyyoth* (first part of the additional service of New Year); the latter is a *mostajāb* and betrays a perfect master both in kabbalah and poetry. For a specimen of Aramaic poetry see his introductory poem to *Milḥamoth Adonai*. (S. M. S.-S.)

RAMBOUILLET, chief town of an arrondissement in the department of Seine-et-Oise, France, 30 miles south-west of Paris on the line to Brest, is a small place of 5186 inhabitants, and derives its whole interest from the associations connected with the ancient château, which stands surrounded by a beautiful park of 2965 acres and a wide forest dating from the 14th century. A great machicolated tower and some apartments with good woodwork still remain. The gardens, partly in French, partly in English style, are picturesque, and have an avenue of Louisiana cypress unique in Europe. The park contains the national sheep-farm, where the first flock of merino sheep in France was raised last century The school of sheep-farming is of recent foundation. Here, too, is the first military school erected for soldiers' children.

Originally a royal domain, the lands of Rambouillet passed in the 14th century to the D'Angennes family, who held them for 300 years and built the château. Francis I. died there in 1547; and Charles IX. and Catherine de' Medici found a refuge in the château in the wars of religion, as Henry III. did after them. The famous marquise de Rambouillet is separately noticed below. Created a duchy and peerage in favour of the duke of Toulouse, son of Louis XIV., Rambouillet was subsequently bought and embellished by Louis XVI., who erected a model farm, sheep establishment, and other buildings. The place was a hunting-seat of Napoleon I. and Charles X., and it was here that in 1830 the latter signed his abdication.

RAMBOUILLET, CATHERINE DE VIVONNE, MARQUISE DE (1588-1665), a lady famous in the literary history of France, was born in 1588. She was the daughter and heiress of Jean de Vivonne, marquis of Pisani, and her mother Giulia was of the noble Roman family of Savelli. She was married at twelve years old to Charles d'Angennes, vidame of Le Mans, and afterwards marquis of Rambouillet. Her celebrity is due to the salon or literary meeting-place which she established as early as 1608 in the Hôtel de Rambouillet,—or, to give it its proper name, the Hôtel Pisani, for M. de Rambouillet had shortly before his marriage sold his family mansion. Madame de Rambouillet not merely endeavoured to refine the manners of her guests and gave special attention to literary conversation, but also seems to have taken great trouble to arrange her house for purposes of reception, and is said to have been the first to devise suites of rooms through which visitors could move easily. The hôtel was open for more than fifty years, and almost all the more remarkable personages in French society and French literature frequented it, especially during the second quarter of the century, when it was at the height of its reputation. The incidents connected with the salon of the "incomparable Arthénice" (an anagram for Catherine which is said to have taken two poets of renown, Malherbe and Racan, a whole afternoon to devise) are innumerable, and it would be impossible to recount them in any space here available. Among the more noteworthy are the sonnet war between the Uranistes and the Jobistes—partisans of two famous sonnets by Voiture and Benserade—and the composition by all the famous poets of the day of the *Guirlande de Julie*, a collection of poems on different flowers, addressed to Julie d'Angennes, Madame de Rambouillet's eldest daughter. Even more important is the rise of the Précieuses, who owed their existence to Madame de Rambouillet's salon and influence. These ladies—who are usually represented in the memory of posterity by Molière's avowed caricatures and by Mademoiselle de Scudéry, but whose name, it must be remembered, Madame de Sévigné herself was proud to bear—insisted on a ceremonious gallantry from their suitors and friends (though it seems from Tallemant's account that practical jokes of a mild kind were by no means excluded from the Hôtel de Rambouillet), and especially favoured an elaborate and quintessenced kind of colloquial and literary expression, such as at the end of the 16th and in the earlier part of the 17th century was fashionable throughout Europe. The immortal *Précieuses Ridicules* was no doubt directly levelled not at the Hôtel de Rambouillet itself but at the numerous coteries which in the course of years (for the salon had been open for more than a generation when Molière's piece, which was patronized by the real Précieuses themselves, appeared) had sprung up in imitation of it. But the satire did in truth touch the originators as well as the imitators,—the former more closely perhaps than they perceived. The Hôtel de Rambouillet continued open till the death of its mistress, 27th December 1665, but latterly it lost its peculiar position. It had no doubt a very considerable influence in bringing about the classicizing of French during the 17th century, though the literary work with which it is chiefly identified was of an older school than that of the age of Louis XIV. proper.

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[1] Nachmanides's acuteness and honesty are a sufficient guarantee that the *Bahir* (*Midrash*, 15; *Ency. Brit.*, xvi. p. 287), so often quoted in his Pentateuch commentary as a *bona fide* old book, cannot be a composition of his own time, as some have of late asserted.

The chief original authorities respecting Madame de Rambouillet and her set are Tallemant des Réaux in his *Historiettes* and Somaize in his *Dictionnaire des Précieuses*. Many recent writers have treated the subject, among whom MM. Cousin, Livet, and De Barthélemy deserve special mention.

RAMEAU, JEAN PHILIPPE[1] (1683-1764), musical theorist and composer, was born at Dijon, 25th September 1683. His musical education, partly in consequence of his father's desire to prepare him for the magistracy, still more through his own wayward disposition, was of a very desultory character; but his talent manifested itself at a very early age. In 1701 his father sent him to Milan to break off a foolish love-match. But he learned little in Italy, and soon returned, in company with a wandering theatrical manager, for whom he played the second violin. He next settled in Paris, where he published his *Premier Livre de Pièces de Clavecin*, in 1706. In 1717 he made an attempt to obtain the appointment of organist at the church of St Paul. Deeply annoyed at his unexpected failure, he retired for a time to Lille, whence, however, he soon removed to Clermont-Ferrand, where he succeeded his brother as organist at the cathedral, and here it was that his true art-life began.

Burning with desire to remedy the imperfection of his early education, Rameau now diligently studied the writings of Zarlino, Descartes, Mersenne, F. Kircher, and certain other well-known authors. He not only mastered their several theories but succeeded in demonstrating their weak points and substituting for them a system of his own, which, notwithstanding its manifest imperfection, was based upon firm natural principles, and ultimately led to discoveries of the utmost possible value to musical science. His keen insight into the constitution of certain chords, which in early life he had studied only by ear, enabled him to propound a series of hypotheses, many of which are now accepted as established facts; and, if, in his desire to carry out his system to a logical conclusion, he was sometimes tempted into palpable and dangerous error, it was only in obedience to the law which invariably renders the inventor of a new theory blind to the stubborn facts which militate against its universal application. His theory was based upon an instinctive anticipation of the discoveries of modern science. While the older contrapuntists were perfectly satisfied with the laws which regulated the melodious involutions of their vocal and instrumental parts, Rameau demonstrated the possibility of building up a natural harmony upon a fundamental bass, and of using that harmony as an authority for the enactment of whatever laws might be considered necessary for the guidance either of the contrapuntist or the less ambitious general composer. And in this he first explained the distinction between two styles, which, in deference to the views expressed by a popular critic of the present day, have been called the "horizontal and vertical systems," the "horizontal system" being that by which the older contrapuntists regulated the onward motion of their several parts, and the "vertical system" that which constructs an entire passage out of a single harmony. From fundamental harmonies he passed to inverted chords, to which he was the first to call attention; and the value of this discovery fully compensates for his erroneous theory concerning the chords of the eleventh and the great (*Angl.* "added") sixth.[2]

Rameau first set forth his new theory in his *Traité de l'Harmonie* (Paris, 1722), and followed it up in his *Nouveau Système* (1726), *Génération Harmonique* (1737), *Démonstration* (1750), and *Nouvelles Réflexions* (1752). But it was not only as a theorist that he became famous. Returning to Paris in 1722, he first attracted attention by composing some light dramatic pieces, and then showed his real powers in his first great opera, *Hippolyte et Aricie*, founded on Racine's *Phèdre*, and produced at the Académie in 1733. Though this work was violently opposed by the admirers of Lully, whose party spirit eventually stirred up the famous "guerre des bouffons," Rameau's genius was too brilliant to be trampled under foot by an ephemeral faction, and his ultimate triumph was assured. He afterwards produced more than twenty operas, the most successful of which were *Dardanus*, *Castor et Pollux*, *Les Indes Galantes*, and *La Princesse de Navarre*. Honours were now showered upon him. He was appointed conductor at the Opéra Comique, and the directors of the opera granted him a pension. King Louis XV. appointed him composer to the court in 1745, and in 1764 honoured him with a patent of nobility and the order of Saint Michael. But these last privileges were granted only on the eve of his death, which took place in Paris on 12th September 1764.

RAMESES (Gen. xlvii. 11; Exod. xii. 37; Num. xxxiii. 3), or, with a slight change in the vowel points, **RAAMSES** (Exod. i. 11), the name of a district and town in Lower Egypt, is notable as affording the mainstay of the current theory that King Rameses II. was the pharaoh of the oppression and his successor Menptah the pharaoh of the exodus. The actual facts, however, hardly justify so large an inference. The first three passages cited above are all by the priestly (post-exile) author and go together. Jacob is settled by his son Joseph in the land of Rameses and from the same Rameses the exodus naturally takes place. The older narrative speaks not of the land of Rameses but of the land of Goshen; it seems probable, therefore, that the later author interprets an obsolete term by one current in his own day, just as the Septuagint in Gen. xlvi. 28 names instead of Goshen Heroopolis and the land of Rameses. Heroopolis lay on the canal connecting the Nile and the Red Sea, and not far from the head of the latter, so that the land of Rameses must be sought in Wády Túmílát near the line of the modern freshwater canal. In Exod. i. 11, again, the store-cities or arsenals which the Hebrews built for Pharaoh are specified as Pithom and Raamses, to which LXX. adds Heliopolis. Pithom (the city of the god Tum) is probably the Patumus of Herod. ii. 158, which also lay on the canal, so here again Wády Túmílát is the district to which we are referred. But did the Israelites maintain a continuous recollection of the names of the cities on which they were forced to build, or were these names rather added by a writer who knew what fortified places were in his own time to be seen in Wády

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[1] Not Jean Baptiste, as erroneously stated by Gerber.

[2] For further information on this subject, see vol. xvii. p. 92.

Túmilát? The latter is far the more likely case, when we consider that the old form of the story of the Hebrews in Egypt is throughout deficient in precise geographical data, as might be expected in a history not committed to writing till the Israelites had resided for centuries in another and distant land. The post-exile or priestly author indeed gives a detailed route for the exodus (which is lacking in the older story), but he, we know, was a student of geography and might supplement tradition by what he could gather from traders as to the caravan routes.[1] And at all events to argue that, because the Hebrews worked at a city named after Rameses, they did so in the reign of the founder, is false reasoning, for the Hebrew expression might equally be used of repairs or new works of any kind.

It appears, however, from remains and inscriptions that Rameses II. did build in Wády Túmilát, especially at Tell Maskhúta, which Lepsius therefore identified with the Raamses of Exodus. This identification is commemorated in the name of the adjacent railway station. But recent excavations on the spot have brought to light further inscriptions, on the ground of which Naville makes the ruins those of Pithom and further identifies Pithom with the later Heroopolis. The identity of Pithom and Heroopolis is also favoured by comparison of the LXX. and the Coptic of Gen. xlvi. 28. See E. Naville, *The Store-city of Pithom and the Route of the Exodus*, London, 1885.

RAMESWARAM, a small island situated between Ceylon and India, at the entrance of Palk Strait in the Gulf of Manaar, in 9° 18′ N. lat. and 79° 22′ E. long. It is about 14 miles long by 5 wide, is low and sandy, and for the most part uncultivated. The estimated population of the island is about 14,000. It contains one of the most venerated Hindu shrines, founded, according to tradition, by Rama himself, which for centuries has been the resort of thousands of pilgrims from all parts of India. To the south of this great temple there is a freshwater lake about 3 miles in circumference. At the western extremity of the island is the small but busy port of Pambam, which gives its name to the channel between India and Ceylon.

Rameswaram island is the first link in the chain of islets and rocks forming Adam's Bridge. Geological evidence shows that this gap was once bridged by a continuous isthmus, which, according to the temple records, was breached by a violent storm in 1480. Operations for removing the obstacles in the channel, and for deepening and widening it, were begun in 1838. The main channel has a minimum depth of 14 feet; its length is 4232 feet and its breadth 80 feet. A second channel to the south, called the Kilkarai Passage, is 2100 feet long, 150 feet wide, and is dredged to a depth of 12 feet.

RAMMOHUN ROY. See ROY.

RAMPUR, a native state of India, in the Rohilkhand division of the North-Western Provinces, lying between 28° 26′ and 29° 10′ N. lat. and between 78° 54′ and 79° 33′ E. long. It is bounded on the N. and W. by the British district of Murádábád, and on the N.E. and S.E. by the district of Bareli. The country is level and generally fertile; it is well watered in the north by the rivers Kosila and Nahul and in the south by the Rámgangá. It adjoins the Tarái on the north, at the foot of the Himálayas, and is exceedingly unhealthy. The total area of the state is 945 square miles, with a population (1881) of 541,914 (males 282,359, females 259,555), of whom 302,989 were Hindus and 238,925 Mohammedans.

The revenue of Rámpur in 1883-84 was £167,031 and the ordinary annual expenditure £160,134. Rice, sugar, hides, and a kind of damask are the principal exports, and the imports comprise elephants, English cloth, and groceries and salt. During the mutiny of 1857 the nawab of Rámpur rendered important services to the British, for which he received a grant of land assessed at £12,852 in perpetuity, besides other honours.

RÁMPUR, capital of the above state, stands on the left bank of the Kosila in 28° 48′ N. lat. and 79° 4′ E. long.; it is surrounded by a belt of bamboo trees and brushwood, with a low ruined parapet, and is the residence of the nawab, who represents the Rohilla chieftains of Rohilkhand. A lofty mosque stands in the marketplace; the streets are densely crowded together and principally built of mud. The population of the town in 1881 numbered 74,250 (males 36,355, females 37,895); it is famous for fine shawls and damask, which are exported to all parts of India.

RAMPUR BEULEAH. See RÁJSHÁHÍ, *supra*, p. 261

RAMSAY, ALLAN (1686-1758), author of the *Gentle Shepherd*, a pastoral drama in the Lowland Scotch dialect, was born in Lanarkshire in 1686. An Edinburgh barber set agoing the literary movement in Scotland that culminated in the poetry of Burns. This peasant-poetry is often spoken of as if it were a spontaneous indigenous product, but the harvest that ripened towards the close of the 18th century had its seed-time earlier, and the seeds were imported from England. Allan Ramsay was a peasant by birth (although he claimed kinship with the noble family of Dalhousie)—the son of a manager of lead-mines in Lanarkshire; but the country-bred lad was transplanted to a town, being apprenticed at the age of fifteen to a barber in Edinburgh. In this calling he somehow made the acquaintance of a band of Jacobite young gentlemen of literary tastes, was admitted to the convivialities of their "Easy Club," and formally adjudged "a gentleman." The basis of the club seems to have been literary, the members taking fancy names of celebrities,—Buchanan, Boece, Bickerstaff, and so forth. Ramsay's name was Bickerstaff, and the fact is of some importance as showing how he was brought into contact with the discussion of the theory of pastoral poetry among the London wits of the time. Ramsay's connexion with the Easy Club lay between 1712 and 1715, and in the course of that period occurred the dispute about pastoral poetry occasioned by the great publication of Pope's *Windsor Forest* (see POPE). The *Guardian* for 7th April 1713 (No. 23) contained a description of a true pastoral poem, which was afterwards realized by Ramsay in the *Gentle Shepherd* with such scrupulous fidelity in every detail that the criticism might fairly be described as the recipe from which the poem was made. There is not a clearer case in literary history of the influence of criticism on creation; Ramsay's great pastoral—and it well deserves the epithet—was the main outcome of the prolonged discussion of that kind of poetry by the Queen Anne wits. "Paint the manners of actual rustic life," said the *Guardian* critic to the poet, "not the manners of artificial shepherds and shepherdesses in a fictitious golden age; use actual rustic dialect; instead of satyrs and fauns and nymphs introduce the supernatural creatures of modern superstition." These precepts Ramsay diligently observed, and the result was that his *Gentle Shepherd* not only attracted attention among the learned students of poetry as a literary curiosity, the first genuine pastoral after Theocritus, but at once became a favourite and a living force among the peasantry in whose dialect it was written and for whose characters it furnished ideal models. There was hardly a farmhouse in Scotland in which a copy of the poem was not to be found, and the moral force of the ideal exhibited in the hero Patie may be traced in the character of Burns and many another Scottish peasant-bard in whom ostentatious libertinism is not redeemed by the same genius. From a moral point of view a better exemplar than Ramsay's ideal hero might well have been desired. The poet-laureate of the Easy Club took his moral tone from the poets of the Restoration, with whom his Jacobite boon companions were in full sympathy; and thus through the genial, convivial, quick-witted, and slily humorous barber the spirit of the Restoration passed into the homes of the Scotch peasantry to do battle with the austere spirit of the kirk.

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[1] From the position of the words it is even not unlikely that "Pithom and Raamses" may be the addition of a redactor, and that the first author of Exod. i. 11 only spoke generally of store-cities.

The *Gentle Shepherd* is the only production of Ramsay's that has much claim to remembrance. His lyrics for the most part are poor artificial imitations, adorned here and there with pretty fancies, but devoid of sincerity of feeling. He is happier in his humorous descriptions of character and occasional personal poems; "renowned Allan, canty callan," as his admirers loved to call him, had a quick sense of the ridiculous and a firm touch in the exhibition of what amused him. Once he had established a character as a poet he abandoned the trade of wig-making, set up as a bookseller, and was the first to start a circulating library in Scotland. From his shop in High Street opposite Niddry Street he issued his incidental poems in broadsheets, and made a volume of them in 1721, and another in 1728. The nucleus of the *Gentle Shepherd* was laid in separately issued pastoral dialogues; round these the complete drama was built and published as a whole in 1725. As a collector, editor, imitator, and publisher of old Scottish poetry Ramsay gave an impetus to vernacular literature at least as great as that given by his principal original poem. His *Tea-Table Miscellany*, published in 1724, for which English as well as Scottish poets and moderns as well as ancients were laid under contribution, was extremely popular; and his *Evergreen* (1724), a collection of poems written prior to 1600, was the precursor of Bishop Percy's *Reliques* in a similar field. A collection of *Fables*, published complete in 1730, part original, part translated from La Motte and La Fontaine, was Ramsay's last literary work, but he lived to an advanced age, dying in 1758, the year before the birth of Burns. One of the speculations of the enlightened and enterprising man of business was a theatre, which was opened in 1736, but soon shut up by the magistrates.

A complete edition of Ramsay's poems was issued by A. Gardner in 1877.

RAMSAY, Allan (1713-1784), portrait-painter, the eldest son of the author of *The Gentle Shepherd*, was born at Edinburgh about 1713.[1] Ramsay manifested an aptitude for art from an early period, and at the age of twenty we find him in London studying under the Swedish painter Hans Huyssing, and at the St Martin's Lane Academy; and in 1736 he left for Rome, where he worked for three years under Solimena and Imperiali (Fernandi). On his return he settled in Edinburgh; and, having attracted attention by his head of Forbes of Culloden and his full-length of the duke of Argyll, he removed to London, where he was patronized by the duke of Bridgewater. His pleasant manners and varied culture, not less than his artistic skill, contributed to render him popular. In 1767 the Scotsman was appointed to succeed Shakelton as principal painter to His Majesty; and so fully employed was he on the royal portraits which the king was in the habit of presenting to ambassadors and colonial governors that he was forced to take advantage of the services of a host of assistants—of whom David Martin and Philip Reinagle are the best known—upon the minor portions of his works, and sometimes on the faces themselves. His life in London was varied by frequent visits to Italy, where he occupied himself more in literary and antiquarian research than with art. But at length this prosperous career came to an end. The painter's health was shattered by an accident, a dislocation of the right arm. With an unflinching pertinacity, which we can understand when we see the firm-set resolute mouth of his own portrait, he struggled till he had completed a likeness of the king upon which he was engaged at the time, and then started for his beloved Italy, leaving behind him a series of fifty royal portraits to be completed by his assistant Reinagle. For several years he lingered in the south, his constitution finally broken. He died at Dover on the 10th of August 1784.

In his art Ramsay paid the penalty of popularity: the quality of the work which bears his name suffered from his unremitting assiduity as a court-painter and from his unsparing employment of assistants. Among his most satisfactory productions are some of his earlier ones, such as the full-length of the duke of Argyll and the numerous bust-portraits of Scottish gentlemen and their ladies which he executed before settling in London. They are full of both grace and individuality; the features show excellent draughtsmanship; and the flesh-painting is firm and sound in method, though frequently tending a little to hardness and opacity. His full-length of Lady Mary Coke is an especially elegant female portrait, remarkable for the skill and delicacy with which the white satin drapery is managed; while in the portrait of his brown-eyed wife, the eldest daughter of Sir Alexander Lindsay of Evelick, in the Scottish National Gallery, we have a sweetness and tenderness which shows the painter at his highest. This last-named work shows the influence of French art, an influence which helped greatly to form the practice of Ramsay, and which is even more clearly visible in the large collection of his sketches in the possession of the Royal Scottish Academy and the Board of Trustees, Edinburgh.

RAMSAY, Andrew Michael (1686-1743), commonly called the "Chevalier Ramsay," who was born at Ayr, Scotland, on 9th January 1686, is noteworthy as having been among the few writers not of French birth who are admitted by French criticism to have written in French with purity and scholarship. Ramsay visited France comparatively early and came under the influence of Fénelon, which made him a convert to Roman Catholicism. He held several important tutorships in his adopted country, the chief of which was the charge of Prince Charles Edward and the future cardinal of York. His biographers mention with surprise the conferring of an honorary degree upon him by the university of Oxford. The claim was nominally his discipleship to Fénelon, but in reality beyond doubt his connexion with the Jacobite party. He died at St Germain-en-Laye (Seine-et-Oise) on 6th May 1743.

Ramsay's principal work was the *Travels of Cyrus* (London and Paris, 1727), a book composed in avowed imitation of *Télémaque*. He also edited *Télémaque* itself with an introduction, and wrote an *Essai de Politique* on the principles of his master and a *Histoire de la Vie et des Ouvrages de Fénelon*, besides a partial biography of Turenne, some poems in English, and other miscellaneous works.

RAMSAY, David (1749-1815), American physician and historian, was the son of an Irish emigrant, and was born in Lancaster county, Pennsylvania, on 2d April 1749. After graduating M.D. at Princeton College in 1765 he settled as a physician at Charleston, where he obtained an extensive practice. During the revolutionary war he served as a field-surgeon, and in 1776 he became a member of the South Carolina legislature. Having acted as one of the "council of safety" at Charleston, he was on the capture of that city on 27th August 1780 seized by the British as a hostage, and for nearly a year was kept in confinement at St Augustine. From 1782 to 1786 he was a member of Congress. His interest in the revolutionary struggle led him to devote his leisure to the preparation of several historical works on the subject, and in 1785 he published in two volumes *History of the Revolution in South Carolina*, in 1789 in two volumes *History of the American Revolution*, in 1801 a *Life of Washington*, and in 1809 in two volumes a *History of South Carolina*. He was also the author of several minor works. He died at Charleston on 8th May 1815 from a wound inflicted by a lunatic. His *History of the United States* in 3 vols. was published posthumously in 1816, and forms the first three volumes of his *Universal History Americanized*, published in 12 vols. in 1819.

RAMSDEN, Jesse (1735-1800), astronomical instrument maker, was born at Salterhebble near Halifax, Yorkshire, in 1735. He went to London in 1755, and was shortly afterwards bound apprentice to a mathematical instrument maker. He afterwards started business on his own account and acquired great celebrity as an artist. He died on 5th November 1800.

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[1] There seems to be some dubiety as to the exact date: the brothers Redgrave, in their *Century of Painters*, give the date as 1709, while Samuel Redgrave, in his *Dictionary of Painters of the English School* states it as 1713, a year—probably the correct one—assumed by Cunningham in his *Lives*.

Ramsden's speciality was divided circles, which began to supersede the quadrants in observatories towards the end of the 18th century. His most celebrated work was a 5-feet vertical circle, which was finished in 1789 and was used by Piazzi at Palermo in constructing his well-known catalogue of stars. He was the first to carry out in practice a method of reading off angles (first suggested in 1768 by the duke of Chaulnes) by measuring the distance of the index from the nearest division line by means of a micrometer screw which moves one or two fine threads placed in the focus of a microscope. Ramsden's transit instruments were the first which were illuminated through the hollow axis: the idea was suggested to him by Professor Ussher in Dublin.

RAMSGATE, a seaport and watering-place of England, in the Isle of Thanet, Kent, and a "vill" of the old Cinque Port of Sandwich, is finely situated between chalk cliffs at the northern extremity of Pegwell Bay, on the London, Chatham, and Dover Railway, 79 miles east-south-east of London. It possesses a fine stretch of sand, and is much frequented as a watering-place. It first rose into importance in the beginning of the 18th century through its trade with Russia. In 1749 it was selected as a harbour of refuge for the Downs, and the erection of a pier under the direction of Smeaton was begun in 1787. The harbour has been improved at various periods, and now (1885) covers an area of 51 acres, enclosed by two piers, one about 1200 and the other about 1500 feet in length, accommodation being afforded for as many as 400 sail. The limits of the port were extended in 1882. A considerable shipping trade in coal and provisions is carried on, and there is also a fleet of 150 vessels engaged in the North Sea fishery. A fine promenade pier was erected in 1881. The town possesses a town-hall (1839), assembly rooms, and extensive bathing establishments. The church of St George was built in 1826. There is a small Roman Catholic cathedral, built by Welby Pugin. The neighbouring Pegwell Bay, famed for its shrimps, is supposed to have been the scene of the landing of Hengist and Horsa, and at Cliff's End (Ebbs Fleet) a monolithic cross marks the landing-place of St Augustine in 596. On the summit of Osengal Hill, about a mile to the west of the town, a graveyard of the early Saxon settlers was discovered during the cutting of the railway. Ramsgate was incorporated as a borough in 1884. The population of the urban sanitary district (area 2278 acres) in 1871 was 19,640, and in 1881 22,683, or, including 638 fishermen at sea, 23,321.

RAMUS, Peter, or Pierre de la Ramée (1515-1572), logician, was born at the village of Cuth in Picardy in the year 1515. He was descended from a noble family, which had fallen, however, into such poverty that his father earned his livelihood as a field-labourer. The early death of his father increased Ramus's difficulties in obtaining the education for which he thirsted. But at last his perseverance was rewarded by admission, in a menial capacity, to the college of Navarre. He worked with his hands by day and carried on his studies at night. The reaction against scholasticism was still in full tide; it was the transition time between the old and the new, when the eager and forward-looking spirits had first of all to do battle with scholastic Aristotelianism. In the domain of logic men like Laurentius Valla, Rudolphus Agricola, and Ludovicus Vives, imbued with the spirit of the Renaissance, had already invoked Cicero against the barbarous Latinity of the scholastic compends; and, following the same prototype, they had proposed various innovations which tended to assimilate logic to rhetoric. Ramus outdid his predecessors in the impetuosity of his revolt. He signalized himself on the occasion of taking his degree (1536) by victoriously defending the daring thesis—Everything that Aristotle taught is false. This *tour de force* was followed up by the publication in 1543 of *Aristotelicæ Animadversiones* and *Dialecticæ Partitiones*, the former a criticism on the old logic and the latter a new text-book of the science. What are substantially fresh editions of the *Partitiones* appeared in 1547 as *Institutiones Dialecticæ*, and in 1548 as *Scholæ Dialecticæ*; his *Dialectique*, a French version of his system, is the earliest work on the subject in the French language. Meanwhile Ramus, as graduate of the university, had opened courses of lectures; but his audacities drew upon him the determined hostility of the conservative party in philosophy and theology. He was accused of undermining the foundations of philosophy and religion, and the matter was brought before the parlement of Paris, and finally before the king. By him it was referred to a commission of five, who found Ramus guilty of having "acted rashly, arrogantly, and impudently," and interdicted his lectures (1544). He withdrew from Paris, but soon afterwards returned, the decree against him being cancelled through the influence of the cardinal of Lorraine. In 1551 Henry II. appointed him professor of philosophy and eloquence at the Collége de France, where for a considerable time he enjoyed free scope for his energies. His incessant literary activity is proved by the fifty works which he published in his lifetime, to which must be added nine that appeared after his death. In 1561, however, the slumbering enmity against Ramus was suddenly fanned into flame by his adoption of Protestantism. He had to flee from Paris for his life; and, though he found an asylum in the palace of Fontainebleau, his house was pillaged and his library burned in his absence. He resumed his chair after this for a time, but in 1568 the position of affairs was again so threatening that he found it advisable to ask permission to travel. He travelled mainly in Switzerland and Germany, residing some time in Basel, Heidelberg, Geneva, and Lausanne, and meeting everywhere with the most flattering reception. Returning to France, Ramus at last fell a victim to the inveterate hate of his opponents: he perished by the hands of hired assassins in the massacre of St Bartholomew (1572)

The logic of Ramus enjoyed a great celebrity for a time, and there existed a school of Ramists boasting numerous adherents in France, Germany, and Holland. As late as 1626 Burgersdyck divides the logicians of his day into the Aristotelians, the Ramists, and the Semi-Ramists, who endeavoured, like Goclenius of Marburg, to mediate between the contending parties. Ramus's works appear among the logical text-books of the Scottish universities, and he was not without his followers in England in the 17th century. There is even a little treatise from the hand of Milton, published two years before his death, called *Artis Logicæ Plenior Institutio ad Petri Rami Methodum concinnata*. It cannot be said, however, that Ramus's innovations mark any epoch in the history of logic; and, though some of his additions have maintained their ground, he has made no contribution of fundamental importance to the science. His rhetorical leaning is seen in the definition of logic as the "ars disserendi"; he maintains that the rules of logic may be better learned from observation of the way in which Cicero persuaded his hearers than from a study of the *Organon*. The distinction between natural and artificial logic, *i.e.*, between the implicit logic of daily speech and the same logic made explicit in a system, passed over into the logical handbooks. Logic falls, according to Ramus, into two parts—invention (treating of the notion and definition) and judgment (comprising the judgment proper, syllogism, and method). This division gave rise to the jocular designation of judgment or mother-wit as the "secunda Petri." He is, perhaps, most suggestive in his emendations of the syllogism. He admits only the first three figures, as in the original Aristotelian scheme, and in his later works he also attacks the validity of the third figure, following in this the precedent of Laurentius Valla. Ramus also set the modern fashion of deducing the figures from the position of the middle term in the premises, instead of basing them, as Aristotle does, upon the different relation of the middle to the so-called major and minor term. On the whole, however, though Ramus may be allowed to have advanced logical study by the wholesome fermentation of thought which he caused, we are at a loss to see the grounds for his pretentious claim to supersede Aristotle by a new and independent system.

See Waddington-Kastus, *De Petri Rami vita, scriptis, philosophia*, Paris, 1848; Charles Desmaze, *Petrus Ramus, professeur au Collége de France, sa vie, ses écrits, sa mort*, Paris, 1864.

RAMUSIO. The noble family of Ramusio—the spelling adopted in the publication of the *Navigationi*, though it is also written Rannusio, Rhamnusio, Rannusio, &c.—was one of note for literary and official ability during at least four generations. Its original home was in Rimini, and the municipality of that city has within the last few years set up a tablet on the town hall bearing an inscription which may be thus rendered: "The municipality of Rimini here records the claim of their city to the family of the Ramusios, adorned during the 15th and 16th centuries by the illustrious jurist and man of letters Paolo the elder, who rendered the work of Valturius, our fellow-citizen, into the vernacular; by the physician Girolamo, a most successful student of Oriental tongues, and the first to present Europe with a translation of Avicenna; and by Giovanni Battista, cosmographer to the Venetian republic and secretary to the Council of Ten, who bequeathed to the world that famous collection of voyages and travels, regarded in his own day as a marvellous work, and still full of authority among all civilized nations."

Paolo the Elder (*c.* 1443-1506), the first of those thus commemorated, migrated in 1458 from Rimini to Venice, where he obtained full citizenship, studied law, and became a member of the magistracy, filling the offices of *vicario*, of judicial assessor, and of criminal judge under various administrators of the Venetian provinces on the continent. He continued, however, to maintain relations with the Malatesta princes of his native city, and in 1503 negotiated with them the cession of Rimini to the republic. The wife of Paolo, bearing the singular name of Tomyris Macachio, bore him three sons and four daughters. Paolo died at Bergamo on 19th August 1506 at the age of sixty-three, and was buried in S. Agostino at Padua. Paolo was the author of a variety of legal treatises and the like, and also published at Verona in 1483 both a corrected edition and an Italian translation of a once famous book, *Valturius, De re militari*, dedicating both to Pandolfo Malatesta of Rimini.[1]

Girolamo (1450-1486), younger brother of Paolo, had a notable history. After he had studied medicine at Padua public suspicion was roused against him in connexion with the death of a lady with whom he had had some love passages, and this ran so high that he was fain, by help of his brother Paolo, to whom he transferred his property, to make his escape (about 1481-83) to Syria and to take up his abode at Damascus. In 1486 he removed to Beyrout, and died the same year, killed, as the family chronicler relates, by a surfeit of "certain fruit that we call *armellini* and *albicocche*, but which in that country are known as *mazzafranchi*," a title which English sailors in southern regions still give to apricots in the vernacular paraphrase of *kill-johns*. During his stay in Syria Girolamo studied Arabic and made a new translation of Avicenna, or rather, we may assume, of some part of that author's medical works (the *Canon*?). It was, however, by no means the first such translation, as is erroneously alleged in the Rimini inscription, for the *Canon* had been translated by Gerard of Cremona (d. 1187), and this version was frequently issued from the early press. Girolamo's translation was never printed, but was used by editors of versions published at Venice in 1579 and 1606. Other works of this questionable member of the house of Ramusio consisted of medical and philosophical tracts and Latin poems, some of which last were included in a collection published at Paris in 1791.[2]

Gian Battista (1485-1557), the eldest son of Paolo Ramusio and Tomyris Macachio, was born at Treviso in 1485 (20th June). Having been educated at Venice and at Padua, at an early age he entered the public service (1505), becoming in 1515 secretary of the senate and in 1533 secretary of the Council of Ten. He also served the republic in various missions to foreign states, *e.g.*, to Rome, to Switzerland, and to France, travelling over much of the latter country by special desire of the king, Louis XII. He also on several occasions filled the office of *cancellier grande*. In 1524 he married Franceschina, daughter of Francesco Navagero, a noble,—a papal dispensation being required on account of her being cousin to his mother Tomyris. By this lady he had one son, Paolo. In his old age Ramusio resigned the secretaryship and retired to the Villa Ramusia, a property on the river Masanga, in the province of Padua, which had been bestowed on his father in 1504 in recognition of his services in the acquisition of Rimini the year before. The delights of this retreat are celebrated in the poems and letters of several of Gian Battista's friends. He also possessed a house at Padua in the Strada del Patriarcato, a mansion noted for its paintings and for its collection of ancient sculpture and inscriptions. These, too, are commemorated by various writers. A few days before his death Ramusio removed to this house in Padua, and there died, 10th July 1557, at the age of seventy-two. He was, by his own desire, buried at Venice, in the tomb which he had made for his mother, in Santa Maria dell' Orto. His wife's death had occurred in 1536. In the work called *Museum Mazzuchellianum* (Venice, 1761, vol. i. pl. lxiv. No. 6) there is represented a 16th-century medal of Ramusio, which looks a genuine likeness, and a bronze example of which, without the reverse,[3] is preserved in St Mark's Library. There was a portrait of him, represented as in conversation with Andrea Gradenigo, in the Sala del Maggior Consiglio, but in 1577 this perished in a fire, as did also a portrait of his father, Paolo. A professed portrait of Gian Battista by Francesco Grisellini, in the Sala dello Scudo, appears to be, like the companion portrait of Marco Polo, a work of fancy. A public nautical school at Rimini has within the last three years received from the Government the title of the Istituto Ramusio.

Ramusio was evidently a general favourite, as he was free from pushing ambition, modest, and ingenuous, and, if it be safe to judge from some of the dissertations in his *Navigationi*, must have been a delightful companion; both his friend Giunti and the historian Giustiniani[4] speak of him with the strongest affection. He had also a great reputation for learning. Before he was thirty Aldus Manutius the elder dedicated to him his edition of Quintilian (1514); a few years later (1519) Francesco Ardano inscribed to him an edition of Livy, and in 1528 Bernardino Donati did the like with his edition of Macrobius and Censorinus. To Greek and Latin and the modern languages of southern Europe he is said to have added a knowledge of "Oriental tongues," but there is no evidence how far this went, unless we accept as such a statement that he was selected in 1530 on account of this accomplishment to investigate the case of one David, a Hebrew, who, claiming to be of the royal house of Judah, wished to establish himself at Venice outside of the Ghetto.[5] But

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[1] Both works are in the British Museum.

[2] "Ramusii Ariminensis Carmina," in *Quinque Illustrium Poetarum Lusus in Venerem*. Girolamo's are grossly erotic.

[3] The reverse is an amorphous map. The book is in the British Museum.

[4] *Rerum Venetarum . . . Historia*, bk. xiv.

[5] Ramusio's report on this Hebrew is preserved in the diaries of Marino Sanudo, and is printed by Cigogna. It is curious. David represented himself as a prince of the Bedouin Jews who haunt the caravan-road between Damascus and Medina; he claimed to be not only a great warrior covered with wounds but great also in the law and in the cabala, and to have been inspired by God to conduct the

Ramusio had witnessed from his boyhood the unrolling of that great series of discoveries by Portugal and Spain in East and West, and the love of geography thus kindled in him made that branch of knowledge through life his chief study and delight. He is said, with the assistance of friends touched by the same flame, to have opened a school for geography in his house at Venice. And it appears from a letter addressed to him by his friend Andrea Navagero, that as early as 1523 the preparation of material for his great work had already begun. The task had been suggested and encouraged, as Ramusio himself states in a dedicatory epistle to the famous Girolamo Fracastoro, by that scholar, his lifelong friend; an address to the same personage indeed introduced each of the three volumes, and in the first the writer speaks of his desire to bequeath to posterity, along with his labours, "a testimony to the long and holy friendship that had existed between the two." They were contemporaries in the strictest sense (Ramusio 1485-1557, Fracastorius 1483-1553). His correspondence, which was often devoted to the collection of new material for his work, was immense, and embraced many distinguished men. Among those whose names have still an odour of celebrity were Fracastoro, just mentioned, Cardinal Bembo, Damiano de Goez, and Sebastian Cabot; among lesser lights, Vettor Fausto, Daniel Barbaro, Paolo Manuzio, Andrea Navagero, the cardinals Gasparo Contarini and Gregorio Cortese, and the printer Tommaso Giunti, editor after Ramusio's death of the *Navigationi*. Before speaking more particularly of this work we may conclude the history of the family.

PAOLO (GIROLAMO GASPARE)[1] (1532-1600) was the only child of Gian Battista, and was born on 4th July 1532. Like his father, he maintained a large correspondence with many persons of learning and note. In 1541 Francesco Contarini, procurator of St Mark's, brought from Brussels a MS. of Villehardouin's *History of the Conquest of Constantinople*, which he presented to the Council of Ten. In 1556 they publicly ordered its translation into Latin, and gave the commission to Paolo Rannusio. His father also seems to have taken much interest in the work, for a MS. vernacular translation by him exists in the Marciana. Paolo's book was not completed till 1573, many years after the father's death, and was in fact a paraphrase enlarged from other sources, thus, according to Cigogna's questionable judgment, "converting the dry story of Villehardouin into an elegant (*fiorita*) historical work." It was not published till 1609, nine years after Paolo's death; nor was it ever really reprinted, though it became the subject of a singular and unintelligible forgery. For Jacopo Gaffarelli, who was sent to Venice to buy books for Richelieu, having apparently procured the "remainder" copies, removed the title and preliminary pages and substituted a fresh title with the date 1634, and a dedication to his master the cardinal.[2]

GIROLAMO GIUSEPPE (1555-1611), the son of Paolo, was born at Venice in 1555. He entered the public service in 1577, and was employed in connexion with various foreign missions. In 1601 he published at Lyons the French text of Villehardouin; and, besides an Italian translation of this old historian (who seems thus to have furnished occupation for three generations of Ramusios), he left behind him a *Storia o Cronaca di Casa Ramusia*, a folio MS. still in St Mark's Library. He died at Padua in 1611, and his posterity did nothing to continue the reputation of the family, official or literary.

We revert to the *Navigationi e Viaggi*. Two volumes only were published during the life of Gian Battista, vol. i. in 1550, vol. iii. in 1556; vol. ii. did not appear till 1559, two years after his death, delayed, as his friend and printer T. Giunti explains, not only by that event but by a fire in the printing-office (November 1557), which destroyed a part of the material which had been prepared. It had been Ramusio's intention to publish a fourth volume, containing, as he mentions himself, documents relating to the Andes, and, as appears from one of the prefaces of Giunti, others relating to explorations towards the Antarctic.[3] Ramusio's collection was by no means the first of the kind, though it was, and we may say on the whole continues to be, the best. Even before the invention of the press such collections were known, of which that made by a certain Long John of Yprès, abbot of St Bertin, in the latter half of the 14th century was most meritorious, and afforded in its transcription a splendid field for embellishment by the miniaturists, which was not disregarded. The best of the printed collections before Ramusio's was the *Novus Orbis*, edited at Basel by Simon Grynaeus in 1532, and reissued in 1537 and 1555. This, however, can boast of no disquisitions nor of much editorial judgment. Ramusio's collection is in these respects far superior, as well as in the variety and fulness of its matter. He spared no pains in ransacking Italy and the Spanish peninsula for contributions, and in translating them when needful into the racy Italian of his day. Several of the pieces are very rare in any other shape than that exhibited in Ramusio's collection; several besides of importance—*e.g.*, the invaluable travels of Barbosa and Pigafetta's account of Magellan's voyage—were not publicly known in any complete form till the present century. Of two important articles at least the originals have never been otherwise printed or discovered; one of these is the *Summary of all the Kingdoms, Cities, and Nations from the Red Sea to China*, a work translated from the Portuguese, and dating apparently from about 1535; the other, the remarkable Ramusian redaction of MARCO POLO (*q.v.*). The *Prefatione*, *Espositione*, and *Dichiarazione*, which precede this version of Marco Polo's book, are the best and amplest examples of Ramusio's own style as an editor. They are full of good sense and of interesting remarks derived from his large reading and experience, and few pictures in words were ever touched more delightfully than that in which he sketches the return of the Polo family to their native city, as he had received it in the tradition of the Venetian elders.

There were several editions of the *Navigationi e Viaggi*, and as additions continued to be made to the several volumes a good deal of bibliographical interest attaches to these various modifications.[4] The two volumes (i. and iii.) published in Ramusio's lifetime do not bear his name on the title-page, nor does it appear in the addresses to his friend Fracastorius with which these volumes begin (as does also the second and posthumous volume). The editions of vol. i. are as follows—1550, 1554, 1563, 1588, 1606, 1613.[5] The edition of 1554 contains the following articles which are not in that of 1550,—(1) copious index; (2) "Narr. di un Compagno di Barbosa"; (3) "Informationi del Giapan"; (4) "Alli Lettori di Giov. de Barros"; (5) "Capitoli estratti da di Barros." The edition of 1563 adds to these a preliminary leaf concerning Ramusio, "Tommaso Giunti alli Lettori." After 1563 there is no change in the contents of this volume, only in the title-page. It should be added that in the edition of 1554 there are three double-page woodcut maps (Africa, India, and India extra Gangem), which do not exist in the edition of 1550, and which are replaced by copper-plate maps in subsequent editions. These maps are often missing. The editions of vol. ii. are as follows—1559, 1574, 1583, 1606. There are important additions in the 1574 copy, and still further additions in that of 1583. The additions made in 1574 were—(1) "Herberstein, Della Moscovia e della Russia"; (2) "Viaggio in Persia di Caterino Zeno"; (3) "Scoprimento dell' Isola Frislanda, &c., per due fratelli Zeni"; (4) "Viaggi in Tartaria per alcuni frati Minori"; (5) "Viaggio del Beato Odorico" (two versions). Further additions made in 1583 were—(1) "Navigatione di Seb. Cabota"; (2) at the end 90 ff. with fresh pagination, containing ten articles on "Sarmatia, Polonia, Lithuania, Prussia, Livonia, Moscovia, and the Tartars by Aless. Guagnino and Matteo di Micheovo." The two latest "editions" of vol. ii. are identical, *i.e.*, from the same type, with a change of title-page only, and a reprint of the last leaf of the preface and of the last leaf of the book. But the last circumstance does not apply to all copies. In one now before the

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dispersed tribes to the Holy Land and to rebuild the temple. In this view he had visited Prester John and the Jews in his kingdom, and then various European countries. David was dark in complexion, "like an Abyssinian," lean, dry, and Arab-like, well dressed and well attended, full of pretensions to supernatural cabalistic knowledge, and with enthusiastic ideas about his mission, whilst the Jews regarded him as a veritable Messiah.

[1] This person and his son affected the spelling Rannusio.

[2] In the British Museum.

[3] See in vol. iii. the end of Ramusio's *Discorso* on the conquest of Peru, and Giunti's "Alli Lettori" in the 3d edition of the first volume.

[4] Brunet's statements on the subject are borrowed, and not quite accurate. The detail in Cigogna seems to be accurate, but it is vague as to the deficiencies of the earlier editions.

[5] All of these are in the British Museum.

writer, whilst the title bears 1606, the colophon bears "Appresso i Giunti, 1583." Vol. iii. editions are of 1556, 1565, and 1606.[1] There is no practical difference between the first two, but that of 1606 has forty-five pages of important new matter, which embraces the *Travels* of Cesare Fedrici or Federici in India, one of the most valuable narratives of the 16th century, and *Three Voyages of the Hollanders and Zealanders to Nova Zembla and Greenland*. Vol. iii. also contains (omitting maps and figures inserted in the text, or with type on the reverse) a two-page topographical view of Cuzco, a folding map of Terra Nova and Labrador, a two-page map of Brazil, a two-page map of Guinea, &c., a two-page map of Sumatra, a two-page pictorial plan of the town of Hochelaga in New France, and a general map of the New World in a hemisphere. Brunet's statement mentions issues of vol. ii. in 1564, and of vol. iii. in 1613; but these seem to have no existence. It would thus appear that a set of Ramusio, to be as complete as possible, should embrace—for vol. i., 1563 or any subsequent edition; for vol. ii., 1583 or 1606; for vol. iii., 1606

Besides the circumstances to be gathered from the *Navigationi* regarding the Ramusio family see the *Iscrizioni Venete* of Emanuele Cicogna. There is also in the British Museum *Monografia letta il 14 Marzo 1883* . . . by Guglielmo Carradori, Rimini, 1883; but hardly anything has been found in this except the inscription quoted at the beginning of this article. (H. Y.)

RANCE, ARMAND JEAN LE BOUTHILLIER DE. See TRAPPISTS.

RANDERS, a town of Denmark, at the head of an amt in the province of North Jutland (Nörrejylland), on the Gudenaa, about 8 miles above its junction with Randers Fjord, an inlet of the Cattegat. It is situated on the railway that runs south by Aarhuus to Fredericia, and has a branch line (1875) to Grenaa on the coast. Though a place of considerable antiquity—being mentioned in 1086 as the meeting-place of insurgents against Knud, the saint—Randers has few remains of old buildings and bears the stamp of a compact modern manufacturing town that owes its importance to its distilleries, dye-works, carriage-factories, salt-works, weaving-factories, tan-works, &c. St Morten's church dates from the 14th century, but has been frequently altered and enlarged down to 1869-70. Other buildings are the town-house (1778, restored 1858), the court-house (1860-62), the infirmary (1870), the alms-house (1868), the Jewish synagogue (1858), and the high school (1858; the institution founded by Christian III.). The population was 11,354 in 1870 and 13,457 in 1880.

Randers is best known in history as the scene of the assassination of Count Geerts by Niels Ebbesön in 1340. In the Middle Ages it had six churches and four monastic establishments—the oldest a Benedictine nunnery (1170). The Grey Friars' building was turned into a castle (Dronningborg) after the Reformation; its church was burned down in 1698.

RANDOLPH, JOHN (1773-1833), of Roanoke, American statesman, was descended from an influential and wealthy Virginian family, and was the third and youngest son of John Randolph of Cawsons, Chesterfield county, where he was born on 2d June 1773. His father having died in his infancy, his early years were passed under the care of his stepfather. He attended schools at Williamsburg and Princeton and for a short time studied at Columbia College, New York, but, although well read in modern works bearing on politics and philosophy, his own statement, "I am an ignorant man, sir," was in other respects not inaccurate. Both his religious and his political views were radical and extreme. At an early period he imbibed deistical opinions, which he promulgated with extreme eagerness. He was also so strongly opposed to the new constitution of the United States that he could not bear to hear Washington take the oath to support it. In order to assist in asserting the right of resistance to national laws, and to withstand the "encroachments of the administration upon the indisputable rights" of Virginia, he was in 1799 elected as a democrat to Congress, where he sat, with the exception of two terms, till 1825. After the election of Jefferson as president in 1801 Randolph was elected chairman of the committee of ways and means. He took an active part in agitating for the reform of the judiciary, and in 1804 moved the impeachment of Judge Chase. The part he took in this matter tended to widen his breach with Jefferson, from whom he finally separated in 1806. Possessing considerable wit, great readiness, and a showy if somewhat bombastic eloquence, he would undoubtedly have risen to high influence but for his strong vein of eccentricity and his bitter and ungovernable temper. The championship of State rights was carried by him to an extreme utterly quixotic, inasmuch as he not only asserted the constitutional right of Virginia to interpose her protest against the usurpation of power at Washington but claimed that the protest should be supported by force. On account of his opposition to the war with England in 1812 he was not returned to Congress in 1813, but he was re-elected in 1815. In 1825 he was elected to the United States Senate, where he continued to sit till 1827. In 1830 he was for a short time minister to Russia. He was elected to Congress in 1832, but died of consumption at Philadelphia before he took his seat, 24th May 1833. His last will was disputed in the law courts, and the jury returned a verdict that in the later years of his life he was not of sane mind.

Among several biographies of Randolph mention may be made of that by Hugh A. Garland, New York, 1850 (11th ed., 1857), and that by Henry Adams, forming vol. i. of the series of *American Statesmen*, edited by J. T. Morse, junior, Boston, 1883.

RANDOLPH, THOMAS (1605-1634), an English poet, was born in Northamptonshire in 1605. He was educated at Westminster and Cambridge, and soon gave promise as a writer of comedy. Ben Jonson, not an easily satisfied critic, adopted him as one of his "sons." The ease and melody of his verse and the quickness of his wit and fancy justify the favour with which the youth was received by the magnates of literature. Unhappily he died under thirty in 1634, before his powers had reached their maturity. His principal works are—*The Muses' Looking-Glass, a Comedy*; *Amyntas, or the Impossible Dowry*, a pastoral acted before the king and queen; *Aristippus, or the Jovial Philosopher*; *The Conceited Pedlar*; *The Jealous Lovers, a Comedy*; *Hey for Honesty, down with Knavery, a Comedy*; and several other poems. His works have recently been edited by W. Carew Hazlitt.

RANGOON TOWN, a district in the Pegu division of the province of British Burmah, situated in 16° 47′ N. lat. and 96° 13′ E. long., on the left bank of the Hlaing or Rangoon river at its junction with the Pegu and Pu-zwon-doung streams, 21 miles from the sea. In 1880 the town was detached from the surrounding area of the old district of Rangoon and constituted a separate district, the remainder of the country being formed into a distinct jurisdiction under the title of Hanthawady. The soil of Rangoon in the mountains and elevated tracts is grey sandy clay, and in the plains it is mostly alluvial mixed with earth of reddish colour, well suited for the growth of rice, vegetables, and fruit trees. The Rangoon river flows from the junction of the Panlaing and Hlaing rivers to the sea; from the sea to Rangoon it is navigable during the monsoons by vessels of the largest draught, and in the dry season by vessels of 1000 tons. Pu-zwon-doung creek empties itself into the Rangoon river at Battery Point. It is navigable during the spring tides of the south-west monsoon for cargo boats of 100 tons; near its junction with the Rangoon river is a small rock, dangerous to large vessels. The only lake of any importance is the Kandaugyi or Royal Lake within the Dalhousie Park. The chief products of the district are grains and pulses (principally rice), cotton, timber, and cutch (catechu) and gambier. Rangoon comprises an area of 22 square miles, with a population in 1881 of 134,176 (males 91,504, females 42,672); Hindus numbered 35,871, Mohammedans 21,169, Christians 9741, and Buddhists 67,131.

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[1] All of these are in the British Museum.

The town was first built in 1753 by Aloung-bhoora, the founder of the Burmese monarchy. On the outbreak of the first Burmese War, in 1824, it was taken by the British, but subsequently restored to the native power. It was captured a second time in 1852 and passed along with the province of Pegu into the hands of the British. The town was destroyed by fire in 1850, and serious conflagrations occurred again in 1853 and 1855. Since the last devastation Rangoon has undergone considerable improvements; among the latest may be mentioned the construction of steam tramways in the principal thoroughfares and the establishment of a volunteer fire brigade.

RANGPUR, a district of British India, in the lieutenant-governorship of Bengal, lying between 25° 3′ and 26° 19′ N. lat. and 88° 47′ and 89° 56′ E. long., is bounded on the N. by Jalpáigurí district and Kuch Behar state, on the E. by the Brahmaputra, separating it from Goalpara and Maimansinh, on the S. by Bogra, and on the W. by Dinájpur and Jalpáigurí. The district is one vast plain; the greater part of it, particularly towards the east, is inundated during the rains, and the remainder is traversed by a network of streams which frequently break through their sandy banks and plough for themselves new channels over the fields. Agricultural industry has taken full advantage of the natural fertility of the soil, which is composed of a sandy loam. The river system is constituted by the Brahmaputra and its tributaries, chief of which are the Tista, Dharla, Sankos, and Dudhkumar. There are no embankments or artificial canals in the district, nor does the alluvial soil produce any minerals. The climate of Rangpur is generally malarious owing to the numerous stagnant swamps and marshes filled with decaying vegetable matter. The average annual rainfall is 86·14 inches. The Northern Bengal State Railway cuts through the western half of the district from north to south, with a branch to Rangpur town.

In 1881 the population was 2,097,964 (males 1,067,701, females 1,030,263); Hindus numbered 816,532, Mohammedans 1,279,605, and Christians 86. The population is for the most part rural; the only towns containing upwards of 10,000 inhabitants are RANGPUR, the capital (*q.v.*), Barakhatta (11,393), Bhogdabari (10,892), and Dimlah (10,503). The district contains an area of 3486 square miles, about three-fourths being under continuous cultivation. The staple crops are rice, wheat, and other grains, oil-seeds, and jute; among the miscellaneous crops are indigo, sugar-cane, betel-leaf, betel-nut, and mulberry for silkworms. Spare land capable of cultivation can hardly be said to exist,—even the patches of waste land yield a valuable tribute of reeds and cane. Of industries the chief is the manufacture of paper from jute fibre; other products are striped cotton carpets, silk cloth woven from the cocoon of a worm fed on the castor-oil plant, baskets and mats, brass-ware, and ornaments carved in ivory and buffalo horn. In 1883-84 the gross revenue of Rangpur district was £165,165, of which the land-tax contributed £102,248.

The tract comprised within the district of Rangpur was formerly the western outpost of the ancient Hindu kingdom of Kamrup. The realm appears to have attained its greatest power and prosperity under Rájá Nilambhar, who was treacherously overthrown by Husain Sháh, king of Bengal, at the close of the 15th century. On the conquest of the kingdom of Bengal about 1542 by the renowned Afghan Sher Sháh, subsequently emperor of Delhi, Rangpur appears to have become incorporated with the empire. During the turbulent period which followed the death of Sher Sháh it threw off allegiance to Delhi, but the country was re-annexed by Akbar in 1584, though it was not completely subjugated till the time of Aurangzeb, about 1661. Rangpur passed to the East India Company in 1765 under the firman of the emperor Sháh Alam. Numerous changes have since taken place in the jurisdiction, in consequence of which the district area has been much diminished.

RANGPUR, principal town and administrative headquarters of the above district, is situated on the north bank of the Ghaghat river in 25° 44′ N. lat. and 89° 17′ E. long., and contains a population (1881) of 13,320.

RANJÍT SINGH (RUNJEET SINGH). See PUNJAB, above, p. 111.

RANKINE, WILLIAM JOHN MACQUORN (1820-1872), a descendant of old Scottish families, the Rankines of Carrick and the Cochranes of Dundonald by the father's side, and the Grahames of Dougalston by the mother's, was born at Edinburgh in 1820, and completed his education in its university. He was trained as an engineer under Sir J. Macneill, working chiefly on surveys, harbours, and railroads, and was appointed in 1855 to the chair of civil engineering in Glasgow, vacant by the resignation of Lewis Gordon, whose work he had undertaken during the previous session.

He was a voluminous writer on subjects directly connected with his chair, and, besides contributing almost weekly to the technical journals, such as the *Engineer*, brought out a series of standard text-books on *Civil Engineering*, *The Steam-Engine and other Prime Movers*, *Machinery and Millwork*, and *Applied Mechanics*. These have passed through many editions, have done more for the advancement of their subjects than any works of modern date, and are still in the very highest rank of educational works. To these must be added his elaborate treatise on *Shipbuilding, Theoretical and Practical*. This, however, corresponded to but one phase of Rankine's immense energy and many-sided character. He was an enthusiastic and most useful leader of the volunteer movement from its commencement, and a writer, composer, and singer of humorous and patriotic songs, some of which, as "The Three Foot Rule" and "They never shall have Gibraltar," became well known far beyond the circle of his acquaintance. Rankine was the earliest of the three founders of the modern science of THERMODYNAMICS (*q.v.*) on the bases laid by Sadi Carnot and Joule respectively, and the author of the first formal treatise on the subject. His contributions to the theories of *Elasticity* and of *Waves* rank high among modern developments of mathematical physics, although they are mere units among the 150 scientific papers attached to his name in the Royal Society's *Catalogue*. The more important of these have been collected and reprinted in a handsome volume (*Rankine's Scientific Papers*, London, 1881), which contains a memoir of the author, written by Professor Tait. Rankine died in 1872.

RANPUR, a native state of India, in the province of Orissa in the lieutenant-governorship of Bengal, situated on the western boundary of the British district of Puri, in about 20° N. lat. and 85° 20′ E. long. The south-west part of the state is a region of hills, forest clad, and almost entirely uninhabited, which wall in its whole western side, except at a single point, where a pass leads into the adjoining state of Nayagarh. Its population in 1881 was 36,539 (18,382 males, 18,157 females). The only town is the rájá's place of residence, which consists of one long and wide street.

RANUNCULUS. Familiarly known as "buttercups," the species of this genus form the type of the order *Ranunculaceæ*. The plants are herbs, sometimes with fleshy root-fibres, or with the base of the stem dilated into a kind of tuber (*R. bulbosus*). They have tufted or alternate leaves, dilated into a sheath at the base and very generally, but not universally, deeply divided above. The flowers are solitary, or in loose cymes, and are remarkable for the number and distinctness (freedom from union) of their parts. Thus there are five sepals, as many petals arranged in whorls, numerous stamens, and numerous carpels arranged in spires. The petals have a little pit or gland at the base, which is interesting as foreshadowing the more fully developed tubular petals of the nearly allied genera *Aconitum* and *Helleborus*. The presence of all the floral organs in a free condition induced A. P. de Candolle to place *Ranunculus* at the head of the vegetable kingdom, but at the present time the reverse opinion holds good, and *Ranunculus* with its numerous separate parts is supposed to occupy a lower status than a flower in which a greater amount of consolidation and differentiation takes place. The genus is large as to number of species, which occur in most temperate countries in the northern and southern hemispheres, and, while they extend into arctic and antarctic regions, they show little or no tendency to inhabit tropical countries except on the higher mountains. Several are natives of Great Britain, occurring in pastures, while the water-buttercups, denizens of pools and streams, vary greatly in the character of the foliage according as it is submersed, floating, or aerial, and when submersed varying in accordance with the depth and strength of the current. The ranunculus of the florist is a cultivated form of *R. asiaticus*, remarkable for the range of colour of the flowers (yellow to purplish black) and for the regularity with which the stamens and pistils are replaced by petals. The common or lesser celandine is the *R. Ficaria* of the botanist, remarkable for its tuberous root-fibres. The species are all more or less acrid.

RAOUL ROCHETTE, Désiré (1783-1854), French archæologist, was born in 1783 at St Amand in the department of Cher, and received his education at Bourges. In 1813 he was called to the chair of history in the Collége de Louis-le-Grand at Paris. About four years afterwards he was translated to the similar chair in the Sorbonne. The first result of his labours, published in 1815 under the title of *Histoire Critique de l'Établissement des Colonies Grecques*, in 4 vols. 8vo, was favourably received by the public. In 1819 he was appointed superintendent of antiquities in the Bibliothèque at Paris, an office which he held till 1848. To this was added in 1826 the professorship of archæology at the Bibliothèque, a result of which may be seen in his excellent *Cours d'Archéologie* (1828). In the following year (1829) appeared his *Monuments Inédits*, and if this great work is now less frequently referred to than in former years it is because the path which it indicated has been steadily followed out by others, and with more complete results than was possible in his day. A still valuable and interesting work is his *Peintures Inédites* (1836). So also his *Peintures de Pompéi* (1844) remains a splendid monument of the enterprise with which he sought to render attractive the study of archæology. He was a frequent contributor to the *Annali* of the Roman Institute, the *Journal des Savants*, and the *Académie des Inscriptions*, and often engaged in disputes with his contemporaries in matters on which time has for the most part proved him to have been right. At his death in 1854 Raoul Rochette was perpetual secretary of the Academy of Fine Arts and a corresponding member of most of the learned societies in Europe.

RAOUX, Jean, French painter, was born at Montpellier in 1677 and died at Paris in 1734. After the usual course of training he became a member of the Academy in 1717 as an historical painter. His reputation had been previously established by the credit of decorations executed during his three years in Italy on the palace of Giustiniani Solini at Venice, and by some easel paintings, the Four Ages of Man (National Gallery), commissioned by the grand prior of Vendôme. To this latter class of subject Raoux devoted himself, nor did he even paint portraits except in character. The list of his works is a long series of sets of the Seasons, of the Hours, of the Elements, or of those scenes of amusement and gallantry in the representation of which he was immeasurably surpassed by his younger rival Watteau. After his stay in England (1720) he lived much in the Temple, where he decorated several rooms. His best pupils were Chevalier and Montdidier. His works, of which there is a poor specimen in the Louvre, were much engraved by Poilly, Moyreau, Dupuis, &c.

See Mariette, *Abecedario Arch. de l'Art Français*; Dussieux, *Les Artistes Français à l'Étranger*, Soulié. *Musée de Versailles*; De Chennevières, *Peintres provinciaux.*

RAPANUI, or Easter Island (*Paascheylandt*, *Osterinsel*, *Île de Pâques*, &c.), the Waihu or Teapi of Cook, an island in the eastern part of the South Pacific, lying in 27° 8′ S. lat. and 109° 25′ W. long., 1000 miles east of Pitcairn. It is rudely triangular in shape, with its hypotenuse 12 miles long running north-east and south-west, and its three angles marked by three volcanic peaks. The coasts have no natural harbours of any importance, and landing is difficult. There is no lack of fertile soil, and the climate is moist enough to make up for the absence of running water. At one time the island would appear to have been wooded, but it now presents only a few bushes (*Edwardsia*, *Broussonetia*, &c.), ferns, grasses, sedges, &c. The natives keep a few goats and a large stock of domestic fowls, and the French house which now owns a large part of the island feeds about 10,000 sheep.

It is doubtful whether Rapanui (*i.e.*, Great Rapa) was discovered by Davis in 1686, though it is sometimes marked Davis Island on our maps. Admiral Roggeveen reached it on 6th April 1722; in 1744 Captain Cook discovered it anew, and it has since been visited by La Pérouse (1776), Kotzebue (1816), Beasby (1826), &c. At the time of Roggeveen's discovery the island probably contained from 1500 to 2000 inhabitants of Polynesian race, who, according to their own tradition, came from Rapa Iti (Little Rapa) or Oparo, one of the Tibuai or Austral group.

The remarkable colossal statues which give a unique archæological interest to Rapanui have been described under Polynesia, vol. xix. p. 428; figures of them will be found in Pinart's valuable paper in the *Tour du Monde* (1878, No. 927).

RAPE OIL. This important fatty oil, known also as "sweet oil," is obtained from seeds of cultivated varieties of the cruciferous genus *Brassica*, the parent form of the whole apparently being the wild navew, *B. campestris* (Lin.), the *B. præcox* of De Candolle. From the same stock, it is generally assumed, have sprung the Swedish turnip and the common turnip; but the oil-yielding plants have developed in a special direction and are exclusively cultivated for the oil they yield. Under the general name "rape oil" is included the produce of several plants having distinct and fairly constant characters, and one of these oils —Colza (*q.v.*)—is a very well-known commercial variety. In Germany, where the production of rape oil centres, three principal oil-seeds—colza (*Kohlsaat*), rape, and rübsen —are well recognized. Colza is the produce of the parent stock *B. campestris* and is the form principally cultivated in France and Germany. Rape seed, the variety produced by *B. campestris*, var. *napus*, and rübsen seed, yielded by *B. campestris*, var. *rapa*, are extensively cultivated in the valley of the Danube and eastwards through Persia into India. These plants are principally distinguished from each other by the colour of their radicle leaves and the form of inflorescence, but also by the size and appearance of the small ovoid seeds. The seed of the colza is ruddy brown, rape is blue-black, and rübsen is almost black in colour. It has been found that 1000 seeds of colza weigh 29·3 grains, the same number of rübsen weighing 34·5 grains and of rape 71·75 grains. Each of these plants has summer and winter, or annual and biennial, varieties; and as there are numerous intermediate forms in cultivation the varieties merge into each other.

The oil yielded by these seeds is, in physical and chemical properties, practically the same, the range of fluctuations not being greater than would be found in the oil of any specific seed under similar varying conditions of production. Colza seed is, in general, the richest in oil, and the winter varieties of all the seeds are more productive than the summer varieties. In summer rape and rübsen the proportion of oil averages from 30 to 35 per cent., the winter seeds have from 35 to 40, and winter colza contains from 40 to 45 per cent. Newly pressed rape oil has a dark sherry colour with, at first, scarcely any perceptible smell; but after resting a short time the oil deposits an abundant mucilaginous slime, and by taking up oxygen it acquires a peculiar disagreeable odour and an acrid taste. Refined by the ordinary processes (see OILS, vol. xvii. p. 743), the oil assumes a clear golden yellow colour. In specific gravity it ranges between 0·9112 and 0·9117 in the raw state, and from 0·9127 to 0·9136 when refined; the solidifying point is from $-2°$ to $-10°$ C. Rape oil consists of a mixture of three simple fats or glycerides of fatty acids—the glyceride of oleic acid (olein), of stearic acid (stearin), and of brassic acid, the latter being a fat found hitherto only in oils from the *Cruciferæ* and from grape seeds. The olein of rape oil differs from ordinary olein in not yielding sebacylic acid on destructive distillation.

The principal uses of rape oil are for lubrication and lighting; but since the introduction of mineral oils for both these purposes the importance of rape has considerably decreased. It is but little employed in soap-making, as it saponifies with difficulty and yields only an indifferent product. In Germany it is very considerably used as a salad oil under the name of Schmalzol, being for that purpose freed from its biting taste by being mixed with starch, heated till the starch is carbonized, and filtered after the oil has cooled. The offensive taste of rape oil may also be removed by treatment with a small proportion of sweet spirit of nitre (nitrous ether). In the East Indies rape oil and its equivalents, known under various names, are the most important of oils for native use. They are largely consumed as food instead of ghi under the name of "metah" or sweet oil, but for all other purposes the same substance is known as "kurwah" or bitter oil. Most natives prefer it for the preparation of their curries and other hot dishes. Rape oil is the subject of extensive adulteration, principally with the cheaper hemp oil, rosin oil, and mineral oils. These sophistications can be most conveniently detected, first by taste and next by saponification, rosin oil and mineral oil remaining unsaponified, hemp oil giving a greenish soap, while rape oil yields a soap with a yellow tinge. With concentrated sulphuric acid, fuming nitric acid, nitrous acid, and other reagents rape oil gives also characteristic colorations; but these are modified according to the degree of purity of the oil itself. The presence of sulphur in rape and other cruciferous oils also affords a ready means for their identification. Lead plaster (*emplastrum lithargyri*) boiled in rape oil dissolves, and, sulphide of lead being formed, the oil becomes brown or black. Other lead compounds give the same black coloration from the formation of sulphide.

RAPHAEL (רפאל, "God heals") first appears in literature in the book of Tobit, where in human disguise and under the name of Azarias ("God helps") he accompanies Tobias in his adventurous journey and conquers the demon Asmodæus. He is said to be "one of the seven angels [archangels] who present the prayers of the saints and enter into the presence of the glory of the Holy One." In the book of Enoch Raphael is the angel of the spirits of man, and it is his business to gather the souls of the dead in the place where they are reserved till the day of judgment,—a conception which seems to imply a derivation from רפאים, "ghosts." In later Midrash Raphael appears as the angel commissioned to put down the evil spirits that vexed the sons of Noah with plagues and sicknesses after the flood, and he it was who taught men the use of simples and furnished materials for the "Book of Noah," the earliest treatise on materia medica (Rönsch, *Buch der Jubiläen*, p. 385 *sq.*).

RAPHAEL (1483-1520). **RAPHAEL SANZIO** was the son of Giovanni Santi, a painter of some repute in the ducal city of Urbino, situated among the Apennines on the borders of Tuscany and Umbria.[1] For many years both before and after the birth of Raphael the city of Urbino was one of the chief centres in Italy of intellectual and artistic activity, thanks to its highly cultured rulers, Duke Federigo II. of Montefeltro and his son Guidobaldo, who succeeded him in 1482,[2] the year before Raphael was born. The ducal residence of Urbino, built by Federigo II., even now one of the most magnificent palaces in Italy, was lavishly adorned with works of art of every class—frescos, panel-pictures, tapestries, tarsia-work, stucco-reliefs, and sculpture—executed for the duke by some of the chief Italian artists of his time, and contained a collection of oil-paintings by the Van Eycks and other celebrated Flemish painters. Giovanni Santi was a welcome guest at this miniature but splendid court, and the rich treasures which the palace contained, familiar to Raphael from his earliest years, were a very important item among the various influences which formed and fostered his early love for art. It may not perhaps be purely fanciful to trace Raphael's boyish admiration of the oil-paintings of Jan Van Eyck and Justus of Ghent in the miniature-like care and delicacy with which some of his earliest works, such as the Knight's Dream, were executed.

Though Raphael lost his father at the age of eleven, yet to him he certainly owed a great part of that early training which enabled him to produce paintings of apparently mature beauty when he was scarcely twenty years of age. From his father, too, Raphael learned much of the religious sentiment and grace of motive which are specially conspicuous in his earlier paintings. The altar-piece painted by Giovanni for the church of Gradara, and a fresco, now preserved in the Santi house[3] at Urbino, are clearly prototypes of some of Raphael's most graceful paintings of the Madonna and Child. On the death of his father in 1494 young Raphael was left in the care of his stepmother (his own mother, Magia Ciarla, having died in 1491) and of his uncle, a priest called Bartolomeo.[4]

First or Perugian Period.—In what year Raphael was apprenticed to Perugino and how the interval before that was spent are matters of doubt. Vasari's statement that he was sent to Perugia during his father's lifetime is certainly a mistake. On the whole it appears most probable that he did not enter Perugino's studio till the end of 1499, as during the four or five years before that Perugino was mostly absent from his native city.[5] As was the case with every one with whom Raphael came in contact, the Perugian master was fascinated by the charm of his manner and delighted by his precocious ability, and seems to have devoted special pains to his artistic education. The so-called *Sketch Book of Raphael* in the academy of Venice contains studies apparently from the cartoons of some of Perugino's Sistine frescos, possibly done as practice in drawing.

This celebrated collection of thirty drawings, now framed or preserved in portfolios, bears signs of having once formed a bound book, and has been supposed to be a sketch-book filled by Raphael during his Perugian apprenticeship. Many points, however, make this tempting hypothesis very improbable; the fact that the drawings were not all originally on leaves of the same size, and the miscellaneous character of the sketches—varying much both in style and merit of execution—seem to show that it is a collection of studies by different hands, made and bound together by some subsequent owner, and may contain but very few drawings by Raphael himself.[6]

Before long Raphael appears to have been admitted to take a share in the execution of paintings by his master;

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[1] See Pungileoni, *Elogio Storico di Raffaello*, Urbino, 1829; for a valuable account of Raphael's family and his early life, see also Id., *Vita di Giov. Santi*, Urbino, 1822, and Campori, *Notizie e Documenti per la Vita di Giov. Santi e di Raffaello*, Modena, 1870.

[2] See an interesting account of the court of Urbino by Delaborde, *Études sur les B. Arts . . . en Italie*, Paris, 1864, vol. i. p. 145.

[3] The house of Giovanni Santi, where Raphael was born, still exists at Urbino in the Contrada del Monte, and, being the property of the municipality, is now safe from destruction.

[4] The administration of Giovanni Santi's will occasioned many painful family disputes and even appeals to law; see Pungileoni, *El. Stor. di Raffaello.*

[5] Crowe and Cavalcaselle (*Life of Raphael*, vol. i., London, 1882) adopt the notion that Raphael went to Perugia in 1495, but the reasons with which they support this view appear insufficient.

[6] See an excellent critical examination of the *Sketch Book* by Morelli, *Italian Masters in German Galleries*, translated by Mrs Richter, London, 1882; according to this able critic, only two drawings are by Raphael. See also Schmarsow, "Raphael's Skizzenbuch in Venedig," in *Preussische Jahrbücher*, xlviii. pp. 122-149, Berlin, 1881, who takes the opposite view. Kahl, *Das venezianische Skizzenbuch*, Leipsic, 1882, follows Morelli's opinion

and his touch can with more or less certainty be traced in some of Perugino's panels which were executed about 1502. Many of those who, like Messrs Crowe and Cavalcaselle, adopt the earlier date of Raphael's apprenticeship believe that his hand is visible in the execution of the beautiful series of frescos by Perugino in the Sala del Cambio, dated 1500; as does also M. Müntz in his excellent *Raphaël, sa Vie*, Paris, 1881, in spite of his accepting the end of 1499 as the period of Raphael's first entering Perugino's studio,—two statements almost impossible to reconcile. Considering that Raphael was barely seventeen when these frescos were painted, it is hardly reasonable to attribute the finest heads to his hand; nor did he at an early age master the difficulties of *fresco buono*. The Resurrection of Christ in the Vatican and the Diotalevi Madonna in the Berlin Museum are the principal pictures by Perugino in parts of which the touch of Raphael appears to be visible, though any real certainty on this point is unattainable.[1]

About 1502 Raphael began to execute independent works; four pictures for churches at Città di Castello were probably the earliest of these, and appear to have been painted in the years 1502-4. The first is a guild-banner painted on one side with the Trinity, and below, kneeling figures of S. Sebastian and S. Rocco; on the reverse is a Creation of Eve, very like Perugino in style, but possessing more grace and breadth of treatment. These are still in the church of S. Trinità.[2] Also for Città di Castello were the coronation of S. Niccolo Tolentino, now destroyed, though studies for it exist at Oxford and Lille (*Gaz. d. B. Arts*, 1878, i. p. 48), and the Crucifixion, now in the Dudley collection, painted for the church of S. Domenico, and signed **RAPHAEL VRBINAS P.** It is a panel 8 feet 6 inches high by 5 feet 5 inches wide, and contains noble figures of the Virgin, St John, St Jerome, and St Mary Magdalene. The fourth painting executed for this town, for the church of S. Francesco, is the exquisitely beautiful and highly finished Sposalizio, now in the Brera at Milan, signed and dated **RAPHAEL VRBINAS MDIIII.** This is closely copied both in composition and detail from Perugino's painting of the same subject now at Caen, but is far superior to it in sweetness of expression and grace of attitude. The Temple of Jerusalem, a domed octagon with outer ambulatory in Perugino's picture, is reproduced with slight alterations by Raphael, and the attitudes and grouping of the figures are almost exactly the same in both. The Connestabile Madonna is one of Raphael's finest works, painted during his Perugian period; it is a round panel; the motive, the Virgin reading a book of hours, is a favourite one with him, as it was with his father Giovanni. This lovely picture was lost to Perugia in 1871, when Count Connestabile sold it to the emperor of Russia for £13,200.

Second or Florentine Period, 1504-1508.—From 1504 to 1508 Raphael's life was very stirring and active. In the first half of 1504 he visited Urbino, where he painted two small panels for Duke Guidobaldo, the St George and the St Michael of the Louvre. His first and for him momentous visit to Florence was made towards the end of 1504, when he presented himself with a warm letter of recommendation[3] from his patroness Joanna della Rovere to the gonfaloniere Pier Soderini. In Florence Raphael was kindly received, and, in spite of his youth (being barely of age), was welcomed as an equal by the majority of those great artists who at that time had raised Florence to a pitch of artistic celebrity far above all other cities of the world. At the time of his arrival the whole of artistic Italy was being excited to enthusiasm by the cartoons of the battle of Anghiari and the war with Pisa, on which Da Vinci and Michelangelo were then devoting their utmost energies (see LEONARDO and MICHELANGELO). To describe the various influences under which Raphael came and the many sources from which he drank in stores of artistic knowledge would be to give a complete history of Florentine art in the 15th century.[4] With astonishing rapidity he shook off the mannerisms of Perugino, and put one great artist after another under contribution for some special power of drawing, beauty of colour, or grace of composition in which each happened to excel. Nor was it from painters only that Raphael acquired his enlarged field of knowledge and rapidly growing powers. Sculptors like Ghiberti and Donatello must be numbered among those whose works helped to develop his new-born style.[5] The Carmine frescos of Masaccio and Masolino taught this eager student long-remembered lessons of methods of dramatic expression.[6] Among his contemporaries it was especially Signorelli and Michelangelo who taught him the importance of precision of line and the necessity of a thorough knowledge of the human form.[7] From Da Vinci he learned subtleties of modelling and soft beauty of expression,[8] from Fra Bartolomeo nobility of composition and skilful treatment of drapery in dignified folds.[9] The friendship between Raphael and the last of these was very close and lasted for many years. The architect Baccio d'Agnolo was another of his special friends, at whose house the young painter enjoyed social intercourse with a large circle of the chief artists of Florence, and probably learned from him much that was afterwards useful in his practice as an architect.

The transition in Raphael's style from his first or Perugian to his second or Florentine manner is well shown in the large picture of the Coronation of the Virgin painted for Maddalena degli Oddi, now in the Vatican, one of the most beautiful that he ever produced, and especially remarkable for its strong religious sentiment,—in this respect a great contrast to the paintings of his last or Roman manner which hang near it. The exquisite grace of the angel musicians and the beauty of the faces show signs of his short visit to Florence, while the general formality of the composition and certain details, such as the fluttering ribbands of the angels, recall peculiarities of Perugino and of Pinturicchio, with whose fine picture of the same subject hung close by it is interesting to compare it. Raphael's painting, though by far the more beautiful of the two, is yet inferior to that of Pinturicchio in the composition of the whole; an awkward horizontal line divides the upper group of the Coronation from that below, the apostles standing round the Virgin's tomb, filled with roses and lilies (Dante, *Par.*, xxiii. 73), while the older Perugian has skilfully united the two groups by a less formal arrangement of the figures. The predella of this masterpiece of Raphael is also in the Vatican; some of its small paintings, especially that of the Annunciation to the Virgin, are interesting as showing his careful study of the rules of perspective.[1] Several preparatory sketches for this picture exist: fig. 1 shows a study, now at Lille, for the two principal figures, Christ setting the crown on His mother's head (see fig. 2). It is drawn from two youths in the ordinary dress of the time; and it is interesting to compare it with his later studies from the nude, many of which are for figures which in the future picture were to be draped, made at a time when his developed style required a more careful rendering of the human form than was necessary for the simpler and more religious manner of Perugia. It was at Florence, as Vasari says, that Raphael began serious life studies, not only from nude models but also by making careful anatomical drawings from dissected corpses and from skeletons.

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[1] Parts of Perugino's beautiful triptych of the Madonna, with the archangels Raphael and Michael, painted for the Certosa near Pavia and now in the National Gallery of London, have been attributed to Raphael, but with little reason. Perugino's grand altar-piece at Florence of the Assumption of the Virgin shows that he was quite capable of painting figures equal in beauty and delicacy to the St Michael of the Certosa triptych. See Frizzoni, *L'Arte Italiana nella Gal. Nat. di Londra*, Florence, 1880.

[2] For an account of processional banners painted by distinguished artists, see Mariotti, *Lettere pittoriche Perugine*, p. 76 *sq.*

[3] This letter, which still exists, was sold in Paris in 1856, and is now in private hands.

[4] See Minghetti, "I Maestri di Raffaello," in the *Nuova Antologia*, 1st August 1881.

[5] See his sketch of St George and the Dragon in the Uffizi, largely taken from Donatello's pedestal relief outside Or San Michele.

[6] See his cartoon of St Paul preaching at Athens (South Kensington Museum).

[7] See many of his life-studies, especially the one he sent to Albert Dürer, now at Vienna.

[8] See the portrait of Maddalena Doni in the Pitti.

[9] See the Madonna del Baldacchino in the Pitti.

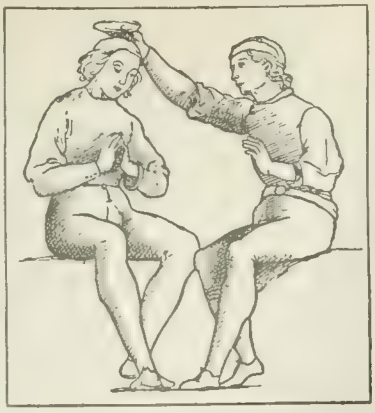
Fig. 1.—Silver-point study for the main figures in the Coronation of the Virgin (Vatican). In the Lille museum. Illustrating Raphael's use of draped models during his early period.

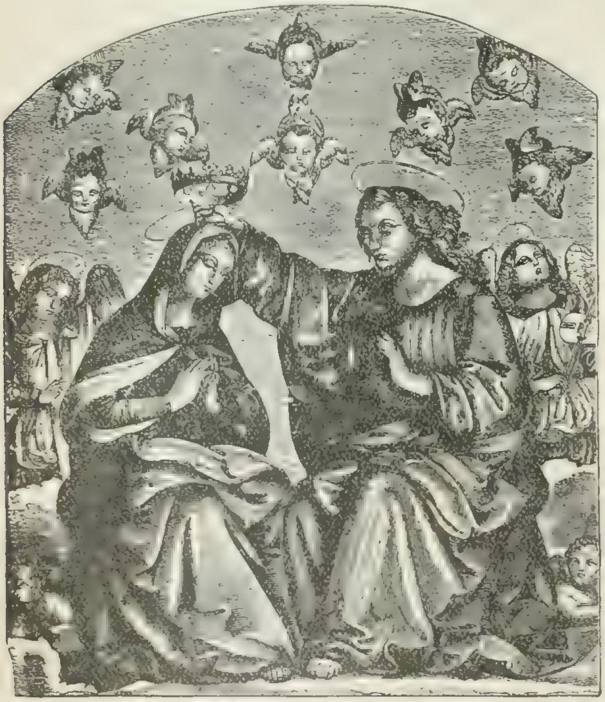
Fig. 2.—The group for which fig. 1 is a study.

His first visit to Florence lasted only a few months; in 1505 he was again in Perugia painting his first fresco, the Trinity and Saints for the Camaldoli monks of San Severo, now a mere wreck from injury and restorations. The date MDV and the signature were added later, probably in 1521. Part of this work was left incomplete by the painter, and the fresco was finished in 1521 (after his death) by his old master Perugino.[2] It was probably earlier than this that Raphael visited Siena and assisted Pinturicchio with sketches for his Piccolomini frescos.[3] The Madonna of S. Antonio was also finished in 1505, but was probably begun before the Florentine visit.[4] A record of his visit to Siena exists in a sketch of the antique marble group of the Three Graces, then in the cathedral library, from which, not long afterwards, he painted the small panel of the same subject now in Lord Dudley's collection.

In 1506 Raphael was again in Urbino, where he painted for the duke another picture of St George, which was sent to England as a present to Henry VII. The bearer of this and other gifts was Guidobaldo's ambassador, the accomplished Baldassare **Castiglione** (*q.v.*), a friend of Raphael's, whose noble portrait of him is in the Louvre. At the court of Duke Guidobaldo the painter's ideas appear to have been led into a more secular direction, and to this stay in Urbino probably belong the Dudley Graces, the miniature Knight's Dream of Duty and Pleasure in the National Gallery (London),[5] and also the Apollo and Marsyas, sold in 1882 by Mr Morris Moore to the Louvre for £10,000, a most lovely little panel, painted with almost Flemish minuteness, rich in colour, and graceful in arrangement.[6]

Towards the end of 1506 Raphael returned to Florence, and there (before 1508) produced a large number of his finest works, carefully finished, and for the most part wholly the work of his own hand. Several of these are signed and dated, but the date is frequently very doubtful, owing to his custom of using Roman numerals, introduced among the sham Arabic embroidered on the borders of dresses, so that the I's after the V are not always distinguishable from the straight lines of the ornament. The following is a list of some of his chief paintings of this period:—the Madonna del Gran Duca (Pitti); Madonna del Giardino, 1506 (Vienna); Holy Family with the Lamb, 1506 or 1507 (Madrid); the Ansidei Madonna, 1506 or 1507 (National Gallery); the Borghese Entombment, 1507; Lord Cowper's Madonna at Panshanger, 1508; La bella Giardiniera, 1508 (Louvre); the Eszterhazy Madonna, probably the same year; as well as the Madonna del Cardellino (Uffizi), the Tempi Madonna (Munich), the Colonna Madonna (Berlin), the Bridgewater Madonna (Bridgewater House), and the Orleans Madonna (Duc d'Aumale's collection). The Ansidei Madonna was bought in 1884 for the National Gallery from the duke of Marlborough for £70,000, more than three times the highest price ever before given for a picture.[7] It was painted for the Ansidei family of Perugia as an altar-piece in the church of S. Fiorenzo, and is a work of the highest beauty in colour, well preserved, and very large in scale. The Virgin with veiled head is seated on a throne, supporting the Infant with one hand and holding a book in the other. Below stands S. Niccolo da Tolentino, for whose altar it was painted; he holds a book and a crozier. and is clad in jewelled mitre and green cope, under which appear the alb and cassock. On the other side is the Baptist, in red mantle and camel's-hair tunic, holding a crystal cross. The rich jewellery in this picture is painted with Flemish-like minuteness. On the border of the Virgin's robe is a date, formerly read as MDV by Passavant and others; it really is MDVI or MDVII. If the later date is the true one, the picture was probably begun a year or two before. A favourite method of grouping his Holy Families is that seen in the Madonna del Cardellino and the Bella Giardiniera, in which the main lines form a pyramid. This arrangement is also used in the Madonna del Giardino and in the larger group, including St Joseph and St Elizabeth, known as the Canigiani Holy Family, now at Munich, one of the least graceful of all Raphael's compositions. The Entombment of Christ, now in the Palazzo Borghese in Rome, was painted during a visit to Perugia in 1507 for Lady Atalanta Baglioni, in memory of the death of her brave and handsome but treacherous son Grifonetto, who was killed in 1500 by his enemies the Oddi party.[1] The many studies and preliminary sketches[2] for this important picture which exist in various collections show that it cost Raphael an unusual amount of thought and labour in its composition, and yet it is quite one of his least successful paintings, especially in colour. It is, however, much injured by scraping and repainting, and appears not to be wholly by his hand. The Madonna del Baldacchino, one of the finest compositions of the Florentine period, owing much to Fra Bartolomeo, is also unsatisfactory in execution; being left unfinished by Raphael, it was completed by Ridolfo Ghirlandajo, by whom the ungraceful angels of the upper part and the canopy were wholly executed, and even designed. It was painted for the Dei family as an altar-piece for their chapel in S. Spirito, Florence. The St Catherine of the National Gallery was probably painted in 1507; its cartoon, pricked for transference, is in the Louvre. In colouring it much resembles parts of the Borghese Entombment, being quiet and grey in tone. To the Florentine period belong some of his finest portraits, and it is especially in these that Da Vinci's influence appears. The portraits of Angelo Doni and his wife Maddalena (Pitti) are vivid and carefully executed paintings, and the unknown lady with hard features (now in the Uffizi) is a masterpiece of noble realism and conscientious finish. The Czartoriski portrait, a graceful effeminate-looking youth with long hair and tapering hands, now moved to Cracow, is probably a work of this period; though worthy to rank with Raphael's finest portraits, its authenticity has been doubted. Very similar in style is the Herrenhausen portrait, once attributed to Giovanni Bellini, but an undoubted work of Raphael, in his second manner; it also represents a young man with long hair, close shaven chin, a wide cloth hat and black dress, painted in half length. The so-called Portrait of Raphael by himself at Hampton Court is a very beautiful work, glowing with light and colour, which may possibly be a genuine picture of about 1506. It represents a pleasant-looking youth with turned-up nose, not bearing the remotest resemblance to Raphael, except the long hair and black cap common to nearly all the portraits of this time.[3] A fine but much-restored portrait of Raphael by himself, painted at Florence, exists in the Uffizi; it represents him at a very early age, and was probably painted during the early part of his stay in Florence.

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[1] While at Florence he is said to have taught the science of perspective to his friend Fra Bartolomeo, who certainly gave his young instructor valuable lessons on composition in return.

[2] The fresco of the Last Supper, dated 1505, in the refectory of S. Onofrio at Florence is not now claimed as a work of Raphael's, in spite of a signature partly introduced by the restorer.

[3] Raphael probably had no hand in the actual execution of the paintings; see Schmarsow, *Raphael und Pinturicchio in Siena*, Stuttgart, 1880, and Milanesi, in his edition of Vasari, iii. p. 515 *sq.*, appendix to life of Pinturicchio.

[4] This fine altar-piece, with many large figures, is now the property of the heirs of the duke of Ripalta, and is stored in the basement of the National Gallery, London.

[5] This missal-like painting is about 7 inches square; it was bought in 1847 for 1000 guineas. The National Gallery also possesses its cartoon, in brown ink, pricked for transference.

[6] In spite of some adverse opinions, frequently expressed with extreme virulence, the genuineness of this little gem can hardly be doubted by any one who carefully studies it without bias. Sketches for it at Venice and in the Uffizi also appear to bear the impress of Raphael's manner. See Delaborde, *Études sur les B. Arts . . . en Italie*, i. p. 236; Gruyer, *Raphaël et l'Antiquité*, ii. p. 421; Eitelberger, *Rafael's Apollo und Marsyas*, Vienna, 1860; Batté, *Le Raphaël de M. Moore*, Paris, 1859; and also various pamphlets on it by its former owner, Mr Morris Moore.

[7] It is engraved at p. 53, vol. ii., of Dohme, *Kunst und Künstler des Mittelalters*, Leipsic, 1878, a work which has many good reproductions of Raphael's paintings and sketches.

Third or Roman Period, 1508-20.—In 1508 Raphael was painting several important pictures in Florence; in September of that year we find him settled in Rome, from a letter addressed in the warmest terms of affectionate admiration to Francia, to whom he sent a sketch for his Adoration of the Shepherds, and promised to send his own portrait in return for that which Francia had given him.[4] Raphael was invited to Rome by his fellow-citizen (not relation, as Vasari says) Bramante, who was then occupied in the erection of the new church of St Peter's, the foundation-stone of which had been laid by Julius II. on 18th April 1506. At this time the love of the popes for art had already attracted to Rome a number of the chief artists of Tuscany, Umbria, and North Italy, among whom were Michelangelo, Signorelli, Perugino, Pinturicchio, Lorenzo Lotto, Peruzzi, Sodoma, and many others, and it was among this brilliant assembly that Raphael, almost at once, took a leading position.[5] Thanks to Bramante's friendly intervention, Julius II. (Della Rovere) soon became Raphael's most zealous patron and friend, as did also the rich bankers Agostino Chigi (the Rothschild of his time) and Bindo Altoviti, whose portrait, at the age of twenty, now at Munich, is one of the most beautiful that Raphael ever produced.

A series of rooms in the Vatican, over the Appartamenti Borgia, were already decorated with frescos by Bonfigli, Perugino, Piero della Francesca, Andrea del Castagno, Signorelli, and Sodoma; but so rapidly had the taste of the time changed that Julius II. decided to sweep them all away and re-cover the walls with paintings in the more developed but less truly decorative style of Raphael. It was not without regret that Raphael saw the destruction of this noble series of frescos. One vault, that of the

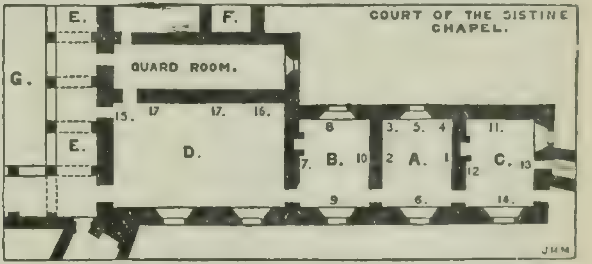

FIG. 3.—Plan showing position of Raphael's frescos in the stanze.

A. Stanza della Segnatura (1509-11): 1, Disputa; 2, School of Athens; 3, Justinian giving his code to Trebonian; 4, Gregory IX. giving decretals to a jurist; 5 (over the window), Three Virtues; 6 (over the other window), Apollo and a group of poets on Mount Parnassus; vault with medallions of Poetry, Theology, Science, and Justice, and other paintings. B. Stanza d'Eliodoro (1511-14): 7, Expulsion of Heliodorus from the Temple; 8, Mass of Bolsena; 9, St Peter freed from prison; 10, Attila repulsed by Leo I.; vault with scenes from Old Testament, by pupils. C. Stanza dell' Incendio (1517), nearly all painted by pupils: 11, Burning of the Borgo; 12, Victory of Leo IV. over the Saracens at Ostia; 13, Coronation of Charlemagne by Leo III. in St Peter's; 14, Oath of Leo III. before Charlemagne. D. Sala di Costantino, painted by pupils (1520-24): 15 and 16, oil paintings of Comitas and Justitia attributed to Raphael; 17, 17, great fresco of the Defeat of Maxentius. E E. Part of Raphael's loggia, by his pupils. F. Chapel of Nicholas V., painted by Fra Angelico. G. Cortile of Bramante.

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[1] See Symonds, *Sketches in Italy*, the chapter on Perugia, mainly taken from the contemporary chronicle of Matarazzo.

[2] These show that Raphael at first intended to paint a Deposition from the Cross, and afterwards altered his scheme into the Entombment; an excess of study and elaboration partly account for the shortcomings of this picture

[3] To judge of the authorship of a portrait from internal evidence is especially difficult, as in so many cases the strong individuality of the person represented obscures that of the painter.

[4] Malvasia, *Felsina pittrice*, Bologna, 1678, was the first to publish this letter; see also Muntz, *Raphael, sa Vie*, &c., p 315, Paris, 1881. Minghetti (*Nuova Antologia*, 1883) throws doubt on the date of this letter.

[5] Müntz, "Michel-Ange et Raphaël à la cour de Rome," *Gaz. des B. Arts*, March and April 1882, and *Les Arts à la cour des Papes*, vol. iii., Paris, 1884.

Stanza dell' Incendio, painted by his master Perugino, he saved from obliteration; it still exists, well preserved, a most skilful piece of decorative work; and he also set his pupils to copy a number of portrait-heads in the frescos of Piero della Francesca before they were destroyed.[1] Fig. 3 shows the positions of Raphael's frescos in the stanze, which, both from their size and method of lighting, are very unsuited for the reception of these large pictures. The two most important rooms (A and B) are small, and have an awkward cross light from opposite windows.[2]

Stanza della Segnatura (papal signature room), painted in 1509-11 (A on fig. 3). The first painting executed by Raphael in the stanze was the so-called Disputa, finished in 1509. It is very unlike the later ones in style, showing the commencement of transition from his Florentine to his "Roman manner"; as a decorative work it is very superior to the other frescos; the figures are much smaller in scale, as was suited to the very moderate size of the room, and the whole is arranged mainly on one plane, without those strong effects of perspective which are so unsuited to the decorative treatment of a wall-surface. In its religious sentiment too it far excels any of the later stanze paintings, retaining much of the sacred character of earlier Florentine and Umbrian art. As a scheme of decoration it appears to have been suggested by some of the early apsidal mosaics. Fig. 4 shows the disposition of its main masses, which seem to indicate the curved recess of an apse. Gold is largely used, with much richness of effect, while the later purely pictorial frescos have little or none. The subject of this magnificent painting is the hierarchy of the church on earth and its glory in heaven.[3] The angels in the upper tier and the nude cherubs who carry the books of the Gospels are among the most beautiful figures that Raphael ever painted.

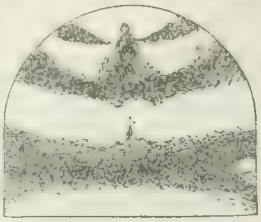
Fig. 4.—Diagram to show main lines of the Disputa, suggesting an apse, with mosaic decoration.

The painting on the vault of this room is the next in date, and shows further transition towards the "Roman manner." In his treatment of the whole Raphael has, with much advantage, been partly guided by the painting of Perugino's vault in the next room (C). Though not without faults, it is a very skilful piece of decoration; the pictures are kept subordinate to the lines of the vault, and their small scale adds greatly to the apparent size of the whole. A great part of the ground is gilt, marked with mosaic-like squares, a common practice with decorative painters,—not intended to deceive the eye, but simply to give a softer texture to the gilt surface by breaking up its otherwise monotonous glare. The principal medallions in each cell of this quadripartite vault are very graceful female figures, representing Theology, Science, Justice, and Poetry. Smaller subjects, some almost miniature-like in scale, are arranged in the intermediate spaces, and each has some special meaning in reference to the medallion it adjoins; some of these are painted in warm monochrome to suggest bas-reliefs. The fine painting of the Flaying of Marsyas is interesting as showing Raphael's study of antique sculpture: the figure of Marsyas is a copy of a Roman statue, of which several replicas exist. The very beautiful little picture of the Temptation of Eve recalls Albert Dürer's treatment of that subject, though only vaguely. Much mutual admiration existed between Raphael and Durer: in 1515 Raphael sent the German artist a most masterly life study of two nude male figures (now at Vienna); on it is written in Albert Dürer's beautiful hand the date and a record of its being a gift from Raphael. It is executed in red chalk, and was a study for two figures in the Battle of Ostia (see below).

On the wall opposite the Disputa is the so-called School of Athens.[4] In this and the succeeding frescos all notion of decorative treatment is thrown aside, and Raphael has simply painted a magnificent series of paintings, treated as easel pictures might have been, with but little reference to their architectural surroundings.[5] The subject of this noble fresco, in contrast to that opposite, is Earthly Knowledge, represented by an assembly of those great philosophers, poets, and men of science of ancient Greece who were admitted by the church to have been not wholly without inspiration from Heaven, and by their labours to have prepared the way for the clearer light of Christianity. The central figures are Plato and Aristotle, while below and on each side are groups arranged with the most consummate skill, including the whole "filosofica famiglia" of Dante (*Infer.*, iv. 133-144), and a number of other leaders of thought, selected in a way that shows no slight acquaintance with the history of philosophy and science among the ancient Greeks. In this selection we may fairly suppose that Raphael was aided by Bembo, Ariosto,[6] Castiglione, Bibbiena, or others of the crowd of scholars who at this time thronged the papal court. Many interesting portraits are introduced—Bramante as the aged Archimedes, stooping over a geometrical diagram; a beautiful fair-haired youth on the left is Francesco Maria della Rovere, duke of Urbino; and on the extreme right figures of Raphael himself and Perugino are introduced (see fig. 5, below). The stately building in which these groups are arranged is taken with modifications from Bramante's first design for St Peter's.

Over the window (No. 6 on fig. 3) is a group of poets and musicians on Mount Parnassus, round a central figure of Apollo; it contains many heads of great beauty and fine portraits of Dante and Petrarch. The former, as a theologian, appears also in the Disputa. Over the opposite window (No. 5) are graceful figures of the three chief Virtues, and at one side (No. 4) Gregory IX. (a portrait of Julius II.) presenting his volume of decretals to a jurist; beside him is a splendid portrait of Cardinal de' Medici (afterwards Leo X.) before his face was spoiled by getting too stout. This painting shows the influence of Melozzo da Forli.[7] On the other side Justinian presents his code to Trebonianus (No. 3); this is inferior in execution and appears to have been chiefly painted by pupils.

The next room (B), called La Stanza d'Eliodoro, was painted in 1511-14;[8] it is so called from the fresco (No. 7 in fig. 3) representing the expulsion of Heliodorus from the Temple (2 Macc. iii.), an allusion to the struggles between Louis XII. of France and Julius II. The whole spirit of the subjects in this room is less broad and tolerant than in the first: no pagan ideas are admitted, and its chief motive is the glorification of the pontificate, with insistence on the temporal power. The main incident of this picture is the least successful part of it: the angel visitant on the horse is wanting in dignity, and the animal is poorly drawn, as is also the case with the horses of Attila's army in the fresco opposite. The group of women and children on the left is, however, very beautiful, and the figures of Julius II. and his attendants are most nobly designed and painted with great vigour. The tall standing figure of Marc Antonio Raimondi, as one of the pope's bearers, is a marvellous piece of portrait painting, as is also the next figure who bears his name on a scroll—IO . PETRO . DE . FOLIARIIS . CREMONĒN. Behind, Giulio Romano is represented as another papal attendant. This picture was completed in 1512. Over the window (No. 8) is the scene of the Miracle at Bolsena of 1264, when the real presence was proved to a doubting priest by the appearance of blood-stains on the Corporal (see ORVIETO). Julius II. is introduced kneeling behind the altar; and the lower spaces on each side of the windows are filled with two groups, that on the left with women, that on the right with officers of the papal guard. The last group is one of the most masterly of all throughout the stanze: each face, a careful portrait, is a marvel of expression and power, and the technical skill with which the whole is painted to the utmost degree of finish, almost without any tempera touches, is most wonderful. The next fresco in date (No. 10) is that of the Repulsion of Attila from the walls of Rome by Leo I., miraculously aided by the apparitions of St Peter and St Paul; it contains another allusion to the papal quarrels with France. It was begun in the lifetime of Julius II., but was only half finished at the time of his death in 1513, thus it happens that the portrait of his successor, the Medici pope Leo X., appears twice over, first as a cardinal riding behind the pope, painted before the death of Julius II., and again in the character of S. Leo, instead of the portrait of Julius which Raphael was about to paint.[9] Attila with his savage-looking army is not the most successful part of the fresco: the horses are very wooden in appearance, and the tight-fitting scale armour, put on in some impossible way without any joints, gives a very unreal and theatrical look to the picture. Part is the work of pupils. In 1514 he painted the Deliverance of St Peter from Prison, with a further political allusion (No. 9). It is very skilfully arranged to fit in the awkward space round the window, and is remarkable for an attempt, not much suited for fresco-painting, to combine and contrast the three different qualities of light coming from the moon, the glory round the angel, and the torches of the sentinels.

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[1] How fine these portrait-heads probably were may be guessed from Piero's magnificent frescos at *Arezzo*, in the retro-choir of S. Francesco.

[2] See Braun, *Die Composition der Wandgemalde Raphaels im Vatican*, Berlin, and Gruyer, *Les Fresques de Raphael au Vatican*, Paris, 1859.

[3] It need hardly be said that the name Disputa is a misnomer; there could be no dispute among the saints and doctors of the church about so well established a dogma as the real presence: the monstrance with the Host below and the figure of Christ above indicate His double presence both on earth and in heaven. Dr Braun, Springer, and Hagen have published monographs in German on this painting.

[4] See Trendelenburg, *Ueber Rafael's Schule von Athen*, Berlin, 1843, and Richter (same title), Heidelberg, 1882; the title "School of Athens" is comparatively modern.

[5] He has shown great skill in the way in which he has fitted his end frescos into the awkward spaces cut into by the windows, but they are none the less treated in a purely pictorial manner

[6] Ariosto visited Rome twice about this time, as ambassador from the duke of Ferrara to Julius II.,—the first time in 1509.

[7] Compare his fresco of Sixtus IV. now in the picture-gallery of the Vatican.

[8] The vault of this room is painted with scenes from the Old Testament on a harsh blue ground, much restored, they are probably the work of Giulio Romano, and in a decorative way are very unsuccessful,—a striking contrast to the beautiful vaults of Perugino and Raphael in rooms C and A. The deep blue grounds so much used by Raphael's school are very liable to injury from damp, and in most cases have been coarsely restored. Those in the Villa Madama are untouched, and in parts the damp has changed the ultramarine into emerald green.

[9] A pen sketch in the Louvre by Raphael shows Julius II. in the place afterwards occupied by Leo X.; another difference in this sketch is that the pope is borne in a chair, not on horseback as in the fresco.

For room C Raphael designed and partly painted the Incendio del Borgo (No. 11), a fire in the Borgo or Leonine City, which was miraculously stopped by Leo IV. appearing and making the sign of the cross at a window in the Vatican. In the background is shown the façade of the old basilica of St Peter, not yet destroyed when this fresco was painted. One group on the left, in the foreground, is remarkable for its vigour and powerful drawing; the motive is taken from the burning of Troy; a fine nude figure of Æneas issues from the burning houses bearing on his back the old Anchises and leading the boy Ascanius by the hand. Some of the female figures are designed with much grace and dramatic power. Many studies for this picture exist. This is the last of the stanze frescos on which Raphael himself worked. Others designed by him and painted by Giulio Romano, Gianfrancesco Penni, and other pupils were the Battle of Ostia (No. 12), a very nobly composed picture, and the Oath of Leo III. before Charlemagne (No. 14). The other great picture in this room (No. 13), the Coronation of Charlemagne (a portrait of Francis I. of France), is so very inferior in composition that it is difficult to believe that Raphael even made a sketch for it. The enormous fresco of the Defeat of Maxentius by Constantine (room D, No. 17) was painted by Giulio Romano, soon after Raphael's death, from a sketch by the latter; it is even more harsh and disagreeable in colour than most of Giulio Romano's early frescos.[1] Among the other very inferior frescos in this great hall are two female figures (Nos. 15 and 16) representing Comitas and Justitia, painted on the wall in oil colours, very harmonious and rich in tone; they are usually, though wrongly, attributed to Raphael himself.

Technical Methods employed in Raphael's Frescos.—Having made many studies, both nude and draped, for single figures and groups, the painter made a small drawing of the whole composition, which was enlarged by his pupils with the help of numbered squares, drawn all over it, to the full size required,[2] on paper or canvas. Holes were then pricked along the outlines of the cartoon, and the design pounced through on to an undercoat of dry stucco on the wall, with pounded charcoal and a stiff brush. Over this, early in the morning, a patch of wet stucco was laid, about enough to serve for the day's painting; this of course obliterated the outline on the wall, and the part covered by the patch was again sketched in by freehand, with a point on the wet stucco, so as to be a guide for the outline traced with the brush and the subsequent painting. A line impressed on the wet stucco was easily smoothed out, but a touch of the brush full of pigment sank deeply into the moist stucco, and could not easily be effaced. It will thus be seen that in fresco painting the only use of pouncing the whole design on to the wall was to keep the general positions of the figures right, and was no guide as to the drawing of each separate part. Fig. 5 shows the portrait-heads of himself and Perugino, at the extreme left of the School of Athens; on this are visible many of the impressed sketch-lines, and also part of the "fresco edge" of the patch on which this part is painted. The heads in this figure are less than one day's work. It will be seen that there is no attempt at any accuracy of drawing in the impressed lines. Raphael, especially in his later frescos, worked with wonderful rapidity: three life-sized busts, or half a full-length figure, more than life-size, was a not unusual day's work. In some of the frescos the edges of each day's patch of stucco can easily be traced, especially in the Incendio del Borgo, which has a strong side light. In the Disputa much use was made of tempera in the final touches, but less was used in the subsequent frescos, owing to his increasing mastery of the difficulties of the process.

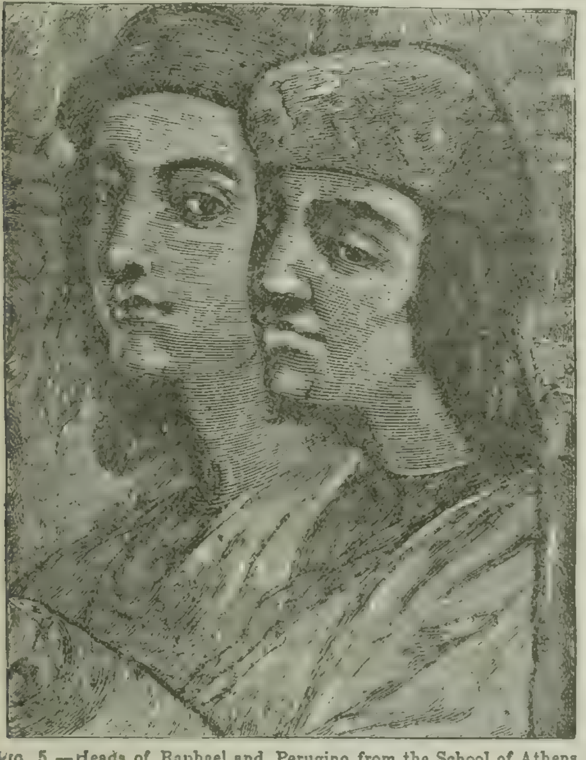

FIG. 5.—Heads of Raphael and Perugino from the School of Athens, showing incised lines and "fresco edges."

The paintings in the stanze were only a small part of Raphael's work between 1509 and 1513. To this period belong the Madonna of Foligno (Vatican), painted in 1511 for Sigismondo Conti; it is one of his most beautiful compositions, full of the utmost grace and sweetness of expression, and appears to be wholly the work of his hand. It has suffered much from repainting. Of about the same date are the gem-like Garvagh Madonna (National Gallery, bought for £9000; once in the possession of the Aldobrandini family), the Diademed Virgin of the Louvre, and the Madonna del Pesce at Madrid. The last is a very noble picture, but the design is more pleasing than the colour, which, like other paintings of Raphael's at Madrid, suggests the inferior touch of a pupil; it was executed in 1513 for S. Domenico in Naples. In addition to other easel pictures a number of his finest portraits belong to this period—that of Julius II. (Uffizi),[3] of which a good replica or contemporary copy exists in the National Gallery, the so-called Fornarina in the Palazzo Barberini, the Baldassare Castiglione of the Louvre, and the unfinished portrait of Federigo Gonzaga of Mantua.

When Giovanni de' Medici, at the age of thirty-eight, became pope as Leo X., a period of the most glowing splendour and reckless magnificence succeeded the sterner rule of Julius II. Agostino Chigi, the Sienese financier, was the chief of those whose lavish expenditure contributed to enrich Rome with countless works of art. For him Raphael painted, in 1513-14, the very beautiful fresco of the Triumph of Galatea in his new palace by the Tiber bank, the Villa Farnesina, and also made a large series of magnificent designs from Apuleius's romance of Cupid and Psyche, which were carried out by a number of his pupils.[4] These cover the vault and lunettes of a large loggia (now closed in for protection); in colouring they are mostly harsh and gaudy,[5] as is usually the case with the works of his pupils, a great contrast to the fresco of the Galatea, the greater part of which is certainly the master's own work.[6] For the same patron he painted

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[1] See Montagnani, *Sala di Costantino*, Rome, 1834. Though he was never a good colourist, the great frescos by Giulio Romano in the Palazzo del Tè, Mantua, show some improvement as compared with his Roman work.

[2] These three stages were usually distinguished as *study*, *sketch*, and *cartoon*.

[3] A very fine ancient copy of this portrait is in the Pitti Palace; certain peculiarities in its execution show it to be by some Venetian painter, as was pointed out to the present writer by Mr Fairfax Murray.

[4] Chiefly by Giulio Romano, Gianfrancesco Penni, and Giovanni da Udine; much injury has been done to these frescos by repainting, especially in the coarse blue of the ground.

[5] These and other frescos by his pupils are much disfigured by the disagreeable hot tone of the flesh, very unlike the pearly tone of the flesh of Galatea.

[6] Dorigny, *Psychis et Amoris fabula a Raphaele*, &c., Rome, 1693; and Gruner, *Fresco Decorations in Italy*, London, 1854, pls. 16-18. The group of the Triton and Nymph on the left of the composition was probably executed by Giulio Romano.

(also in 1513) his celebrated Sibyls in S. Maria della Pace,—figures of exquisite grace, arranged with perfect skill in an awkward space. It is not without reason that Vasari gives these the highest position among his fresco-paintings.[1] Agostino Chigi also employed Raphael to build for him a private chapel in S. Maria del Popolo, and to make a series of cartoons to be executed in mosaic on the inner dome.[2] The central medallion has a figure of God among clouds and angel boys, such as Raphael drew with unrivalled grace (fig. 6), and around are the eight

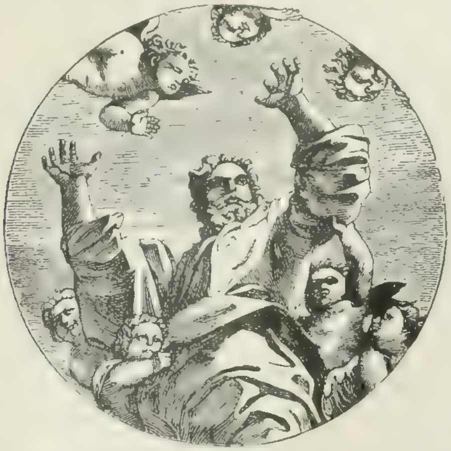

Fig. 6.—Mosaic of God creating the stars, from the Chigi chapel, in centre of dome, designed by Raphael.

planets, each with its pagan deity and directing angel.[3] He has not hampered himself by any of the usual rules which should apply to the designing of mosaic; they are simply treated as pictures, with almost deceptive effects of perspective. The execution of these brilliant mosaics was carried out by the Venetian Luigi della Pace, whose signature is introduced on the torch of Cupid in the panel representing the star Venus (Ludovico della Pace Veneziano fecit, 1516). These mosaics are still as perfect and brilliant as if they were the work of yesterday. Probably in the early years of Leo X.'s reign were painted the Madonna della Seggiola (Pitti), the S. Cecilia at Bologna (not completed till 1516), the miniature Vision of Ezekiel (Pitti), and three important pictures at Madrid. The latest of these, known as Lo Spasimo, from the church at Palermo, for which it was painted, is one of Raphael's finest compositions, representing Christ bearing His Cross. It bears signs of Giulio Romano's hand in its heavy colouring with unpleasant purple tones. The Madonna called Della Perla has much changed from the darkening of the pigments; in design it recalls Leonardo da Vinci.[4] The small Madonna della Rosa is the most perfect in colour of all the master's pictures in the Madrid Gallery, and is usually rather undervalued; it is a most graceful little picture. The portrait of Leo X. with Cardinals de' Rossi and de' Medici, in the Pitti, is one of his finest portrait-pictures, especially as regards the figure of the pope.[5] Little is known about the Madonna di S. Sisto, the glory of the Dresden Gallery; no studies or sketches for it exist. In style it much resembles the Madonna di Foligno; it is less injured by restoration than the latter.

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Among the latest works of Raphael are the large St Michael and the Devil, in the Louvre, signed "Raphael Urbinas pingebat, MDXVIII.," and the very beautiful portrait of the Violin-player, in the Sciarra-Colonna Palace in Rome, also dated 1518; this last bears much resemblance to the painter himself. The British Museum possesses one of Raphael's finest portraits, though only a chalk drawing, that of his friend the painter Timoteo della Vite, a masterpiece of expression and vigour; it is executed in black and red, and is but little inferior in chromatic effect to an oil-painting; it is life-size, and is executed with wonderful skill and evident keen interest in the subject.

The tapestry cartoons, seven of which are in the South Kensington Museum, were painted by pupils from Raphael's designs. They are part of a set of ten, with scenes from the Acts of the Apostles, intended, when copied in tapestry, to adorn the lower part of the walls of the Sistine chapel. The tapestries themselves, worked at Brussels, are now, after many vicissitudes, hung in a gallery in the Vatican; the set is complete, thus preserving the design of the three lost cartoons. The existing seven, after being cut up into strips for use on the looms, were bought by Rubens for Charles I.[6] The tapestry copies are executed with wonderful skill, in spite of Raphael's having treated the subjects in a purely pictorial way, with little regard to the exigencies of textile work. The designs are reversed, and the colours far more brilliant than those of the cartoons, much gold and silver being introduced. The noble figure of Christ in the Delivery of the Keys to St Peter is in the tapestry much disfigured by the addition of a number of large gold stars all over the drapery, which spoil the simple dignity of the folds. The rich framework round each picture, designed by Raphael's pupils, probably by Penni and Giovanni da Udine, exists in the tapestries and adds greatly to their decorative effect. The cartoons were executed in 1515 and 1516, and the finished tapestries were first exhibited in their place in the Sistine chapel on 26th December 1519,—a very short time for the weaving of such large and elaborate pictures. The three of which the cartoons are lost represent the Martyrdom of St Stephen, the Conversion of St Paul, and St Paul in Prison at Philippi. Probably no pictures are better known or have been more often engraved and copied than these seven cartoons.[7]

The Transfiguration.[8]—In 1519 Cardinal Giuliano de' Medici (afterwards Clement VII.), as bishop of Narbonne, ordered two altar-pieces for his cathedral,—the one by Raphael, the other by Raphael's Venetian rival Sebastiano del Piombo (see SEBASTIANO). That by the latter painter is the noble Resurrection of Lazarus, now in the National Gallery, in the drawing of which the Venetian received important aid from Michelangelo. Several studies for Raphael's picture exist, showing that he at first intended to paint a Resurrection of Christ as a pendant to Sebastiano's subject, but soon altered his scheme into the Transfiguration. The eight or nine existing studies are scattered through the Oxford, Lille, Windsor, and some private collections. A great part of the lower group was unfinished at the time of the painter's sudden death in 1520, and a good deal of the heavy colouring of Giulio Romano is visible in it. On the death of Raphael the picture became too precious to send out of Rome, and Cardinal de' Medici contented himself with sending the Resurrection of Lazarus to Narbonne. The Transfiguration was bequeathed by him to the monks of S. Pietro in Montorio, in whose church it remained till it was stolen by Napoleon I. It now hangs in the Vatican Gallery.

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[1] Thanks to Michelangelo's generous intervention, Raphael was paid the large sum for that time of 900 gold ducats for this fresco.

[2] Gruner, *Mosaici in S. Maria del Popolo*, Rome, 1839.

[3] In accordance with Dante's scheme in the *Paradiso*.

[4] La Perla, "the pearl" of the Spanish royal collection, was originally painted for Bishop Louis of Canossa; it was sold by Cromwell with the greater part of Charles I.'s collection at Hampton Court. The composition, though not the execution, of this picture belongs to Raphael's early years in Rome; it is very remarkable for its delicacy of touch and high finish.

[5] The magnificent portrait-heads of the Venetian scholars Navagero and Beazzano, now in the Doria Gallery in Rome, are worthy of Raphael at his best, and have for long been attributed to him. There are good contemporary copies at Madrid.

[6] Fortunately they were not sold with the bulk of Charles's collection, and remained at Hampton Court till a few years ago. See Koch, *Rafael's Tapeten im Vatican*, Vienna, 1878 and Müntz, *Hist. de la tapisserie Italienne*, Paris, 1880.

[7] The name "arazzi" given by Italians to these tapestries is derived from Arras, where they were erroneously thought to have been woven; they were made at Brussels. It is much to be regretted that visitors to the Vatican are no longer allowed to see these priceless examples of textile work.

[8] See Morgenstern, *Ueber Rafael's Verklärung*, Leipsic, 1822, and Justi, *Die Verklarung Christi*, Leipsic, 1870.

Architectural Work.[1]—Though he designed but few buildings, Raphael's great repute even in this branch of art is shown by the fact that Bramante, before his death in March 1514, specially requested that Raphael should be made his successor as chief architect of St Peter's. To this most important post he was appointed by a brief of Leo X., dated 1st August 1514. The progress of St Peter's was, however, too slow for him to leave much mark on its design. Another work of Bramante's, completed by Raphael, was the graceful Cortile di S Damaso in the Vatican, including the loggie, which were decorated with stucco-reliefs and paintings of sacred subjects by his pupils under his own supervision, but only very partially from his designs.[2] The Palazzo dell' Aquila, built for Giovanni Battista Branconio, and destroyed in the 17th century during the extension of St Peter's, was one of Raphael's chief works as an architect. He also designed the little cross church, domed at the intersection like a miniature St Peter's, called S. Eligio degli Orefici, which still exists near the Tiber, almost opposite the Farnesina gardens, a work of but little merit. According to M. Geymüller, whose valuable work, *Raffaello come Architetto*, Milan, 1883, has done so much to increase our knowledge of this subject, the Villa Farnesina of Agostino Chigi, usually attributed to Peruzzi, was, as well as its palace-like stables, designed by Raphael; but internal evidence makes this very difficult to believe. It has too much of the delicate and refined character of the 15th century for Raphael, whose taste seems to have been strongly inclined to the more developed classic style, of which Palladio afterwards became the chief exponent. The Palazzo Vidoni, near S. Andrea della Valle, also in Rome, is usually attributed to Raphael, but an original sketch for this in Peruzzi's own hand has recently been identified among the collection of drawings at Siena; this, however, is not a certain proof that the design was not Raphael's. M. Geymüller has, however, shown that the Villa Madama, on the slopes of Monte Mario above Rome, was really designed by him, though its actual carrying out, and the unrivalled stucco-reliefs which make its interior one of the most magnificent palaces in the world, are due to Giulio Romano and Giovanni da Udine, as mentioned in Vasari's life of the latter.[3] The original design for this villa made by Raphael himself has been discovered by M. Geymüller. Another architectural work was the little Chigi chapel in S. Maria del Popolo, built in 1516, for the dome of which the above-mentioned mosaics were designed (see fig. 6). At the time of his death he was preparing to build himself a handsome palace near the church of S. Eligio; the deed for the purchase of its site was signed by him only a few days before his last short illness. Though not completed till 1530, the Palazzo Pandolfini at Florence was also designed by him; it is a dull scholastic building without any special beauty either in proportion or treatment of the mass; it is illustrated by Montigny and Famin, *Architecture Toscane*, Paris, 1815, pls. 33-36.

A sober criticism of Raphael's architectural works must force one to refuse him a high position in this branch of art. In the church of S. Eligio and the Chigi chapel he is merely a copyist of Bramante, and his more original works show but little power of invention or even mastery of the first principles of architectural design. His details are, however, often delicate and refined (especially in the Palazzo Pandolfini), and he was supremely successful in the decorative treatment of richly ornamented interiors when he did not, as in some of the Vatican stanze, sacrifice the room to the frescos on its walls.

Sculpture.—That Vasari is right in attributing to him the model for the beautiful statue of Jonah in the Chigi chapel (fig. 7) is borne witness to by two important documents, which show that his almost universal talents led him to attempt with success the preliminary part of the sculptor's art, though there is no evidence to show that he ever worked on marble.[4] One of these is a letter written to Michelangelo to warn him that Raphael had been invading his province as a sculptor by modelling a boy, which had been executed in marble by a pupil, and was a work of much beauty. Again, after his death his friend Baldassare Castiglione, in a letter dated 8th May 1523, asks his steward in Rome "if Giulio Romano still possesses a certain boy in marble by Raphael and what his lowest price for it would be,"—"s'egli [Giulio Romano] ha più quel puttino di marmo di mano di Raffaello e per quanto si daria all' ultimo." A group in marble of a Dead Boy on his Dolphin Playfellow, now in the St Petersburg Hermitage, has been erroneously supposed to be Raphael's "puttino," which has also been identified with a statuette of a child till recently at Florence in the possession of Signor Molini.[5] The statue of Jonah was executed in marble by Lorenzetto, a Florentine sculptor; and it remained in his studio for many years after Raphael's death. The South Kensington Museum possesses a small clay sketch for this beautiful group, slightly different from the marble; it is probably the original design by the master's own hand. The whole feeling of the group—a beautiful youth seated on a sea-monster—is purely classical, and the motive is probably taken from some antique statue representing Arion or Taras on a dolphin.[6] Being intended for a church it was necessary to give the figure a sacred name, and hence the very incongruous title that it received. There is no trace of Raphael's hand in the design of the other statue, an Elijah by Lorenzetto, though it also is ascribed to him by Vasari.

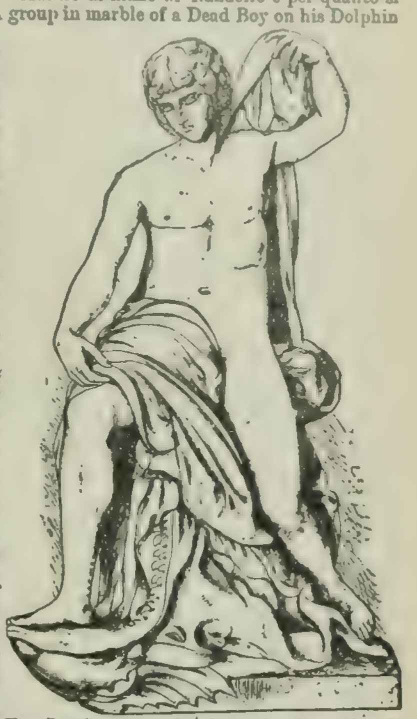

FIG. 7.—Statue of Jonah in the Chigi chapel, designed by Raphael, sculptured by Lorenzetto; heroic size.

Lesser Arts practised by Raphael.—Like other great artists, Raphael did not disdain to practise the lesser branches of art: a design for a silver perfume-burner with female caryatids is preserved in an engraving by Marco da Ravenna; and he also designed two handsome repoussé salvers for Agostino Chigi, drawings for which are now at Dresden. In designs for tarsia-work and wood-carving he was especially skilful; witness the magnificent doors and shutters of the stanze executed by his pupil Giovanni Barile of Siena.[7] The majolica-designs attributed to him were by a namesake and relation called Raffaello di Ciarla;[8] and though many fine dishes and ewers of Urbino and other majolica are decorated with Raphael's designs, they are all taken from pictures or engravings, not specially done by him for ceramic purposes. With the frivolity of his age Leo X. occasionally wasted Raphael's skill on unworthy objects, such as the scenery of a temporary theatre; and in 1516 the pope set him to paint in fresco the portrait life-size of a large elephant, the gift of the king of Portugal, after the animal was dead.[1] This elephant is also introduced among the stucco reliefs of the Vatican loggie, with the poetaster Barrabal sitting in mock triumph on its back.

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[1] See Ojetti, *Discorso su Raffaello Architetto*, Rome, 1883, but more especially Geymüller's work mentioned below, and his *Projets Primitifs pour la Bas. de S. Pierre*, Paris, 1875-80.

[2] See Mariani, *La Bibbia nelle Loggie del Vaticano*, Rome; Anon., *Dipinti nelle Loggie del Vaticano*, Rome, 1841; and Gruner, *Fresco Decorations*, London, 1854, pls. 1-5. Too great a share in the decoration of the loggie is usually given to Raphael; not only the harsh colour but also the feebleness of much of the drawing shows that he can have had but little to do with it.

[3] See Gruner, *Fresco Decorations*, &c., London, 1854, pls. 6-12, and Raffaelle Santi, *Ornati della Villa Madama*, &c., Rome, 1875. Two other little known but very beautiful architectural works, executed under Raphael's influence by his pupils, are the bath-room of Cardinal Bibbiena in the Vatican and the bath-room of Clement VII. in the castle of S. Angelo, both richly decorated with delicate stucco-reliefs and paintings, treated after a classical model

[4] See note on p. 369, vol. iv., of Milanesi's edition of Vasari, Florence, 1879. To one branch of the sculptor's art, practised under Raphael's supervision, belong the elaborate and delicately executed stucco-reliefs of the loggie and elsewhere. Among these occur many panels with figure-subjects, large in scale and important in composition; those executed during his lifetime are free from the too pictorial character which is an obvious fault in the very magnificent reliefs of the Villa Madama.

[5] See Appendix, p. [illegible], vol. iv., of Milanesi's edition of Vasari; [illegible], *Del putto . . . di Raffaello*, Florence, 1872; [illegible] di *Lorenzetto*, Florence, [illegible]. The evidence which would [illegible] of sculpture to Raphael is almost worthless. See on the St [illegible] group, Guedeonoff, [illegible] St Petersburg, 1872.

[6] Compare this latter subject on reverses of the [illegible] of Tarentum, c. [illegible] B.C.

[7] The very beautiful and elaborate choir-stalls of the church of S. Pietro de' Casinensi at Perugia, with panels carved in relief, [illegible] by Stefano da Bergamo, are mainly adapted from Raphael's designs.

[8] See Campori, *Notizie Stor. d. Maiolica di Ferrara*, 3d ed., Pesaro, 1879, pp. 122-133.

Though Raphael himself does not appear to have practised the art of engraving, yet this formed one of the many branches of art which were carried on under his supervision. A large number of his designs were engraved by his pupils Marcantonio Raimondi (see vol. xv. p. 530) and Agostino Veneziano. These valuable engravings are from Raphael's sketches, not from his finished pictures, and in some cases they show important alterations made in the execution of the picture. Raimondi's engraving of the S. Cecilia of Bologna in design is very inferior to that of the actual painting. Several of Raphael's most important compositions are known to us only by these early engravings, *e.g.*, the Massacre of the Innocents (engraved by Raimondi), which is one of his finest works, both for skilful composition and for masterly drawing of the nude. Another magnificent design is the Judgment of Paris, containing a large number of figures; the nude figure of Minerva is a work of especial force and beauty. A standing figure of Lucretia[2] about to stab herself is also one of his most lovely figures. Many of Raphael's studies for Marcantonio's engravings still exist.

Archæology.—As an antiquary Raphael deserves to take the highest rank. His report[3] to Leo X. in 1518 is an eloquent plea for the preservation of ancient buildings. In 1515 he had been appointed by Leo X. inspector of all excavations in Rome and within 10 miles round. His careful study of the antique, both statues and modes of decoration, is clearly shown in many of his frescos, and especially in the graceful stucco reliefs and painted grotteschi, of which he and his pupils made such skilful use in the decorations of the Vatican loggie, the Villa Madama, and elsewhere.[4]

Raphael's Fame.—When we consider the immense field over which his labours were spread and the strong personal individuality which appears in all these varied branches of art, together with the almost incredible number of paintings that issued from his studio, it will be seen that he must have laboured with an amount of unflagging industry which has perhaps never been surpassed, and that too in a time and in a city of which the social habits and luxurious splendour certainly threw every possible temptation in the way of steady application and regular work.

Among all the painters of the world none has been so universally popular as Raphael, or has so steadily maintained his pre-eminent reputation throughout the many changes in taste which have taken place in the last three and a half centuries. Apart from his combined merits as a draughtsman, colourist, and master of graceful composition, he owes the constancy of admiration which has been felt for him partly to the wide range of his subjects, but still more to the wonderful varieties of his style. If the authorship of his paintings were unknown, who would guess that the Sposalizio of the Brera, the Madonna del Baldacchino of the Pitti, and the Transfiguration could possibly be the work of one painter? In his earliest pictures he touches the highly spiritual and sacred art of the Perugian Fiorenzo di Lorenzo, while in his latest Roman work he is fully embarked in the pagan spirit of the last development of the Renaissance, already on the brink of the most rapid decline. In the seventeen or eighteen years which composed his short working life he passed through stages of development for which a century would not have seemed too long, while other painters lived through the same changeful time with but little alteration in their manner of work. Perugino, who outlived his wonderful pupil, completed in 1521 Raphael's San Severo fresco in a style differing but little from his paintings executed in the previous century.

In versatility of power Raphael (as a painter) remains almost without a rival; whether painting an altar-piece for a church, a large historical fresco, a portrait, or decorative scenes from classical mythology, he seems to excel equally in each; and the widely different methods of painting in tempera, oil, or fresco are employed by him with apparently equal facility. His range of scale is no less remarkable, varying from a miniature, finished like an illuminated MS., to colossal figures in fresco dashed in with inimitable breadth and vigour.

An additional glory is thrown round his memory by the personal beauty, charm of manner, and deep kindliness of heart which endeared him to all who knew him.[5] His sincere modesty was not diminished by his admission as an equal by the princes of the church, the distinguished scholars, and the world-famed men of every class who formed the courts of Julius II. and Leo X. In accordance with the spirit of the age he lived with considerable display and luxury, and was approached with the utmost deference by the ambassadors of foreign princes, whether their master desired a picture, or, as the duke of Ferrara did, sent to consult him on the best cure for smoky chimneys. To his pupils he was as a father, and they were all, as Vasari says, "vinti dalla sua cortesia"; they formed round him a sort of royal retinue, numbering about fifty youths, each talented in some branch of the arts.[6] Giulio Romano and Gianfrancesco Penni, his two favourite pupils, lived with him in the Palazzo di Bramante, a house near St Peter's, where he resided during the greater part of his life in Rome. This fine palace, designed by Bramante, was destroyed in the 17th century at the same time as Raphael's Palazzo dell' Aquila.

It is difficult to realize the furor of grief and enthusiasm excited by the master's death on Good Friday 1520, at the age of thirty-seven exactly, after an attack of fever which lasted only ten days. His body was laid out in state in his studio, by the side of the unfinished Transfiguration, and all Rome flocked to the place for a last sight of the "divino pittore." His property amounted to about £30,000; his drawings and MSS. he left to Giulio Romano and Gianfrancesco Penni; his newly bought land to Cardinal Bibbiena, the uncle of the lady to whom he had been betrothed; there were liberal bequests to his servants; and the rest was mostly divided among his relatives at Urbino. He desired to be buried in the Pantheon, under the noble dome which he and Bramante had dreamed of rivalling. His body is laid beside an altar, which he endowed with an annual chantry, and on the wall over it is a plain slab, with an inscription written by his friend Cardinal Bembo. Happily his grave has as yet escaped the disfigurement of a pretentious monument such as those erected to Michelangelo, Dante, and other great Italians; it has not, however, remained undisturbed: in 1833 it was opened and the bones examined.[7] In March 1883 a festival was held at Urbino, on the occasion of the 4th centenary of his birth, and on this occasion many interesting articles on Raphael were published, especially one by Geymüller, "Le IV^{me} Centenaire de la Naissance de Raphaël," 1483-1883, in the *Gaz. de Lausanne*, March 1883.

Literature.—Comolli, *Vita inedita di Raffaello*, 1790; Duppa, *Life of Raphael*, London, 1816; Braun, *Raphael . . . Leben und Werke*, Wiesbaden, 1819; Fea, *Raffaello . . . ed alcune di lui Opere*, Rome, 1822; Rehberg, *Rafael Sanzio aus Urbino*, Munich, 1824; Quatremère de Quincy, *Vita ed Opere di Raffaello*, trans. by Longhena, Milan, 1829 (a work marred by many inaccuracies); Rumohr, *Ueber Raphael und sein Verhältniss*, Berlin, 1851; Rio, *Michelange et Raphaël*, Paris, 1863; Gruyer, *Raphaël et l'Antiquité*

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[1] Under it was inscribed—"Raphael Urbinas quod natura abstulerat arte restituit."

[2] On a pedestal is inscribed in Greek—"Better to die than live basely."

[3] Published by Visconti, *Lettera di Raffaello a Leone X.*, Rome, 1840; see also Muntz. "Raphael Archéologue," &c., *Gaz. des B. Arts*, October and November 1880.

[4] See Gruyer, *Raphael et l'Antiquité*, Paris, 1864.

[5] See the eloquent eulogy of his character at the end of Vasari's *Life.*

[6] See Minghetti, "Gli Scolari di Raffaello," *Nuova Antologia*, June 1880.

[7] See "Ritrovamento delle ossa di Raffaello," *Soc. Virtuosi al Panteone*, Rome, 1833; other pamphlets on this were published in the same year by Fea, Falconieri, and Odescalchi.

(Paris, 1864), *Les Vierges de Raphaël* (Paris, 1878), and *Raphaël, Peintre de Portraits* (Paris, 1880); Grimm, *Das Leben Raphaels von Urbino*, Berlin, 1872 (intended specially to point out the errors of Vasari and Passavant, and not written in a very fair spirit); Gherardi, *Della Vita di Raffaello*, Urbino, 1874; Springer, *Raffael und Michelangelo*, Leipsic, 1878; Perkins, *Raphael and Michelangelo*, Boston, 1878; Dohme, *Kunst und Kunstler des Mittelalters*, Leipsic, 1878 (vol. ii. of this valuable work, with many illustrations, is devoted entirely to Raphael and Michelangelo); Alippi, *Il Raffaello*, Urbino, 1860; Clément, *Michelange et Raphaël*, 5th ed. (improved), Paris, 1881; Eug. Muntz, *Raphaël, sa Vie, son Œuvre*, &c., Paris, 1881 (this is on the whole the best single work on Raphael, both from its text and its numerous well-chosen illustrations); Passavant, *Rafael und sein Vater*, Leipsic, 1839-58 (a valuable book, especially for its list of Raphael's works; a new edition translated by Guasti into Italian was published at Florence in 1882, but, though printed so recently, this edition is in no way superior to the French one of Lacroix, Paris, 1860, which, however, is a great advance on the original German text); Crowe and Cavalcaselle, *Life and Works of Raphael*, London, 1882-85; Eug. Muntz, *Les Historiens et les Critiques de Raphael*, Paris, 1883 (contains a good bibliography of the subject). The student of Raphael owes a special debt of gratitude for the recent labours of MM. Muntz, Gruyer, and Geymuller.

Reproductions of Raphael's Works.—From the time of Raimondi downwards no painter's works have been so frequently engraved. The Calcografia Camerale (now called Regia) of Rome possesses an enormous number of copper-plates of his pictures by a great many good (and bad) engravers of this and the last century. Electrotypes of the old coppers are still worked, and are published by the Stamperia at very moderate prices; in the catalogue Nos. 736 to 894 are the works of Raphael, including several books of engravings containing whole sets, such as the Vatican loggie, &c. A very complete collection of photographs from these and other engravings is published by Gutbier and Lübke, *Rafael's Werke, sämmtliche Tafelbilder und Fresken*, Dresden, 1881-82, in three large volumes, divided into classes,—pictures of the Madonna, frescos, stanze of the Vatican, tapestry cartoons, &c. The descriptive text and life of Raphael are by Lübke. The Malcolm, Oxford, British Museum, Lille, Louvre, Dresden, and other collections of Raphael's drawings have mostly been published in photographic facsimile, and an enormous number of illustrated monographs on single pictures exists. Braun's autotypes of the stanze and Farnesina frescos are especially good. (J. H. M.)

RAPIN, Paul de (1661-1725), sieur of Thoyras, French historian, was the son of Jacques de Rapin, avocat at Castres (Tarn), where he was born on 25th March 1661. He was educated at the Protestant academy of Saumur, and in 1679 he became an advocate, but soon afterwards entered the army. The revocation of the Edict of Nantes in 1685 and the death of his father, which happened two months afterwards, led him to come to England; but, unable to find employment there, he crossed to Holland and enlisted in the company of French volunteers at Utrecht commanded by Daniel de Rapin, his cousin-german. He accompanied the prince of Orange to England in 1688, and the following year Lord Kingston made him ensign in his regiment, with which he proceeded to Ireland. He took part in the siege of Carrickfergus and the battle of the Boyne, and was shot through the shoulder at the battle of Limerick. Soon afterwards he was promoted captain; but in 1693 he resigned in order to become tutor to the earl of Portland's son. His next change was to return to his family, which he had settled at The Hague, and there he continued some years. But, as he found his family increase, he resolved to retire to a more economical residence, and accordingly removed in 1707 to Wesel, where he commenced his great work *L'Histoire d'Angleterre*. Though he was of a strong constitution, the seventeen years' application entirely ruined his health. He died in 1725.

Rapin was also the author of a *Dissertation sur les Whigs et les Torys*, 1717. *L'Histoire d'Angleterre*, embracing the period from the invasion of the Romans to the death of Charles I., was printed at The Hague in 1724 in 8 vols. It was translated into English, and improved with notes, by Tindal, in 2 vols. folio, 1725-31. Although the work of a foreigner, it is deservedly esteemed as one of the fullest and most impartial collections of English political transactions extant.

RASGRAD or **Hesargrad**, a town of Bulgaria, with a station about 2 miles distant on the Varna and Rustchuk Railway, is situated on the Byaly Lom, 970 feet above sea-level. It has increased in population during the last fifty years from 3000 to 10,000 inhabitants. In 1810 it was the scene of the defeat of the Turks by the Russians.

RASHBA (רשב״א) stands for three rabbins of various ages and various countries.

1. R. Shime'on Ben El'azar was a Mishnic teacher of the 2d century.

2. Rabbenu Shim-hon Ben Abraham of Sens wrote commentaries on various Mishnic treatises (see Mishnah, vol. xvi. p. 506).

3. R. Shelomoh Ben Abraham (or Ben [The] Addereth) was a disciple of Nachmanides, upon whom his master's mantle had fallen (see Nachmanides). He became chief rabbi of Barcelona. Here so many disciples from the neighbouring provinces flocked to him as to arouse emulation among the Jews in the capital of Castile, who thereupon appointed the German Rabbi Asher b. Yeḥiel (Rosh). At the same time religious questions poured in upon him from all Israel, so that it is a marvel how he could go through his mere clerical work.

His works extend over the whole Talmud, although not all of them are printed. But thousands of his Responsa have been printed, while many others lie in MS. at Cambridge (Add. 500). Of his other works, the enumeration of which would occupy columns, mention can be made only of his explanations of the Agadoth of the Babylonian Talmud, containing polemic against both Christians and Moslems (MS., Univ. Camb., Add. 1567, 1). On his part in the Maimonidean controversy see Schiller-Szinessy, *Catalogue*, i. 187 *sq.* (S. M. S.-S.)

RASHBAM. Rabbenu Shemuel Ben Meir, commonly called, from his title and the initials of his own and his father's names, Rashbam, was born at Rameru (Ramerupt near Troyes, in France) about 1080. He was almost the greatest Talmudist of his time, the only two excelling him till 1105 being Rashi and later on his own younger brother, Rabbenu Ya'akob, better known as Rabbenu Tham. In Bible criticism and exegesis, however, he excelled all the men of the 11th and 12th centuries, even if we include R. Menaḥem b. Helbo, R. Yoseph Bekhor Shor, and R. Yoseph Kara of the Franco-Ashkenazic school, and Abraham Ibn 'Ezra of the Sepharadic school. Rashbam was the son of Yokhebed, second daughter of Rashi (*q.v.*), and of Rabbenu Meir of Rameru (b. Shemuel). He succeeded his grandfather Rashi as head of the Rabbinical college, and probably also of the congregation, of Troyes. Later, however, we meet him at other places, *e.g.*, Caen, Loudun. He died about 1160.

Of his works the following are known. (1) Commentaries on the Bible: (*a*) his commentary on the Pentateuch, uncritically edited several times (*ed. princeps*, Berlin, 1705), and critically and most ably for the first time by Rosin of Breslau (1881, 8vo); (*b*) commentaries on most of the other books of the Bible, the greater part of which are now lost, but the existence of which is in early times fully testified to. Those on Ecclesiastes and Canticles[1] were published by Dr Jellinek at Leipsic (1855, 8vo); specimens of both books have been translated into English by Dr Ginsburg (*Song of Songs*, London, 1857, and *Coheleth*, London, 1861). (2) Commentaries on the Babylonian Talmud; of these we now possess only his supplements on *Pesaḥim* (leaves 99b-121b), *Baba Bathra* (leaves 29a-176b), and *Makkoth* (leaves 19b *sq.*; see the so-called *Rashi on the Riph*, in the Mishnah, iii. 5, catchword [illegible] Commentaries on five other treatises are distinctly referred to by old authorities,[2] but Rashi's commentaries so thoroughly eclipsed all these written before and after him that none of them had a chance of surviving, except in the shape of a supplement. (3) *Additamenta* or *Tosaphoth*; see Rabbinovicz (*Variae Lectiones*, ii.,

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[1] The present writer cannot share the opinion of those who, because of the Agadic explanations with which that commentary abounds, call Rashbam's authorship in question. Ibn 'Ezra himself, who was sober thinker enough, is compelled in Canticles to resort to the Rabbinic explanation,—a proceeding and a method in which every modern commentator must take refuge, unless he wishes to explain the book as a merely profane one.

[2] See Berliner, *Magazin*, &c., vii. 186, and *Or Zarua'*, in several places (comp. *Magazin*, ii. p. 100).

Preface, p. 13, and Steinschneider, *Hebr. Handschr. in der kön. Bib. Berlin*, p. 3. (4) *Responsa*; see, for example, *Raban* (Prague, 1610, folio), leaves 143, col. 2, to 146b, col. 1, and elsewhere. (5) Of his controversies with Christians nothing is left except what is occasionally to be found in his commentary on the Pentateuch. (6) On his book on the calendar calculations see *Berliner Magazin*, vii. p. 185. (7) On the true author of the commentary on Aboth, ascribed to Rashbam, see Taylor, *Catal.*, No. 20. (8) Although the attack on his hemero-nyction theory (commentary on Gen. i. 4, 5) was made by Ibn 'Ezra (*Iggereth Hasshabbath*; see *Kerem Ḥemed*, iv. pp. 159-173, and *Mibḥar Hammaamarim* by Nathan b. Shemuel, printed at Leghorn in 1840, leaves 58a-66a) in Rashbam's lifetime he seems not to have answered it. (S. M. S.-S.)

RASHI (רש״י), that is, Rabbenu Shelomoh Yiṣḥaḳi (Solomon, son of Isaac), whence by Christian writers he is also called Isacides[1] (1040-1105), was the greatest rabbi of the Middle Ages. He is equally important for Biblical and Talmudic study, and in the former connexion as interesting to Christians as to Jews from the influence of his exegesis on Luther's Bible (through De Lyra; see vol. xi. p. 601) and on the English version of the Old Testament (mainly through Ibn 'Ezra, and still more through Ḳimḥi). Rashi is the most eminent of the "sages" or "great men of Lothaire"[2] (לותיר, *i.e.*, Lorraine) in whom culminated that movement of Jewish scholarship to which Charlemagne had given the first impulse. From the Jew Isaac, first interpreter and then ambassador in his famous mission to Hárún ar-Rashíd, Charlemagne had doubtless learned how superior in literary attainments the Jews of the East were to those of the West, and therefore he gave great privileges to the accomplished Makhirites[3] who were introduced into the south of France, and spread Jewish culture and literature there.[4] Later on he brought from Rome to Mainz the Kalonymites, a family of distinguished Talmudists, poets, &c., of Lucca;[5] and soon Spires, Worms, and Mainz (spoken of as Shum, שו״ם) became famous seats of Jewish learning; their ordinances (*Taḳḳanoth Shum*) were of normative authority for centuries, and the study of the Hebrew Bible and the Babylonian Talmud steadily spread from southern Germany to northern France. Though Spires, Worms, and Mainz by the partition treaty of Verdun in 843 belonged to East Frankland, yet in Jewish literature Lothaire includes these cities; and all the greatest doctors of Jewish lore in the south of Germany or north of France belong to the "great men" or "sages of Lothaire."[6] Rashi was born, in the year in which the last nominal gaon of Pumbadithā died, at Troyes, where his father Yiṣḥaḳ was no doubt rabbi. R. Yiṣḥaḳ was probably a disciple of R. Gershom; certainly he was an eminent Talmudist.[7] His wife, Rashi's mother, was a sister of R. Shime'on hazzaḳen.[8] Her name is unknown, as is also that of the wife whom Rashi, according to Mishnic precept (*Aboth*, v. 21), married at the age of eighteen. Soon after his marriage, and with his wife's consent, he left her to prosecute his studies in Germany, returning home only from time to time.[9] She bore him no sons, but three daughters.[10]

Rashi had at least six teachers,—(1) his father; (2) R. Ya'aḳob b. Yaḳar (chief rabbi at Worms) for Bible and Talmud (Rashi on T. B., *Pesaḥim*, 111a), a disciple of R. Gershom (Rashbam, *ibid.*, and *Siddur*, ii. leaf 10a) and friend of R. Eli'ezer haggadol; (3) his successor, R. Yiṣḥaḳ Segan Leviyyah (T.B., *Beṣah*, 24b), a pupil of R. Eli'ezer haggadol; (4) his mother's brother, already named (T.B., *Shabbath*, 85b); (5) R. Yiṣḥaḳ b. Yehudah, also a pupil of R. Eli'ezer, and head of the community at Mainz (*Pardes*, xxi.); (6) R. Elyaḳim, head of the community at Spires (*ibid.*, clix., clxxxi., ccxc., cccvi.). Besides the oral instruction of his teachers, Rashi had and used copies of, and commentaries on, sundry parts of the Talmud written by these scholars themselves or by their teachers or disciples (T. B., *Berakhoth*, 39a, 57b; *Shabbath*, 10b; *R. Hasshanah*, 28a; *Sukkah*, 45b; *Siddur*, ii. leaf 10a). He had also before him all the Jewish literature existing and known at his time, as the Bible, part of the Apocrypha, all the Targums, sundry cabbalistic works (*Ṣepher Yeṣīrah*, *Hekhaloth*, &c.[11]), both Talmuds, the Midrashim, *Sheeltoth*, *Halakhoth Gedoloth*, *Teshuboth Haggeonim*, the works of R. Mosheh Haddarshan, the lexicographical works of Menaḥem b. Seruḳ and Donash b. Labrat, and, last but not least, the commentaries of R. Gershom, which he used largely, but mostly silently.[12] He also used the works of his own contemporaries, such as the '*Arukh*.[13] His studies completed, Rashi returned to his native town and opened a school for Bible and Talmud. His fame quickly rose; disciples gathered round him from the whole north of France and south of Germany, and men in office, who had grown grey in study, addressed to him "religious questions," his "answers" to which give us insight into his character, piety, and ability.[14] He died on 13th (not 26th) July 1105,[15] having already seen two of his grandsons "interpreting' in his presence, and the budding intelligence of a third, who became the greatest Talmudist of his age.

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[1] The interpretation of the י of רש״י as meaning Yarchi (Jarchi), *i.e.*, of Lunel, is not to be charged on Buxtorf, nor on Seb. Münster, being already found in the text of the *Pugio Fidei* of Raymundus Martini, written in the second half of the 13th century.

[2] Lothaire never means Lhuitre (Luistre), as appears from the phrase מלכות לותיר, "realm of Lothaire." Instead of עיר לותיר in Rashi's so-called *Siddur*, ii. leaf 33a, must be read ערי לותיר, as will be easily seen from the context.

[3] See *Yoḥasin Hasshalem* (London and Edinburgh, 1857, 8vo), p. 84.

[4] Possibly also, like some princes of the 10th century, Charlemagne encouraged Jewish literature in order to keep at home the considerable sums which the Jews had been wont to send to the Babylonian geonim.

[5] See '*Emeḳ Habbakha*, ed. Letteris (Vienna, 1852, 12mo), p. 13, and Wiener's German translation (Leipsic, 1858, 8vo), p. 8. Reshal's *Responsa*, § xxix., is unfortunately corrupt in many places.

[6] See Brit. Mus. MS. Add. 27200, leaf 24a.

[7] This appears from an explanation quoted from him by his son on a passage of '*Abodah Zarah* (f. 75a, catchword ולא פליגי). This treatise was at that time scarcely studied, even by eminent rabbis, and the explanation is markedly superior to one which Rashi also gives from R. Ya'aḳob b. Yaḳar, hitherto regarded as the most eminent of his teachers.

[8] Not to be confounded with his older contemporary, the poet and Halakhist, Shime'on b. Yiṣḥaḳ haggadol. The epithets "hazzaḳen" and "haggadol" both mean "the elder," but the epithet is varied to distinguish the persons.

[9] See *Hophes Matmonim*, ed. Goldberg, p. 2 (ורחיים בצוואר שמשתי לפניהם).

[10] They married three of their father's disciples. The husband of the eldest was, according to Schiller-Szinessy (*Camb. Cat.*, ii. 88 *sq.*, note 1), R. Simḥah of Vitry-le-François (ob. 1105), reputed author of the *Maḥzor Vitri*, which, if the other MSS. so called have no better title to the name than that in the British Museum, Add. 27200-1, must now be regarded as lost (Taylor, *Catal. MSS. of Aboth*, &c., No. 20; Schiller-Szinessy, *op. cit.*, ii. 61 *sq.*). The issue of this marriage was (1) R. Shema'yah of Soissons (see Mishnah, vol. xvi. p. 506); (2) R. Shemuel, who married his cousin, Rashbam's only sister. Rashi's second daughter, Yokhebed, married R. Meir of Rameru (b. Shemuel), a brother of R. Simḥah. He was father of four sons,—(1) Ribam (R. Yiṣḥaḳ b. Meir), who died in his father's lifetime; (2) Rashbam (*q.v.*); (3) R. Tham or Rath; (4) R. Shelomoh (Br. Mus., Add. 27200, leaf 158b). The third daughter, Miryam, married R. Yehudah b. Nathan, who supplemented his father-in-law's commentary on *Makkoth*, and wrote the commentary that goes by Rashi's name on T. B., *Nazir*, &c. Their son's name was R. Yom Tob (*Sepher Hayyashar*, Vienna, 1810, § 599).

[11] See Rashi, T. B., *Berakhoth*, 51a; *Ḥagigah*, 13a; *Sukkah*, 45a; and many other places. See also *Siddur*, ii. leaf 22b, col. 2 (on the reading of the *Shema'* in bed). Such passages as *Ḳiddushin*, 71a, do not, when rightly understood, testify to the contrary. Rashi's "they" refers not to his contemporary teachers, but to those of the Talmud who "had not explained to us the Holy Names of the Twelve and Forty-two." It is therefore quite untrue that Rashi "knew nothing of kabbalah."

[12] R. Gershom, "the light of the Diaspora" (see vol. xvi. p. 506), died in the year in which Rashi was born, and was the immediate teacher of his teachers. One of his commentaries is printed in the *Shittah Meḳubbeṣeth* on *Ḳerethoth*, Vienna, 1878, folio.

[13] See T.B., *Shabbath*, 13b, catchword האוכל.

[14] See *Hophes Matmonim*, p. 8.

[15] See MS. De-Rossi (Roy. Libr., Parma) 175 (*Catal.*, p. 116), and MS. Luzzatto (*Literaturbl. d. Orients*, vii. p. 418). This precious MS., which subsequently belonged to Halberstam of Bielitz, is now the property of the master of St John's College, Cambridge.

Rashi, though not the originator of all that he teaches in his commentary on the Talmud, had so digested the whole literature bearing on that stupendous work that his teaching, even when it appears to be imitative, is really creative. In his Biblical commentaries he has not, of course, grammatical and philological knowledge of the modern type, but he had a very fine sense for linguistic points, which was not equalled, much less surpassed, by the greatest rabbis who followed him. He gave satisfaction, if not to all, at least to the best of his time, and, as the great German poet says, "he who has given satisfaction to the best of his time lives for all ages."

RASHI'S WORKS.—A. *Bible Commentary* (פרוש).—Rashi commented on the whole of the Hebrew Bible except Job, chaps. xl. 21 to the end, and the books of Chronicles.[1] Kimhi's is the only Rabbinical commentary which can be said to have successfully approached this great work in its influence on Jewish scholarship; and on the Pentateuch Rashi had no rival. For centuries too his was the text-book in boys' schools throughout the Jewish world—and in some countries it is so still, its depth and subtilty being combined with simplicity of exposition. Its currency is attested by more than a hundred supercommentaries, translations, extracts, and the like, of which there are about fifty in print. An eminent rabbi declares that Rashi may be substituted for the Targum "in the reading of the weekly pericope" (Reshal, *Yam shel Shelomoh* on Kiddushin, ii. § 14). Rashi's influence on Christian scholars has already been alluded to. N. de Lyra copied him so closely as to be called his "ape."[2]

Translations.—The whole commentary was rendered into Latin by PELLICANUS (*q.v.*), but never printed, and again by Breithaupt (3 vols. 4to, Gotha, 1710-14). This version includes the spurious commentary on Chronicles and is accompanied by notes. Of separate parts there are printed versions of Gen. i.-vi. (Scherzer, 1663), Gen. vi.-xi. (Abicht, 1705), Gen. xlix. (Loscani, 1710), Hosea (Mercier, 1621), Joel, Jonah (Leusden, 1656), Joel (Genebrard, 1563), Jonah, Zephaniah, Obadiah (Pontac, 1556), Obadiah (Crocius, 1673), Malachi (S. de Muis, 1618), Ps. xix. (Id., 1620), Proverbs (Giggæus, 1620), Canticles (Genebrard, 1570), Ruth (Carpzov, 1703), Esther (Aquinas, 1622). The Pentateuch was translated into German by L. Dukes (Prague, 1833-38, 8vo); Genesis was done by L. Haymann (Bonn, 1833, 8vo). *Editions*, especially of the Pentateuch, are very numerous. Only some of the chief can here be named,—(*a*) on the whole Bible, with the sacred text—Venice, 1545, 1595, 1607 (all three in 4to); Cracow, 1610, 4to; Basel, 1618, folio; (*b*) Pentateuch with text (all sm. folio)—Bologna, 1482; Ixar, 1490; Lisbon and Naples, 1491; (*c*) Pentateuch without text—Reggio, 1475, folio (the first Hebrew book printed with date); *s. l. et a.*, but before 1480, 4to; Soncino, 1487, folio. MSS. of Rashi on the whole Bible are very rare, and even those which are supposed to be such turn out, on examination, to be either incomplete or defective, or both. There lies a precious MS. in Leyden (1 Scal.); but it is a trifle defective in Exodus. St John's College, Cambridge, possesses a still more ancient and precious MS. (A. 3; dated 1239); but it lacks the Pentateuch and Ezra(-Nehemiah), and is defective in the end (though, it is true, only in Chronicles, which is not Rashi's, as mentioned before). But MSS. of Rashi on the Pentateuch, both old and good, abound. There are few libraries in Europe that have not one or two of this commentary. It is to be hoped, therefore, that Dr A. Berliner, who has already edited critically Rashi on the Pentateuch (Berlin, 1866, 8vo), although not on the faith of a sufficient number of MSS., will soon issue a second and superior edition.

B. *Commentary on the Babylonian Talmud*, קונטרס.[3]—Rashi had not been dead a hundred years when it was felt in the learned world that no such master in the Talmud had ever existed before him, and that without his aid and especially his corrections of the text (then only embodied in his commentary), the sea of the Babylonian Talmud could not safely be sailed on. He became now the teacher even of the Jews in the East. He commented on the whole of the Talmud to which Gemara is attached (see MISHNAH), except on *Nedarim* from leaf 22b to the end, *Nazir* and *Tamid* from beginning to end, *Bābā Bathrā* from 29a to the end, and *Makkoth* from leaf 19b[4] to the end. In commenting on the two last-named massekhtoth death surprised him. Rashi on the Talmud has never been printed apart from the text, and so the first complete edition is that contained in the *editio princeps* of the Babylonian Talmud (Venice, 1520-23, folio). Portions had come out before with parts of the Talmud (Soncino, 1483, and elsewhere later). There are MSS. containing Rashi on isolated Talmudic treatises in various libraries: the Cambridge University Library and British Museum have six each, the Bodleian twelve, the Paris National Library seven.

C. The *Religious Decisions* (פסקים) given by Rashi are to be found in various works, principally in the so-called *Siddur* (i. and ii.) and *Happardes* (Warsaw, 1870, folio)—called *Happardes Haggadol* to distinguish it from the abridgment by R. Shemuel of Bamberg (13th century) called *Likkuṭe Happardes* (Venice, 1519, 4to)—a work of which Rashi himself seems to have laid the foundation, though other literature on other subjects is now mixed up with it. Of the same nature are *Haorah* and אסור והתר, MSS. of which lie at Munich (kindly lent to the writer by Merzbacher) and Oxford. Various halakhoth, &c., are also to be found in various mahzorim (*e.g.*, the Cambridge MS. Add. 667, leaves 153-156, and elsewhere), the *Shibbole Halleḳet*, ii. (by R. Ṣidkiyyahu b. Abraham Harophe, Cambridge MS. Add. 653).

D. *Poems* (פיוטים).—Rashi was no poet by profession and much less by genius; but he had a tenderly feeling heart, and saw the horrors of the first crusade; and he wrote *Seliḥoth* (propitiatory and penitential prayers), which are by no means without their value. One is embodied in the additional service of the day of atonement and begins "*Tannoth Ṣaroth*" (Reshal's *Responsa*, § xxix.), and several more, which form the acrostic Shelomoh bar Yiṣḥaḳ, are found in the collection of the Seliḥoth of the Ashkenazic rite. It is not improbable also that the Aramaic *Reshuth* iv. to the Haphtarah in Targum (introduction to the prophetic portion as given in Yonathan b. 'Uzz'iel's Aramaic paraphrase), which is to be found in the Reuchlinian Codex (De Lagarde, *Prophetæ chaldaice*, Leipsic, 1872, 8vo, leaf 492), is his. It is much his style, and the acrostic is Shelomoh (and not שמעון). It is also very probable that *Reshuth* v. is his. If so, he must have composed it when very young, as several expressions in it testify.

E. *Le'azim* (לעזים).—In his commentaries Rashi, like R. Gershom before him and others after him, often introduces French words (chiefly verbs and nouns) to give precision to his explanations. Of these *Le'azim* there are certainly more than 3000, and they are most valuable to the student of old French. Unfortunately copyists, notably in Italy, and printers subsequently, have often substituted their own vernacular for the original French; there are now even Russian words to be found in Rashi. Four hundred years ago explanations of some of these *Le'azim* and of those of Kimhi were offered by the author of *Maḳre Dardeḳe* (Naples, 1488). Other contributions have followed intermittingly down to the present time (Brothers Bondi in *Or Esther*, Dessau, 1812; Dormitzer and Landau in *Marpe Lashon*, Odessa, 1865, 12mo). The labours of M. Arsène Darmsteter promise to be exhaustive, and are based on extensive collations, see *Romania*, April 1872, p. 146 *sq.*

There is no satisfactory life of Rashi; most recent accounts rest on a Life by Zunz (1822), which has not been reprinted in his collected works. (S. M. S.-S.)

RASHT (also Räscht, Rescht, Rashd, and Resht), a town in northern Persia, situated in 37° 18′ N. lat. and 49° 37′ E. long., capital of the richly wooded maritime province of Gilan, contains from 15,000 to 20,000 inhabitants. Eastwick, who was there in 1861, accepts the former estimate, but states that the place was four times as populous before the plague of 1831. The distance from Enzelli, on the southern shores of the Caspian, the actual port of disembarkation for passengers and goods from Russia, is about 16 miles, of which 12 (to Pari Bazaar) are accomplished in an open boat, the last part by river, but for the most part over a widespread brackish lake or lagoon (*murdáb*), abounding in wild fowl, surrounded by reeds, and separated from the sea by a narrow belt of sand. From Pari Bazaar to Rasht the road, piercing through forest and swamp, had for many long years been memorable only for its puddles and pools, its ruts and ruggedness, but it has more recently undergone great improvement. As for the town itself, the tiled houses in the streets, and the lanes, lined with hedge and cottage, in the environs, impart a cheerfulness to the locality little in unison with the sickly and fever-stricken faces and forms of the inhabitants. Yet the beauty and hazel eyes of the children, with their "true English pink and white complexions" noticed by Eastwick are not significant of inherited enervation.

Rasht is the residence of a Russian and an English consul, and the seat of a local governor nominated by the sháh. It is the centre of the silk trade, which once flourished so greatly in Persia as to show an annual export of nearly a million and a half pounds in weight, valued at £700,000. In 1882, however, the prevalence of disease among the silkworms caused many of the peasants of Gilan to abandon the culture of silk in favour of rice, which became largely exported to Russia. But the geographical position of Rasht gives it a world-wide reputation irrespective of trade. If the roads by Trebizond, Erzeroum, and Tabriz on the one hand and by Poti, Tiflis, and Tabriz on the other can still be considered the two "commercial highways" from Europe to Persia, the line of land and water communication by Astrakhan and the south-eastern shores of the Caspian has a good claim to be called the true modern highway for travellers and diplomatists moving in the same direction.

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[1] The supplement to the former is generally ascribed to R. Ya'akob Nazir; its relation to the author of the MS. commentary on Job (Camb. Univ. Lib., Dd. 8. 53) has still to be worked out. The commentary on Chronicles in which Rashi is three times cited by name (2 Chron. iii. 15, xxii. 11, and xxiii. 14) is the work of a German rabbi residing in Provence.

[2] See J. H. Maius, *Vita Reuchlini*, 1687, Præf. The thanks of the present writer are due to the curators and librarian of the Bodleian for the loan of this book.

[3] On this word see Schiller-Szinessy, *Catalogue*, i. p. 181, note.

[4] His disciple, son-in-law, and continuator Rabbenu Yehudah b. Nathan writes: "At the word 'tahor' (pure) the soul of our teacher went out in purity."

Rasht was visited in 1739 by "two English gentlemen from Petersburg," whose narrative, published three years later, contains much interesting information on the existing relations of Gilan with Russia. It is noteworthy, but not astonishing, to find that in those days the sháh (Nádir Kuli) was himself "in a manner the sole merchant or trader in all Persia." In 1744 Jonas Hanway came there also; but no fuller account of the capital of Gilan has perhaps ever been recorded than that of Samuel Gmelin in 1771, when Hidáiyat Khán ruled the province, and Karím Khán Zend was sovereign of Persia. Gmelin was received with extraordinary honours, as an imperial officer of Russia, and every opportunity was afforded him of observing the country, its features and produce, and of acquainting himself with the manners and customs of the inhabitants. In 1882 a concession for the construction of a railway from Rasht to Teheran, *via* Kazvin, was granted to a M. Boital. It is probable that no more practical effect will be given to this scheme than to that of Baron de Reuter some ten years before.

See *A Journey through Russia into Persia* (London, 1742); *Histoire des Découvertes*, vol. ii. (Lausanne, 1784); Eastwick, *Three Years' Residence in Persia* (1864); *Telegraph and Travel* (1874); and published official *Reports* (1882).

RASK, Rasmus Christian (1787-1832), an eminent scholar and philologist, was born at Brändekilde in the Island of Fünen or Fyen in Denmark in 1787. He studied at the university of Copenhagen, and early distinguished himself by singular talent for the acquisition of languages. In the year 1808 he was appointed assistant keeper of the university library, and some years afterwards made professor of literary history. In 1811 he published, in Danish, his *Introduction to the Grammar of the Icelandic and other Ancient Northern Languages*, from printed and MS. materials which had been accumulated by his predecessors in the same field of research. The reputation which Rask thus acquired recommended him to the Arna-Magnæan Institution, by which he was employed as editor of the Icelandic *Lexicon* (1814) of Björn Haldorson, which had long remained in manuscript. About the same time Rask paid a visit to Iceland, where he remained from 1813 to 1815, and made himself completely master of the language and familiarized himself with the literature, manners, and customs of the natives. To the interest with which they inspired him may probably be attributed the establishment at Copenhagen, early in 1816, of the Icelandic Literary Society, which was mainly instituted by his exertions, and of which he was the first president.

In October 1816 Rask left Denmark on a literary expedition, at the cost of the king, to prosecute inquiries into the languages of the East, and collect manuscripts for the university library at Copenhagen. He proceeded first to Sweden, where he remained two years, in the course of which he made an excursion into Finland, for the purpose of studying the language of that country. Here he published, in Swedish, his *Anglo-Saxon Grammar* in 1817. In 1818 there appeared at Copenhagen, in Danish, an *Essay on the Origin of the Ancient Scandinavian or Icelandic Tongue*, in which he traced the affinity of that idiom to the other European languages, particularly to the Latin and the Greek. In the same year he brought out the first complete editions of Snorro's *Edda* and Sæmund's *Edda*, in the original text, along with Swedish translations of both *Eddas*, the originals and the versions occupying each two volumes. From Stockholm he went in 1819 to St Petersburg, where he wrote, in German, a paper on "The Languages and Literature of Norway, Iceland, Sweden, and Finland," which was published in the sixth number of the Vienna *Jahrbücher*. From Russia he proceeded through Tartary into Persia, and resided for some time at Tabriz, Teheran, Persepolis, and Shiraz. In about six weeks he made himself sufficiently master of the Persian to be able to converse freely in that language with the natives. In 1820 he embarked at Bushire for Bombay; and during his residence in the latter city he wrote, in English, "A Dissertation on the Authenticity of the Zend Language" (*Trans. Lit. Soc. of Bombay*, vol. iii., reprinted with corrections and additions in *Trans. R. As. Soc.*). From Bombay he proceeded through India to Ceylon, where he arrived in 1822, and soon afterwards wrote, in English, "A Dissertation respecting the best Method of expressing the Sounds of the Indian Languages in European Characters," which was printed in the *Transactions of the Literary and Agricultural Society of Colombo*. Rask returned to Copenhagen in May 1823, bringing with him a considerable number of Oriental manuscripts, Persian, Zend, Pali, Singalese, and others, which now enrich the collections of the Danish capital. He died at Copenhagen on 14th November 1832.

During the period between his return from the East and his death Rask published in his native language a *Spanish Grammar* (1824), a *Frisic Grammar* (1825), an *Essay on Danish Orthography* (1826), a *Treatise respecting the Ancient Egyptian Chronology* and an *Italian Grammar* (1827), and the *Ancient Jewish Chronology previous to Moses* (1828). He likewise edited an edition of Schneider's *Danish Grammar for the use of Englishmen* (1830), and superintended the English translation of his valuable *Anglo-Saxon Grammar* by Thorpe (1830). Rask's services to comparative philology were very great. He was the first to point out the connexion between the ancient Northern and Gothic on the one hand, and of the Lithuanian, Sclavonic, Greek, and Latin on the other, and he also has the credit of being the real discoverer of the so-called "Grimm's Law" for the transmutation of consonants in the transition from the old Indo-European languages to Teutonic, although he only compared Teutonic and Greek, Sanskrit being at the time unknown to him. Rask's facility in the acquisition of languages was extraordinary; in 1822 he was master of no less than twenty-five languages and dialects, and is stated to have studied twice as many. His numerous philological manuscripts were transferred to the king's library at Copenhagen. Rask's *Anglo-Saxon*, *Danish*, and *Icelandic Grammars* have been given to the English public by Thorpe, Repp, and Dasent respectively.

RASKOLNIKS. See Russia.

RASPBERRY. See Horticulture, vol. xii. p. 276.

RASTATT, or Rastadt, a small town in Baden, is situated on the Murg, 4 miles above its junction with the Rhine and 12 miles south-west of Carlsruhe. It is a fortress of great strength, commanding the passage through the Black Forest. The only notable building is the old palace of the margraves of Baden, a large Renaissance edifice in red sandstone, now partly used for military purposes and containing a collection of pictures, antiquities, and trophies from the Turkish wars. The industry of Rastatt is almost confined to local needs, and the town may be said to live on the garrison, which forms nearly half of its population (1880) of 12,356. Two-thirds of the inhabitants are Roman Catholics.

Previous to the close of the 17th century Rastatt was a place of no importance, but after its destruction by the French in 1689 it was rebuilt on a larger scale by Margrave Lewis, the well-known imperial general in the Turkish wars, and became the residence of the margraves of Baden down to 1771. In 1714 the preliminary articles of the peace between Austria and France, ending the War of the Spanish Succession, were signed here. The congress of Rastatt in 1797-99 had for its object the re-arrangement of the map of Germany by providing compensation for those princes who had relinquished to France territory on the left bank of the Rhine.

It dispersed, however, without result, war having again broken out between France and Austria. As the French plenipotentiaries were leaving the town they were waylaid and assassinated by Hungarian hussars. The object and instigators of this deed have remained shrouded in mystery, but the balance of evidence seems to indicate that the Austrian authorities had ordered a violent seizure of the ambassadors' papers, to avoid damaging disclosures with regard to Austrian designs on Bavaria, and that the soldiers had simply exceeded their instructions. The Baden revolution of 1849 began at Rastatt with a military mutiny and ended here a few months later with the capture of the town by the Prussians. Rastatt is now a fortress of the German empire.

RASTELL, the name of two early English printers.

I. JOHN RASTELL or RASTALL, printer and author, was born at London towards the end of the 15th century. He was educated at Oxford, and married Elizabeth, the sister of Sir Thomas More. He was a man of considerable learning and, although not bred to the law like his son, showed his devotion to legal studies by his writings. He went into the printing business about the year 1514, and produced *Liber assisarum*, with a preface by himself. His first dated publication was *Abbreviamentum librorum legum Anglorum* (1517). He also printed *The Wydow Edyth* (1525), *A Dyaloge of Syr Thomas More* (1529), and a number of other books. The last dated piece from his press was *Fabyl's Ghoste* (1533), a poem. He lived "at the sygne of the meremayd at Powlysgate." John Rastell, the Jesuit, who has been frequently confounded with him, was no relation. By his will, dated 20th April 1536, he appointed Henry VIII. one of his executors; administration was granted on the renunciation of the executorship by the king on 18th July 1536. It is a curious document, and contains a long account of the testator's religious belief. Rastell was occupied upon a concordance at the time of his death; its publication was provided for by the will (see Arber's *Registers of Comp. of Stationers*, ii. 8, 9). He died at London, leaving two sons,—William, printer and judge (see below), and John, a justice of the peace.

Rastell's chief writings are the following. *The Pastyme of People; the Chronycles of dyuers Realmys and most specyally of the Realme of Englonde* (1529), now of extreme rarity; a note in the catalogue of the British Museum says, "the only perfect copy known." It ranges from the earliest times to Richard III., and was edited by Dibdin in 1811 for the quarto series of English chronicles. *A new Boke of Purgatory*, 1530, being dialogues on the subject between "Comyngo au Almayne a Christen Man, and one Gyngemyn a Turke." This was answered by John Frith, producing Rastell's *Apology against John Fryth*, also answered by the latter. The controversy is said to have ended in Rastell's conversion to the Reformed religion. *Expositiones terminorum legum anglorum* (in French, also translated into English, 1527; reprinted as recently as 1812 as *Les Termes de la Ley*). *The Abbreviacion of Statutis* (1520), the first abridgment of the statutes in English, with an interesting preface by Rastell, giving reasons for the innovation; down to 1625 fifteen editions appeared.

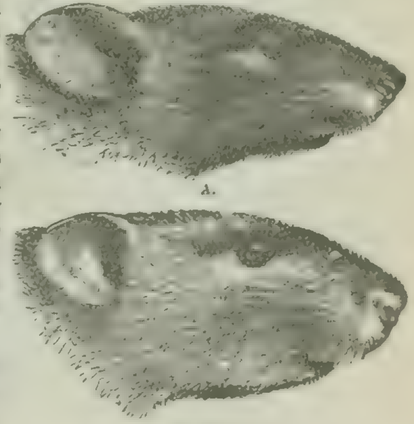
II. WILLIAM RASTELL (*c.* 1508-1565), printer and judge, son of the above, was born in London about 1508. At the age of seventeen he went to the university of Oxford, but did not take a degree, being probably called home to superintend his father's business. The first work which bears his own imprint was *A Dyaloge of Sir Thomas More* (1531), a reprint of the edition published by his father in 1529. He also brought out a few law books, some poetry, an edition of *Fabyan's Cronycle* (1533), and *The Apologye* (1533) and *The Supplycacyon of Soulys* of his uncle Sir Thomas More. His office was "in Fletestrete in saynt Brydys chyrche yarde." He became a student at Lincoln's Inn on 12th September 1532, and gave up the printing business two years later. In 1547 he was appointed reader. On account of his religion he left England for Louvain; but upon the accession of Mary he returned, and was made sergeant-at-law in October 1555. He was one of the seven sergeants who gave the famous feast that year in the Inner Temple Hall (see Dugdale's *Orig. Jurid.*, 1680, p. 128). His patent as judge of the Queen's Bench was granted on 27th October 1558. One of his predecessors, John Boteler, had also been printer and judge. Rastell continued on the bench until 1562, when he retired to Louvain without the queen's licence. By virtue of a special commission issued by the barons of the Exchequer on the occasion an inventory of his goods and chattels was taken. It furnishes an excellent idea of the modest nature of the law library (consisting of twenty-four works) and of the chambers of an Elizabethan judge (see *Law Magazine*, February 1844). He died at Louvain on 27th August 1565.

It is difficult to distinguish between the books written by him and those by his father. The following are believed to be his: *A Colleccion of all the Statutes* (1557), *A Table collected of the Yeares of the Kynges of Englande* (1561), both frequently reprinted with continuations, and *A Colleccion of Entrees, of Declaracions, &c.* (1566), also frequently reprinted. The entries are not of Rastell's own drawing, but have been selected from printed and MS. collections: their "pointed brevity and precision" are commended by Story. He supplied tables or indexes to several law books, and edited *La novel natura brevium de Monsieur Anton. Fitzherbert* and *The Workes of Sir T. More in the English Tonge* (1557). He is also stated to have written a life of Sir T. More, but it has not come down to us.

See Bale, *Scriptores maioris Brytanniæ*, 1557-59; Pits, *Relationes hist. de rebus Angl.*, 1619; Tanner, *Bibliotheca*, 1748; Ames, *Typogr. Antiq.*, by Dibdin, 1816, iii. pp. 81, 370; Wood, *Athenæ Oxonienses*, 1813, i. pp. 100, [illegible]; Dodd, *Church History*, 1739, ii. p. 149; Foss, *Biographia Juridica*, 1870; Reeves, *History of the Engl. Law*, 1869, iii. p. 452; Marvin, *Legal Bibliography*, 1847; Clarke, *Bibliotheca Legum*, 1819; Bridgman, *Legal Bibliography*, 1807; *Catalogue of Books in the British Museum before 1640*, 1884.

RASTRICK, an urban sanitary district in the West Riding of Yorkshire, is situated on an acclivity near the Calder, and on the Lancashire and Yorkshire Railway 5 miles south-east of Halifax and 3½ north of Huddersfield. It possesses woollen and silk manufactures, and there are stone quarries in the neighbourhood. The ancient chapel of St Matthew was replaced in 1798 by a church in the Grecian style, which was restored in 1879. A school was founded in 1701 by Mrs Mary Law, who also endowed a charity for poor widows. The population of the urban sanitary district (area, 1371 acres) in 1871 was 5896, and in 1881 it was 8039.

RAT. Under the article MOUSE (vol. xvii. p. 5) an account has been already given of the relationships and chief allies of the animals known as rats, and the present article is confined to the two species to which the name rat is most strictly applicable. These are the so-called old English black rat, *Mus rattus*, and the common brown or Norway rat, *M. decumanus*. The first of these is a comparatively small and lightly built animal, seldom exceeding about 7 inches in length, with a slender head, large ears (see fig., A), and a long thin scaly tail about 8 or 9 inches in length. Its colour is, at least in all temperate climates, a peculiar shining bluish black, rather lighter on the belly, the ears, feet, and tail being also black; but in tropical regions it is represented by a grey or rufous-backed and white-bellied race to which the name of Alexandrian rat (*M. alexandrinus*) has been applied, owing to its having been first discovered at Alexandria, but which cannot be considered to be really specifically distinct from the true black rat. Its disposi-



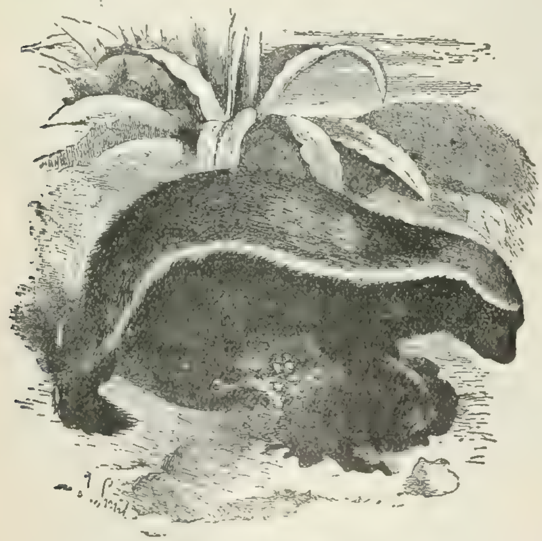
A. Black Rat (*Mus rattus*).
B. Brown Rat (*M. decumanus*).

tion is milder and more tamable than that of *M. decumanus*, and it is therefore the species to which the tame white and pied rats kept as pets commonly belong. It is said that in some parts of Germany *M. rattus* has been lately reasserting itself and increasing at the expense of *M. decumanus*, but this seems very unlikely from the previous history of the two animals (compare MOUSE, vol. xvii. p. 5).

The brown or Norway rat, *M. decumanus*, is a heavily built animal, growing to 8 or 9 inches in length, with a bluff rounded head, small ears (see fig., B), and a comparatively short tail,—always shorter than the head and body combined, and generally not longer than the body alone. Its colour is a uniform greyish brown above, and white below, the ears, feet, and tail being flesh-coloured; melanistic varieties are by no means rare, and these are often mistaken for true black rats, but the differences in size and proportions form a ready means of distinguishing the two. The brown rat is believed to be a native of western China, where a wild race has been recently discovered so like it as to be practically indistinguishable. The two species agree fully in their predaceous habits, omnivorous diet, and great fecundity. They bear four or five times in the year from four to ten blind and naked young, which are in their turn able to breed at an age of about six months. The time of gestation is about twenty days. (O. T.)

RATAFIA is a term applied to a flavouring essence, the basis of which is the essential oil of bitter almonds. Peach kernels are properly the source of ratafia, but any of the other substances yielding bitter almond oil is used. The name "ratafia" is also applied in France to a variety of liquors, and from Dantzic a special liqueur is sent out under the name of "ratafia" (see vol. xiv. p. 686).

RATEL. The animals known as Ratels or Honey-badgers are small clumsy-looking creatures of about the size and appearance of the true badgers, and belong to the same natural group of the *Carnivora*, namely, the subfamily *Melinæ* of the large family *Mustelidæ*, which contains the otters, badgers, stoats, weasels, &c. (see MAMMALIA, vol. xv. p. 440). Of the ratels two species are generally recognized, viz., the Indian Ratel (*Mellivora indica*), a native of all the peninsula of India, and the African (*M. ratel*), which ranges over the whole of the African continent —although by some authors the West African race is considered to represent a third distinct species, which has been named *M. leuconota*. All the ratels are of very much the same colour, namely, iron-grey on the upper parts of the head, body, and tail, and black below, a style of coloration rather rare among mammals, as the upper side of the body is in the great majority darker than the lower. Their body is stout and thickly built; the legs are short and strong, and armed, especially on the anterior pair, with long curved fossorial claws; the tail is short; and the ear-conches are reduced to mere rudiments. These modifications are all in relation to a burrowing mode of life, for which the ratels are among the best adapted of all carnivores. The skull is conical, stout, and heavy, and the teeth, although sharper and less rounded than those of their allies the badgers, are yet far less suited to a purely carnivorous diet than those of such typical *Mustelidæ* as the stoats, weasels, and martens. The two species of ratel may be distinguished by the fact that the African has a distinct white line round the body at the junction of the grey of the upper side with the black of the lower, while in the Indian this line is absent; the teeth also of the former are on the whole decidedly larger, rounder, and heavier than those of the latter. In spite of these differences, however, the two ratels are so nearly allied that they might almost be considered to be merely geographical races of a single widely spread species.



African Ratel (*Mellivora ratel*).

The following account of the Indian ratel is extracted from Dr Judson's *Mammals of India*:—"The Indian badger is found throughout the whole of India, from the extreme south to the foot of the Himalayas, chiefly in hilly districts, where it has greater facilities for constructing the holes and dens in which it lives; but also in the north of India in alluvial plains, where the banks of large rivers afford equally suitable localities wherein to make its lair. It is stated to live usually in pairs, and to eat rats, birds, frogs, white ants, and various insects, and in the north of India it is accused of digging out dead bodies, and is popularly known as the grave-digger. It doubtless also, like its Cape congener, occasionally partakes of honey. It is often very destructive to poultry, and I have known of several having been trapped and killed whilst committing such depredations in Central India and in the northern Circars. In confinement the Indian badger is quiet and will partake of vegetable food, fruits, rice, &c." (O. T.)

RATHENOW, a small town of Prussia in the province of Brandenburg, lies on the right bank of the Havel, 44 miles to the west of Berlin. It is known for its "Rathenow stones," *i.e.*, bricks made of the clay of the Havel, and for its spectacles and optical instruments, which are exported to various parts of the world. It contains no buildings of note. The population in 1880 was 11,394, including 174 Roman Catholics and 68 Jews.

Rathenow has enjoyed the privileges of a town since 1217. In 1394 it was taken and partly destroyed by the archbishop of Magdeburg. During the Thirty Years' War it was repeatedly occupied by the opposing troops, and in 1675 it was cleverly snatched from the Swedish garrison by the Great Elector.

RATIBOR (Polish *Racibórz*), a town of Prussian Silesia in the department of Oppeln, is pleasantly situated on the left bank of the Oder at the point where the river becomes navigable, about 12 miles from the Austrian frontier. The most prominent buildings are the handsome court-house by Schinkel and the Modern Gothic church; on the right bank of the Oder is the old château of the dukes of Ratibor. The town is the seat of a diversified industry, the chief products of which are machinery and railway gear, iron wares, tobacco and cigars, paper, sugar, furniture, and glass. Trade is carried on in these articles and in agricultural produce, and hemp and vegetables are largely grown in the environs. The population in 1880 was 18,373, or, including the immediately adjacent villages, 27,100, five-sixths of whom are Roman Catholics. In the town itself, where there are only about 2500 Poles, German is chiefly spoken, but Polish and Czechish dialects are predominant in the neighbourhood.

Ratibor, which received municipal privileges at the close of the 13th century, was formerly the capital of an independent duchy

380 square miles in extent, which existed as such from 1288 to 1532 and afterwards passed successively into the hands of Austria and Prussia (1742). In 1815 a small mediate principality was formed out of the old lordship of Ratibor and certain ecclesiastical domains, and was conferred upon the landgrave Amadeus of Hessen-Rothenburg as compensation for Rhenish territory absorbed by Prussia. The title of "duke of Ratibor" was revived for his successor in 1840.

RATIONALISM. In modern usage the term "rationalism" is employed almost exclusively to denote a theological tendency, method, or system, and is then applied in a narrower and a wider sense. In its wider sense, which is most common in English theological literature, it is the name of that mode of thought generally which finds the final test of religious truth in the human understanding, conscience, or reason, and particularly in the understanding. In its narrower sense, which is almost the only sense it bears in Germany, it denotes a definite school, or rather phase of theological thought, and a phase of thought which has now been outlived. It is with rationalism in this limited sense and as a tendency of German theological thought that this article deals. Rationalism had as its antitheses on the one hand supernaturalism, and on the other naturalism or simple deism. The matter of the contention between the rationalists and these two classes of opponents was supernatural revelation—its necessity, its existence, its possibility. The naturalists denied revelation altogether; the supernaturalists maintained the fact of a supernatural revelation, possessing an authority above "reason," though capable of being proved by "reason." The rationalists did not deny the fact of a revelation, though in the end they ignored it and claimed the right to submit every supposed revelation to the judgment of the "reason" or the moral sense. The rationalists themselves are, however, divided by some German writers into two classes—relative and absolute—those who hold that the matter of revelation is identical with the truths of reason, but admit that of necessity, or as a matter of fact, revelation anticipated reason, and those who really call in question the fact of a revelation, without going quite the length of the naturalists in the rejection of Christianity. Kant drew a distinction between the "rationalist" and the "pure rationalist," defining the former as one who maintains that natural religion alone is essential, and the latter as one who admits the fact of a supernatural revelation but denies that it is a part of religion to know and accept it.

German rationalism was a specific theological form of the general intellectual movement of the last century known as "illuminism" or *Aufklärung*; but, while the illuminati generally ended in rejecting Christianity, the rationalists retained and defended it in a form approved by the logical understanding or the moral sense. While rationalism, as a child of the general intellectual movement of the age in which it appeared, owed much to the philosophy, science, and humanism of the intellectual life of Europe, as a specially theological tendency it was powerfully influenced by English deistical writings. Both Lechler and Ritschl assign to these writings a great immediate effect on the development of German rationalism. Of German thinkers it was especially the philosopher Wolff—who threw into a compact and systematic form, suited for German students, the philosophy of Leibnitz—who initiated German theologians into the rationalistic habit and method, though Wolff himself was a supernaturalist. The condition of the German church and the state of theology also contributed to the creation of rationalism. The hard intellectual orthodoxy of Lutheranism had already done its part towards producing the pietistic movement, and, while pietism helped to free men's minds from bondage to the Lutheran creeds and once more directed attention to the Bible, the cold intellectual habit of orthodoxy nurtured the same habit of rationalism while it failed to satisfy it, and so created a reaction against itself. Thus both orthodoxy and pietism were agents in calling forth rationalism, which was to prove the most dangerous opponent to both. More than one of the foremost rationalists had passed through the school of pietism.

Regarding rationalism as the opponent of supernaturalism and naturalism, and as an opponent which appealed in the conflict almost exclusively to either the logical understanding or the moral sense as the criterion of religious truth, it may be said to have existed in Germany for nearly a century (*c.* 1740-1836), and to have flourished about half that length of time (*c.* 1760-1810),—that is, it took its rise simultaneously with the publication of Wolff's writings (1736-50) and the translation into German of the works of the English deists (Tindal's *Christianity as Old as the Creation* was translated in 1741), displayed its greatest strength in Semler's critical works (1760-73) and in Kant's philosophy (1781-93), began then to decline gradually under the influence of the works of Herder, Jacobi, Fichte (in his later period), and Hegel, and at last died out when Schleiermacher especially, in the department of theology proper, and Baur and Strauss, amongst others, in the department of Biblical criticism, had given currency to ideas and issues which rendered its main contentions objectless and its criteria of religious truth invalid.

The English deists, the German illuminati, and the French philosophers had before the middle of the last century, with a vast array of argument, called in question the idea of a supernatural revelation, and had seriously attacked the supernatural origin of the Hebrew and Christian Scriptures. Christian Wolff undertook the defence, and claimed to have demonstrated the supernatural revelation of the Bible. He made the old distinction between natural and revealed religion of fundamental importance, and maintained that *demonstrable* truths alone can be regarded as part of natural religion. Revealed religion he drew solely from the Scriptures, and sought to prove by a chain of reasoning and historical evidence their divine origin. Thus in reality the intellect alone was constituted the faculty for ultimately determining the truth of revelation as well as for constructing a natural religion. The general adoption of the distinction between natural and revealed religion, of the appeal to logical and historical evidence and argument for proof of the truths of both, and of the supposition that the truths of natural religion could be demonstrated while those of revealed religion were above, if not contrary to reason, and rested solely on the authority of Scripture, naturally divided theologians into two hostile camps, and proved, contrary to Wolff's expectations, more favourable to the naturalists and rationalists than to the supernaturalists. If it was admitted by all that the appeal in the contention was to be to the understanding, and the religious nature and higher reason were left out of account, and if, moreover, the truths of natural religion —God, duty, immortality—were supposed by all to be demonstrable, supernatural revelation was certain in that age to be put to great disadvantage. The result of Wolff's philosophy was a natural theology, a utilitarian system of morals, without any religious fervour or Christian profundity. Wolff's philosophy thus inaugurated in Germany a theological period corresponding, in its way, with the period in England between 1688 and 1750, when "Christianity appeared to be made for nothing but to be 'proved,'" and the only test to be applied was "reason," which was simply the philosophy in vogue. In both cases religion was regarded as substantially a set of doctrines, revelation as the publication of them, and God as teaching them after the most anthropomorphic manner. No profound conception had been formed of either religion or revelation, and none at all of their relation to each other, while the idea of God was simply that of the deists.

It was in the application of its principles and method (thus brought into vogue) to Biblical studies that rationalism won its greatest triumphs, and really accomplished its greatest measure of good work. Johann Salomo Semler (1725-1791), the father of modern Biblical criticism, as the Germans call him, was the greatest representative of the school in this department. A pietist by education, with something of Gottfried Arnold's liking for heretics and all his dislike of ecclesiasticism, but with none of Arnold's mysticism, a man of immense learning, without any clear and systematic management of it, he was the first German to apply the strict principles of historical criticism, in conjunction with the rationalistic truths and errors of his day, to the study of the Scriptures and ecclesiastical history, particularly the history of doctrines. He assailed with all the wealth of his learning the traditional view of the limits and authority of the Biblical canon especially, and having, as he held, demonstrated its human origin and fallibility, he proceeded to deal freely with the books composing it, as sharing the failings common to everything human. He found the Scriptures pervaded with "local ideas," and his Christianity was really limited to the "natural religion" of the deists and the moral truths taught by Christ. As a man who had been under a pietistic training, he was, it is true, unwilling to refer to the understanding alone for evidence of the truths of Christianity, but his enlargement of the test is confined to the admission of an appeal to the measure of virtue and happiness produced. By this extended test he tries the matter of the Scriptures, assigning to his category of local ideas "whatever is not adapted to make men wise unto their true advantage." The supernatural origin of the Scriptures as writings and most of the miracles recorded in them he rejected; but, on the other hand, he was a vigorous opponent of the adversaries of Christianity and of the naturalists who denied revelation altogether,—Reimarus, for instance, the author of the Wolfenbüttel *Fragmente*. Other decided rationalists contemporaneous with Semler were Teller (1734-1804), Eberhard (1739-1809), and Steinbart (1738-1809), who all agreed in confounding religion with morality, and in reducing Christianity to a popularization of utilitarian morals.

Meanwhile the profounder spirits of the nation—Lessing, Herder, Hamann, and others—were conceiving truer ideas of the nature of religion, of the human conditions of revelation, and of the character of the Bible and the mission of Christianity. It was, however, Kant who produced the greatest immediate effect on the history of rationalism. Himself a rationalist, regarding religion only as a form of morality, and revelation as at most a possible aid to the earlier propagation of moral principles, he nevertheless started doubts and ideas which sealed the doom of rationalism in its first shallow form. There was an end of the *demonstrable* natural religion of Wolff when once Kant's criticism of the proofs of the existence of God and of the immortality of the soul met with even partial acceptance. The breath of lofty mysticism which inspired his grand ethical system was also fatal to the cold shallow reasoning and commonplace utilitarianism of previous rationalists. Yet, though Kant proclaimed principles which compelled rationalism to assume other positions, and which really contained within them the seeds of its destruction, he remained himself a rationalist, for the reason especially that he never advanced to a profound conception of the nature of either religion or revelation and the conditions and relations of both. His fruitful idea of the relation of revelation to a community rather than to an individual he was unable to apply properly to the revelation contained in the Bible. Though his morality was something infinitely beyond 18th-century utilitarianism, it still constituted for him religion, and the only test he applied to a professed revelation was that it must contain the purest moral teaching. Fichte, accepting Kant's ethical principles, taught that a revelation—that is, proclamation of God as the moral lawgiver of the world—might be a necessity in the case of a degeneration of mankind to such an extent that the idea of goodness should be lost. On the other hand, Fries and Jacobi took up the position of Kant regarding the limitations of human *knowledge* of religious truth, and still further prepared for the advance beyond rationalism by claiming for man a special religious faculty, under the names of *faith*, *feeling*, or a *sense of the infinite*. Fichte, in his later period, made an advance in the same direction, abandoning the abstract ethical position of Kant by an appeal to love as the supreme principle in God and man. He thus reached a position more suited for the apprehension of the nature of religion, and he recognized in the workings of genius—with its incomprehensible light and movements—manifestations analogous to the phenomena of revelation. Meantime, the rationalists amongst theologians continued their work of reducing the Bible, with its history, miracles, and doctrines, by one means or another, into harmony with their notions of a rational and useful moral revelation, though for the most part they did not acknowledge the claims of the Old Testament to be considered a revelation at all, or at most a revelation for the childhood of the race. The accounts of miracles in the Bible were either denied or explained away as natural occurrences, or as poetical and Oriental phraseology, while the doctrines of the Bible and the creeds were diluted into religious or moral commonplaces. As representative Biblical scholars of this class J. G. Eichhorn (1752-1827) and H. E. G. Paulus may be mentioned, as representative theologians Henke (1752-1809), Wegscheider (1771-1849), and Röhr (1752-1848).

But early in the new century the triumph of a profounder philosophy of religion and of a worthier treatment of religious systems and the records of revelation began rapidly to make itself felt. Schleiermacher once more carried religion from the confined and frigid regions of the understanding and the distant heights of abstract morals into the vaster and yet nearer, warmer and yet clearer, world of feeling. Following Herder, he annihilated the rationalistic distinction between natural and revealed religion by claiming revelation for all religion and religions, and he mediated in the fruitless contention of rationalism *versus* supernaturalism by vindicating a supernatural element for the religious life and Christianity, while at the same time he justified rationalism in its rejection of any infraction of the laws of nature. He put an end to the conception of revelation as the communication of doctrine by substituting for it the, at all events, profounder and truer view that it consists in a fundamental affection of the whole religious nature, giving it a new and special direction, the organs of it being historical personalities endowed with supreme religious genius. Hegel and Schelling contributed in other ways, particularly by substituting another idea of God and nature, to the decay of rationalism. Amongst Biblical critics De Wette, under the influence of Herder's poetic insight into early literatures and of Fries's religious philosophy, contributed largely to a truer appreciation of the Bible as literature and the record of revelation than such scholars as Eichhorn and Paulus had attained to. In the year 1828 Dr Pusey could inform English theologians that the school had had its day, and early in the third decade of the century Hase was able to sum up the work of the school, which was then practically defunct, though some of its ablest representatives continued for some years to defend its positions. Hase's summary is, that rationalism failed to recognize the historical forces that condition all religious life and progress; that it necessarily issued in a barren religion of the intellect; that in the last instance it drew its decisions, not from the depths of the soul, but from a shallow popular philosophy which overlooked the rights of religious feeling; that on that account it kept its God of the outward universe as far removed from men's hearts and lives as possible; but that, nevertheless, it was through it especially that a breach between modern culture and the church was avoided and the banner of free inquiry was kept waving. Even men as far removed from rationalism as Tholuck, Dorner, Ritschl, and Alexander Schweizer acknowledge that it was a means, however imperfect, of effectually upholding in the church the great principle that religious truth has an intimate affinity to man's nature and must be freely examined and intelligently appropriated. Tholuck pronounces it not an outward skin disease in the history of Protestantism, but an integral part of that history and a phase of its development, in some respects abnormal, in others normal and natural.

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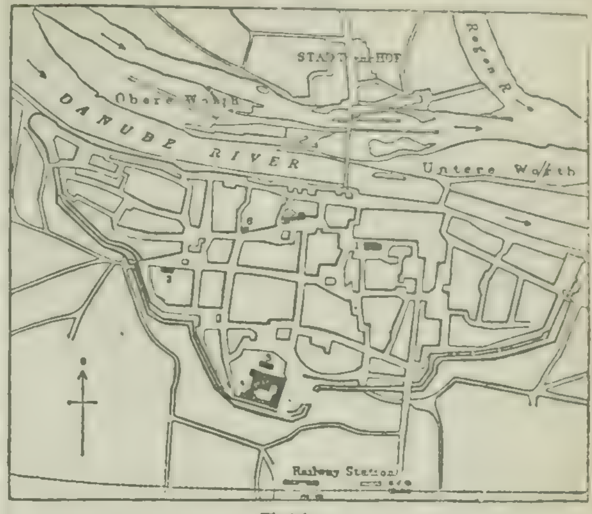
RATISBON (German *Regensburg*), an ancient city of Bavaria, the seat of a bishop, and the capital of the Upper Palatinate, is pleasantly situated on the right bank of the Danube, opposite the influx of the Regen, from which it derives its German name. It lies almost exactly in the centre of the kingdom, about 65 miles to the north-east of Munich and 53 miles to the south-east of Nuremberg. On the other side of the river is the small town of Stadt-am-Hof, connected with Ratisbon by a long stone bridge of the 12th century, above and below which are the islands of the Obere and Untere Wörth. In external appearance Ratisbon is quaint and romantic, presenting almost as faithful a picture of a town of the early Middle Ages as Nuremberg does of the later. Most of the streets are narrow and irregular, but spacious promenades have been laid out on the site of the old fortifications. One of the most characteristic features in its architecture is the number of strong loopholed towers attached to the more ancient dwellings, recalling a day when civic broils were of frequent recurrence. The interesting "street of the ambassadors" is so called because it contained the residences of most of the ambassadors to the German diet, whose coats-of-arms may still be seen on many of the houses.

The cathedral of Ratisbon, though small in size, is a very interesting example of pure German Gothic, diverging in several points from the type elaborated in France. It was founded in 1275 and completed in 1634, with the exception of the towers, which were added during a recent restoration. The details are very harmonious and pleasing, and the interior contains numerous interesting monuments, including one of Peter Vischer's masterpieces. Adjoining the cloisters are two chapels of earlier date than the cathedral itself, one of which, known as the "old cathedral," goes back perhaps to the 8th century. The Schottenkirche, a plain Romanesque basilica of the 12th century, derives its name from the monastery of Irish Benedictines ("Scoti") to which it was attached; the principal doorway is covered with very singular grotesque carvings, the meaning of which remains a mystery. The old parish church of St Ulrich is a good example of the Transition style of the 13th century. Other specimens of the Romanesque basilica style are the church of Obermünster, dating from 1010, and the abbey church of St Emmeran, built in the 13th century and remarkable as one of the few German churches with a detached belfry. The beautiful cloisters of the ancient abbey, one of the oldest in Germany, are still in fair preservation. In 1809 the conventual buildings were converted into a palace for the prince of Thurn and Taxis, hereditary postmaster-general of the old German empire. The town-house, a somewhat gloomy pile, dating in part from the 14th century, contains the rooms occupied by the imperial diet of Germany from 1663 to 1806. An historical interest also attaches to the Golden Cross Inn, where Charles V. made the acquaintance of the fair Barbara Blumberger, the mother of Don John of Austria (b. 1547). The promenade is adorned with a bust of Kepler, who died at Ratisbon in 1630. Perhaps the most pleasing modern building in the city is the Gothic villa of the king of Bavaria on the bank of the Danube. Among the chief manufactures of Ratisbon are iron and steel wares, pottery, parquet flooring, and lead pencils. Boat-building is also prosecuted, and a brisk transit trade is carried on in salt, grain, and timber. In 1880 the town contained 34,516 inhabitants, of whom 27,844 were Roman Catholics, 5995 Protestants, and 675 Jews. Stadt-am-Hof, which practically forms a suburb of Ratisbon, contained 3392 inhabitants.



Ratisbon.

1. Cathedral. 3. St Emmeran's Church. 5. Town-house.
2. Schottenkirche. 4. Thurn and Taxis Palace. 6. Golden Cross Inn.

Near Ratisbon are two very handsome classical buildings erected by Louis I. of Bavaria, with the aid of the architect Klenze, as national monuments of German patriotism and greatness. The more imposing of the two is the Walhalla, a costly reproduction of the Parthenon, erected as a Teutonic temple of fame on a hill rising from the Danube at Donaustauf, 6 miles to the east. The massive substructions of the temple somewhat dwarf the building itself when seen from a distance, and the choice of a classic model for a German Pantheon seems somewhat incongruous, but after these deductions are made it still remains a magnificent and imposing structure. The interior, which is as rich as coloured marbles, gilding, and sculptures can make it, contains the busts of more than a hundred German worthies. The second of King Louis's buildings is the Befreiungshalle at Kelheim, 14 miles above Ratisbon, a large circular building, which has for its aim the glorification of the heroes of the war of liberation in 1813.

The early Celtic settlement of *Radespona* was chosen by the Romans, who named it *Castra Regina*, as the centre of their power on the upper Danube, and it soon attained considerable importance. It afterwards became the seat of the dukes of Bavaria and one of the main bulwarks of the East Frankish monarchy; and it was also the focus from which Christianity spread over southern Germany. St Emmeran founded an abbey here in the middle of the 7th century, and St Boniface established the bishopric about a hundred years later. Ratisbon acquired the freedom of the empire in the 13th century and was for a time the most flourishing city in southern Germany. It became the chief seat of the trade with India and the Levant, and the boatmen of Ratisbon are frequently heard of as expediting the journeys of the crusaders. The city was loyally Ghibelline in its sympathies and was a favourite residence of the German emperors. Numerous diets were held here from time to time, and after 1663 it became the regular place of meeting of the German diet. The Reformation found only temporary acceptance at Ratisbon and was met by a counter-reformation inspired by the Jesuits. Before this period the city had almost wholly lost its commercial importance, owing to the changes in the great highways of trade. Ratisbon had its due share in the Thirty Years' and other wars, and is said to have suffered in all no fewer than seventeen sieges. In 1807 the town and bishopric were assigned to the prince primate Dalberg and in 1810 they were ceded to Bavaria. After the battle of Eggmühl (1809) the Austrians retired upon Ratisbon, and the pursuing French defeated them again beneath its walls and reduced great part of the city to ashes.

RATLAM or Rutlam, a native state of India, in the Western Malwa Agency (Central India Agency), lying between 23° 2′ and 23° 36′ N. lat. and 74° 42′ and 75° 17′ E. long., with an area of 729 square miles, and a population (1881) of 87,314 (males 45,779, females 41,535),—Hindus numbering 54,034, Mohammedans 9913, Jains 6038, Christians 19, and aboriginals 17,297. Its revenue from all sources in 1881-82 was estimated at £130,000. The Nimach State Railway connecting Indore with Nimach and Nasirabad passes by Ratlam town. This town, which is one of the principal seats of the opium trade of Malwa, is superior to most cities in Indore, and has good bazaars. Its population in 1881 amounted to 31,066 (16,544 males and 14,522 females).

Ratlam state is held as tributary to Sindhia; but in 1819 an arrangement was made by which the rájá agreed to pay an annual tribute amounting to about £6600, while Sindhia engaged never to send any troops into the country or to interfere with the internal administration. This tribute was assigned by the treaty of 1844 between the British Government and Sindhia in part payment of the Gwalior contingent. It is now paid to the British Government.

RATNAGIRI or Rutnagherry, a British district of India, in the Konkan division of the Bombay presidency, with an area of 3922 square miles. It lies between 15° 40′ and 18° 5′ N. lat. and 73° 5′ and 73° 55′ E. long., and is bounded on the N. by the Savitri river, separating it from the Janjira Agency, and by Kolaba district; on the E. by the Western Ghats, dividing it from the districts of Satara and Belgaum and the native state of Kolhapur; on the S., where it is reduced to a strip of sea-coast not more than 4 miles wide, by the Portuguese possessions of Goa; and on the W. by the Arabian Sea. The district forms a belt between the Ghats and the sea, and its general character is rocky and rugged; nearly all the fertile land lies on the banks of the streams which intersect the country. The coast, about 150 miles in length, is almost uniformly rocky and dangerous. At intervals of about 10 miles a river or bay opens, sufficiently large to form a secure harbour for native craft, and the promontories at the river-mouths are almost invariably crowned with the ruins of an old fort. The rivers and creeks are generally navigable for about 20 miles, and afford great facilities for a coasting trade. The denudation of the forests has apparently tended to promote deposits of silt; but active measures have of late been taken to preserve and extend the forest area. Tigers, leopards, bears, bison, wild boar, *sambhar* deer, and hyænas are found in the forests on the slopes and near the foot of the Sahyadri Hills. At the beginning of British rule there were no roads, and traffic was confined to places where there was water carriage; but a network of roads has now been made, and the opening of the Ghat roads to cart traffic has revolutionized the trade and concentrated it at Chiplun, Rajapur, and Vengurla, which form the gates of a considerable traffic to and from the Deccan. The exports are salt fish, shell-lime, and cocoa-nuts, and the imports comprise food grains, molasses, tobacco, chillies, ground nuts, turmeric, ghi, blankets, piece goods, and iron. The mean temperature, as registered at Ratnagiri station, is 78°·6, and the average annual rainfall is 103·58 inches.

In 1881 the population of Ratnagiri district was 997,090 (473,053 males and 524,037 females),—Hindus numbering 921,016, Mohammedans 71,051, and Christians 3275. The district contains three towns with a population exceeding 10,000,—Ratnagiri (see below), Malwan (15,565), and Chiplun (12,065). Since it came under British rule the number of inhabitants has increased threefold, all the land is occupied, and the population is greater than the land can feed. Food has in consequence to be imported, and the condition of the people would be deplorable were it not their custom to move in large numbers to Bombay in search of employment, where they earn good wages and return to spend it in their homes. The chief crops are grain and rice. The extent of arable land is small, but on the whole cultivation is good. Of 1,117,686 acres under actual cultivation in 1883-84, of which 38,865 were twice cropped, cereals occupied 1,020,583 and pulses 41,733 acres. There are no manufactures of any importance; but the school of industry at Ratnagiri possesses steam saw-mills, and undertakes wood and iron work of all descriptions. The revenue of the district in 1883-84 amounted to £126,596, of which the land-tax contributed £91,429.

Ratnagiri formed part of the dominions of the peshwa, and was annexed by the British Government in 1818 on the overthrow of Baji Rao.

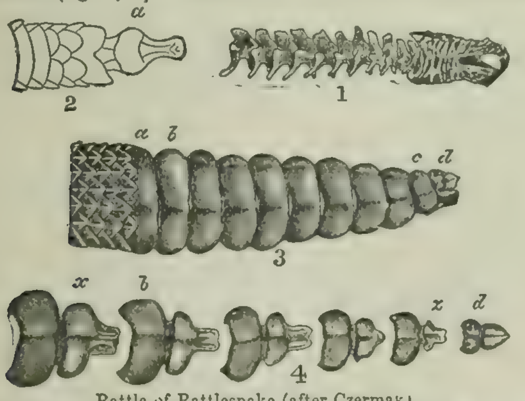
RATNAGIRI or Rutnagherry, chief town of the above district, is situated on the Konkan coast in 16° 59′ N. lat. and 73° 19′ E. long., 136 miles south by east of Bombay. A leading industry connected with the town is the sardine fishery, which usually takes place in January and February, and engages fleets of canoes. A single net-caster will fill his canoe in the course of a morning. The lighthouse was erected in 1867; its light, visible 18 miles distant, is 250 feet above high water. The population of the town in 1881 numbered 12,616 (males 6418, females 6198).

RATRAMNUS, a theological controversialist of some mark, who flourished in the 9th century, was a monk of the Benedictine abbey of Corbie near Amiens, but beyond this fact almost nothing of his personal history has been preserved. He is now best known by his treatise on the Eucharist (*De corpore et sanguine Domini liber*), in which he controverted the doctrine of transubstantiation as taught in a similar work by his contemporary Radbertus Paschasius (see above, p. 210). In the controversy about election, when appealed to by Charles the Bald, he wrote two books *De prædestinatione Dei*, in which he maintained the doctrine of a twofold predestination, nor did the fate of Gottschalk deter him from supporting the view of that unfortunate theologian against Hincmar as to the orthodoxy of the expression "trina Deitas." Ratramnus perhaps won most glory in his own day by his *Contra Græcorum opposita*, in four books (868), a much valued contribution to the controversy between the Eastern and Western Churches which had been raised by the publication of the encyclical letter of Photius in 867.

RATTAN. See Cane and Palm.

RATTAZZI, Urbano (1808-1873), Italian statesman, was born on 29th June 1808 at Alessandria, and from 1838 practised with great success at the bar. In 1848 he was sent to the chamber of deputies in Turin as representative of his native town. By his debating powers he contributed to the defeat of the Balbo ministry, and for a short time held the portfolio of minister of public instruction; afterwards, under Gioberti, he became minister of the interior, and on the retirement of the last-named in 1849 he became practically the head of the Government. The defeat at Novara compelled the resignation of Rattazzi in March 1849. His election as president of the chamber in 1852 was one of the earliest results of the so-called "connubio" with Cavour, and having become minister of justice in 1853 he in that and the next following years was able to carry a number of measures of reform of considerable importance, including that for the suppression of certain of the monastic orders. During a momentary reaction of public opinion he resigned office in 1858, but again entered the cabinet under La Marmora in 1859 as minister of the interior. In consequence of the cession of Nice and Savoy he again retired in January 1860. He was entrusted with the formation of a new ministry in March 1862, but in consequence of his policy of repression towards Garibaldi was driven from office in the following December. He was again prime minister in 1867, from April to October. His death took place at Frosinone on 5th June 1873. (See ITALY, vol. xiii. p. 488 *sq.*)

RATTLESNAKE. Rattlesnakes are a small group of the family of Pit-vipers (*Crotalidæ*), characterized by a tail which terminates in a chain of horny, loosely connected rings, the so-called "rattle." The "pit" by which the family is distinguished from the ordinary vipers is a deep depression in the integument of the sides of the snout, between the nostrils and the eye; its physiological function is unknown. The rattle is a complicated and highly specialized organ, developed from the simple conical scale or epidermal spine, which in the majority of snakes forms the termination of the general integument of the tail. The bone by which the root of the rattle is supported consists of the last caudal vertebræ, from three to eight in number, which are enlarged, dilated, compressed, and coalesced (fig. 1, *a*). This bone is covered with thick and vascular cutis, transversely divided by two constrictions into three portions, of which the proximal is larger than the median, and the median much larger than the distal (fig. 2, *a*). This cuticular portion constitutes the matrix of a horny epidermoid covering which closely fits the shape of the underlying soft part and which is the first commencement of the rattle, as it appears in very young rattlesnakes before they have shed their skin for the first time. When the period of a renewal of the skin approaches a new covering of the extremity of the tail is formed below the old one, but the latter, instead of being cast off with the remainder of the epidermis, is retained by the posterior swelling of the end of the tail, forming now the first loose joint of the rattle. This process is repeated on succeeding exuviations,—the new joints being always larger than the old ones as long as the snake grows (fig. 3). Perfect rattles therefore taper towards the point, but generally the oldest (terminal) joints wear away in time and are lost. As rattlesnakes shed their skins more than once every year, the number of joints of the rattle does not indicate the age of the animal but the number of exuviations which it has undergone. The largest rattle in the British Museum has twenty-one joints. The rattle (fig. 4) consists thus of a variable number of dry, hard, horny cup-shaped joints, each of which loosely grasps a portion of the preceding, and all of which are capable of being shaken against each other. If the interspaces between the joints are filled with water, as often happens in wet weather, no noise can be produced. The motor power lies in the lateral muscles of the tail, by which a vibratory motion is communicated to the rattle, the noise produced being similar to that of a weak child's rattle and perceptible at a distance of from 10 to 20 yards.



Rattle of Rattlesnake (after Czermak).

Fig. 1.—Caudal vertebræ, the last coalesced in a single bone *a*. Fig. 2.—End of tail (rattle removed); *a*, cuticular matrix covering terminal bone. Fig. 3.—Side view of a rattle; *c* and *d* the oldest, *a* and *b* the youngest joints. Fig. 4.—A rattle with joints disconnected; *x* fits into *b* and is covered by it; *z* into *d* in like manner.

The habit of violently and rapidly agitating the tail is by no means peculiar to the rattlesnake, but has been observed in other venomous as well as innocuous snakes with the ordinary termination of the tail, when under the influence of fear or anger. The special object for which the rattle has been developed in these snakes is unknown.

Rattlesnakes are entirely confined to the New World. North-American authors distinguish now a great number of different kinds, the most recent, Garman (*Reptiles and Batrachians of North America*, 1883, 4to), enumerating twelve distinct species and thirteen additional varieties; but all these species or varieties fall into two groups, viz., one which has the upper side of the head covered with the ordinary nine dermal shields, and the other in which the shields between and behind the eyes are broken up or replaced by small scales. The former group consists of two species only, of comparatively small size, both North American, *Crotalus miliarius* being the more generally known. The second group comprises the more formidable kinds of South as well as North America, which are generally described under the names of *C. horridus* and *C. durissus*. In the older standard works the former name was applied to the southern form, which extends from Paraguay and Chili through Brazil into Mexico, and the latter to the common North-American rattlesnake; in modern American works this nomenclature is reversed. *C. horridus* and *C. durissus* belong to the most dangerous of poisonous snakes. If a person bitten by an adult rattlesnake escapes with life, protracted illness and the loss of or injury to the wounded limb are frequently the consequence. They inhabit localities to which the sun has free access, prairies, rough stony ground, &c. Specimens of 5 feet in length are not rare. Formerly common in the eastern parts of the United States, and still so in thinly inhabited districts of the western States, rattlesnakes, like the vipers of Europe, have gradually succumbed to the unceasing persecution of man. They vary much in colour: a common type of coloration is a brownish ground-colour, sometimes yellowish, sometimes blackish. Series of large dark spots, frequently edged with yellow, and of very variable shape, run along the back and sides. The head and neck are ornamented with dark or black longitudinal bands, or are marked by an almost uniform coloration.

RAU, KARL HEINRICH (1792-1870), German political economist, was born at Erlangen on 23d November 1792. He pursued his studies, devoting himself principally to the (so-called) cameralistic sciences, from 1808 to 1812 at the university of his native place, where he afterwards remained as a privat-docent. In 1814 he obtained the prize offered by the academy of Göttingen for the best treatment of the question, How the disadvantages arising from the abolition of trade guilds might be removed. His memoir, greatly enlarged, was published in 1816 under the title *Ueber das Zunftwesen und die Folgen seiner Aufhebung*. He was then favourable to the continued existence of trade corporations on a reformed basis, but afterwards abandoned this view. In the same year appeared his *Primæ lineæ historiæ politices*. In 1818 he became professor at Erlangen. He competed successfully in 1820 for a prize offered by the academy of Haarlem for the best essay on the causes of poverty; and in the same year he published a translation, characterized by Roscher as "free, but very good," of Storch's *Cours d'Économie Politique*, with notes and additions of his own. In 1822 he was called to the chair of political economy at Heidelberg, where the rest of his life was spent, in the main, in teaching and research. He took some part, however, in public affairs: in 1837 he was nominated a member of the first chamber of the duchy of Baden, and did good service in that capacity; and in 1851 he was one of the commissioners sent to England on the part of the Zollverein to study the Industrial Exhibition. A result of this mission was his account of the agricultural implements exhibited at London (*Die landwirthschaftlichen Geräthe der Londoner Ausstellung*, 1853). He was elected a corresponding member of the French Institute in 1856. After a useful and honourable career he died at Heidelberg on 18th March 1870.

His principal work is the *Lehrbuch der politischen Oekonomie* (1826-37), an encyclopædia of the economic knowledge of his time, written with a special view to the guidance of practical men. The doctrines are, in the main, those of Smith and Say; but they are treated in an independent manner, and the conclusions of his predecessors are modified, especially by giving larger scope to the action of the state. The three volumes are respectively occupied with (1) political economy, properly so called, or the theory of wealth, (2) administrative science (*Volkswirthschaftspolitik*), and (3) finance. The two last he recognizes as necessarily admitting of variations in accordance with the special circumstances of different countries, whilst the first is more akin to the exact sciences, and is in many respects capable of being treated, or at least illustrated, mathematically. This threefold division marks his close relation to the older German cameralistic writers, with whose works he was familiarly acquainted. It is a consequence in part of his conformity to their method and his attention to administrative applications that his treatise was found peculiarly adapted for the use of the official class, and long maintained its position as their special text-book. He was the economic teacher, says Roscher, of the well-governed middle states of Germany from 1815 to 1848. The book has passed through many editions; in that of 1870 by Adolf Wagner it was transformed into a new book.

In the earlier part of his scientific life Rau tended strongly towards the relative point of view and an historical method in economics. But, though in his great work he kept clear of the exaggerated abstraction of the Ricardians and rejected some of their *a priori* assumptions, he never joined the historical school. To the end he occupied a somewhat indeterminate position with respect to that school; on the whole, however, he more and more subordinated historical investigation to immediate practical interests, and in his economic politics moved in the direction of limiting rather than extending the sphere of state action. His general merits are thoroughness of treatment, accuracy of statement, and balance of judgment; he shows much industry in the collection and skill in the utilization of statistical facts; and his exposition is orderly and clear. Roscher finds in his earlier works a *spirituel* charm which disappears in the later.

Besides the publications already mentioned, he was author of the following: *Ueber den Luxus*, 1817; *Ansichten der Staatswirthschaft mit besonderer Beziehung auf Deutschland*, 1820; *Malthus und Say über die Ursachen der jetzigen Handelsstockung*, 1821; *Grundriss der Kameralwissenschaft oder Wirthschaftslehre*, 1823; *Ueber die Kameralwissenschaft, Entwickelung ihres Wesens und ihrer Theile*, 1825; *Ueber die Landwirthschaft der Rheinpfalz*, 1830; an academic oration *De vi naturæ in rempublicam*, 1831; and *Geschichte des Pfluges*, 1845.

Rau founded in 1834 the *Archiv der politischen Oekonomie und Polizeiwissenschaft*, in which he wrote a number of articles, afterwards issued in separate form: amongst them may be named those on the debt of Baden, on the accession of Baden to the Zollverein, on the crisis of the Zollverein in the summer of 1852, on the American banks, on the new English poor law, on List's national system of political economy, and on the minimum size of a peasant property. This enumeration will give an idea of the extent and variety of his researches.

RAUCH, Christian Daniel (1777-1857), one of the most celebrated sculptors of modern times, was born at Arolsen in the principality of Waldeck on the 2d of January 1777. The opening career of the young artist was attended with considerable difficulty, his parents being poor and unable to place him under efficient masters. His first instructor taught him little else than the art of sculpturing grave-stones, and Professor Ruhl of Cassel could not give him much more. A wider field of improvement opened up before him when he removed to Berlin in 1797; but poverty still hampered all his efforts. He was obliged to earn a livelihood by becoming a royal lackey, and to reserve the prosecution of his favourite art for his spare hours. The genius of Rauch, however, soon forced itself into notice and recommended him to several persons of influence who were able to give him assistance. Queen Louisa, surprising him one day in the act of modelling her features in wax, sent him to study at the Academy of Art. Not long afterwards, in 1804, Count Sandreczky gave him the means to complete his education at Rome, where William von Humboldt, Canova, and Thorwaldsen befriended him. Under such patronage the young sculptor made rapid progress. Among other works, he executed bas-reliefs of Hippolytus and Phædra, Mars and Venus wounded by Diomede, and a Child praying. In 1811 Rauch entered upon the eminent part of his career, when he was commissioned to execute a monument for Queen Louisa of Prussia. The statue, representing the queen in a sleeping posture, was placed in a mausoleum in the grounds of Charlottenburg, and procured great fame for the artist. Commissions for portraits came pouring in upon him. The consummate tact with which he seized individual characteristics and the artistic manner in which he treated them at once established his reputation. The erection of nearly all public statues came to be entrusted to him. He began to execute that long series of representations of great Germans in which his genius is exhibited to full advantage. In course of time almost every important town throughout the country possessed a bust of some eminent statesman, patriot, or man of genius from his chisel. There were, among others, Blücher at Breslau, Maximilian at Munich, Francke at Halle, Dürer at Nuremberg, Luther at Wittenberg, and the grand-duke Paul Frederick at Schwerin. At length, in 1830, he commenced, along with Schinkel the architect, the models for a colossal monument at Berlin to Frederick the Great. This work was inaugurated with great pomp in May 1851, and has ever since been regarded as one of the masterpieces of modern sculpture. On a granite pedestal 25 feet in height stands the colossal equestrian statue of the king. His plain pinched features and his grotesque costume are given with historical exactness without impairing the artistic effect. An air of resistless majesty ennobles the mean countenance, and a bold and skilful treatment hides the absurdity of the garb. The excellence of his masterpiece was recognized throughout the world. Princes decorated him with honours. The academies of Europe enrolled him among their members. Especially did his own sovereign and countrymen regard him with proud affection and respect. A statue of Kant for Königsberg and a statue of Thaer for Berlin occupied his attention during some of his last years; and he had just finished a model of Moses praying between Aaron and Hur when he was attacked by his last illness. He died on 3d December 1857.

RAUMER, Friedrich Ludwig Georg von (1781-1873), German historian, was born at Wörlitz in Anhalt on 14th

May 1781. His father (who died in 1822) was much esteemed in Anhalt, where, as "kammerdirector," he did excellent service to agriculture. Raumer was educated at the Joachimsthal Gymnasium, Berlin, and at the universities of Halle and Göttingen. In 1801 he began to practise as a lawyer in the Brandenburg chamber, and in the following year he was made assessor. From 1806 to 1808 he was connected with a department of the crown lands chamber at Wusterhausen near Berlin. Having been made a councillor in 1809, he was called in 1810 to a post in the office for the national debt, and soon afterwards received an appointment in the bureau of the chancellor, Hardenberg. He was made a professor at the university of Breslau in 1811, and in 1819 he became professor of political science and history at Berlin. In 1815 he had carried on historical investigations in Venice, and in the two following years he had travelled much in Germany, Switzerland, and Italy. At Berlin he was for some time a member of the Upper Board of Censors and secretary of the Academy of Sciences. The former office he resigned in 1831, the latter in 1847. His professorship at the Berlin university he did not give up until 1853, and even then he did not altogether cease to lecture. In 1848 he was elected a member of the national assembly at Frankfort, where he associated himself with the right centre; and from Frankfort he was sent on a mission to Paris. At a later period he was a member of the first chamber of the Prussian parliament. He died at Berlin on 14th June 1873. Raumer made many contributions to history, in all of which he embodied the results of independent research and gave evidence of a sound and penetrating judgment. His style is direct, lucid, and vigorous, and his best books have been as warmly appreciated by ordinary readers as by scholars.

His first work, published anonymously in 1806, was entitled *Sechs Dialoge über Krieg und Handel*. This was followed by *Das britische Besteuerungssystem* (1810), *Handbuch merkwürdiger Stellen aus den lateinischen Geschichtschreibern des Mittelalters* (1813), *Herbstreise nach Venedig* (1816), and other books. His most famous works are *Geschichte der Hohenstaufen und ihrer Zeit* (1823-25) and *Geschichte Europas seit dem Ende des 15ten Jahrhunderts* (1832-50). In 1831 appeared *Briefe aus Paris und Frankreich im Jahre 1830* and *Briefe aus Paris zur Erläuterung der Geschichte des 16ten und 17ten Jahrhunderts*. He went to England in 1835, to Italy in 1839, and to America in 1843, and these visits led to the publication of various works—*England in 1835* (1836), *Beiträge zur neuern Geschichte aus dem Britischen Museum und Reichsarchive* (1836-39), *Italien, Beiträge zur Kenntniss dieses Landes* (1840), *Die Vereinigten Staaten von Nordamerika* (1845). Among his later books may be mentioned *Antiquarische Briefe* (1851), *Historisch-politische Briefe über die geselligen Verhältnisse der Menschen* (1860), *Lebenserinnerungen und Briefwechsel* (1861), and *Handbuch zur Geschichte der Literatur* (1864-66). In 1830 Raumer began the *Historisches Taschenbuch* published by Brockhaus, which from 1871 was continued by Riehl.

RAUPACH, ERNST BENJAMIN SALOMO (1784-1852), German dramatic writer, was born on the 21st of April 1784 at Straupitz, a village near Liegnitz in Silesia. He attended the gymnasium at Liegnitz and afterwards studied theology at Halle. He spent a good many years in Russia as a teacher, and in 1816 was made a professor in the university of St Petersburg. In 1822 he left Russia, and after travelling for some time in Italy settled as a writer for the stage in Berlin, where he remained during the rest of his life. He died at Berlin on the 18th of March 1852.

Raupach was not a man of imaginative genius, but he had remarkable skill in the invention of effective dramatic situations, and was master of a vigorous rhetorical style. These qualities secured for him a prominent place among the most popular dramatic writers of his day. He wrote both tragedies and comedies, and was the author of a series of dramas representing the great events of the age of the Hohenstaufen.

See P. Raupach, *Raupach, eine biographische Skizze* (1853).

RAVAILLAC, FRANÇOIS (1578-1610), the assassin of Henry IV. of France, was born near Angoulême in 1578. He was of humble origin, and began life as a valet de chambre, but afterwards became a petty solicitor and also teacher of a school. He was not able, however, to keep clear of debt, and after having been imprisoned for some time by his creditors he sought admission to the recently founded order of Feuillants, but after a short probation was dismissed as a visionary. An application for admission to the Society of Jesus was equally unsuccessful in 1606. His various disappointments tended to foster a violently fanatical temperament, and widely-spread rumours that the king was intending to make war upon the pope suggested to him the idea of assassination, which he deliberately and successfully carried out on 14th May 1610. In the course of his trial he was frequently put to the torture, but persistently (and it is now believed truly) denied that he had been prompted by any one or had any accomplices. Sentence of death was carried out with revolting barbarity on 27th May.

RAVEN (Anglo Saxon *Hræfn*, Icelandic *Hrafn*, Danish *Ravn*, Dutch *Raaf*, German *Rabe*), the largest of the Birds of the Order *Passeres*; and, as already shewn (ORNITHOLOGY, vol. xviii. p. 49), probably the most highly developed of all Birds.

Quick-sighted, sagacious, and bold, it must have followed the prehistoric fisher and hunter, and generally without molestation from them, to prey on the refuse of their spoils, just as it now waits, with the same intent, on the movements of their successors; while it must have likewise attended the earliest herdsmen, who could not have regarded it with equal indifference, since its now notorious character for attacking and putting to death a weakly animal was doubtless in those days manifested. Yet the Raven is no mere dependant upon man, being always able to get a living for itself; and moreover a sentiment of veneration or superstition has from very remote ages and among many races of men attached to it—a sentiment so strong as often to overcome the feeling of distrust not to say of hatred which its deeds inspired, and, though rapidly decreasing, even to survive in some places until the present day. There is no need to dwell on the association of this bird with well-known characters of history sacred or profane—Noah or Elijah, Odin or Flokki, the last of whom by its means discovered Iceland. The Raven is even said to have played its part in the mythology of the Red Indian; and none can wonder that all this should be so, since, wherever it occurs and more especially wherever it is numerous, as in ancient times and in thinly peopled countries it must have been, its size, appearance and fearless habits would be sure to attract especial attention. Nor has this attention wholly ceased with the advance of enlightenment, for both in prose and verse, from the time of Shakespeare to that of Poe and Dickens, the Raven has often figured, and generally without the amount of misrepresentation which is the fate of most animals which celebrated writers condescend to notice. Notwithstanding all this, however, the Raven has now fallen upon evil days. The superstitious reverence with which it was once regarded has all but vanished and has been very generally succeeded by persecution, which in many districts has produced actual extirpation, so that it is threatened with extinction, save in the wildest and most unpeopled districts.[1]

The Raven breeds very early in the year, in England resorting to its nest, which is usually an ancient if not an ancestral structure, about the middle or towards the end of January. Therein are laid from five to seven eggs of the common Corvine coloration (see CROW, vol. vi. pp. 617, 618), and the young are hatched before the end of February. In more northern countries the breeding-season is naturally delayed, but everywhere this species is almost if not quite the earliest of birds to enter upon the business of perpetuating its kind. The Raven measures about 26 inches in length, and has an expanse of wing considerably exceeding a yard. Its bill and feet are black, and the same may be said of its whole plumage, but the feathers of the upper parts as well as of the breast are very glossy, reflecting a bright purple or steel-blue.[1] The species inhabits the whole of Europe, and the northern if not the central parts of Asia; but in the latter continent its southern range is not well determined. In America[2] it is, or used to be, found from the shores of the Polar Sea to Guatemala if not to Honduras, but is said hardly to be found of late years in the eastern part of the United States. In Africa its place is taken by three allied but well-differentiated species, two of which (*Corvus umbrinus*, readily distinguished by its brown neck, and *C. affinis*,[3] having its superior nasal bristles upturned vertically) also occur in South-Western Asia, while the third (*C. leptonyx* or *C. tingitanus*, a smaller species characterized by several slight differences) inhabits Barbary and the Atlantic Islands. Further to the southward in the Ethiopian Region three more species appear, whose plumage is varied with white—*C. scapulatus*, *C. albicollis*, and *C. crassirostris*—the first two of small size, but the last rivalling the real Raven in that respect. (A. N.)

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[1] That all lovers of nature should take what steps they can to arrest this sad fate is a belief which the present writer fully holds. Without attempting to deny the loss which in some cases is inflicted upon the rearers of cattle by Ravens, it is an enormous mistake to suppose that the neighbourhood of a pair of these birds is invariably detrimental. On this point he can speak from experience. For many years he had an intimate knowledge of a pair occupying an inland locality surrounded by valuable flocks of sheep, and abounding in rabbits and game, and had ample opportunities, which he never neglected, of repeatedly examining the pellets of bones and [illegible] that these, like all other carnivorous birds, cast up. He thus found that this pair of Ravens fed almost exclusively on moles. Soon after he moved from the neighbourhood in which they lived the unremitting zeal of a gamekeeper, against, it is believed, the orders of his master, put an end to the interesting couple—the last of their species which inhabited the county.

RAVENNA, chief city of an Italian province of the same name, contained 18,571 inhabitants according to the census of 1881. It is situated in the north-east of Italy, in 44° 25′ N. lat. and 12° 12′ E. long., about 4 miles from the Adriatic, with which it is now connected by the Corsini Canal, the two small rivers Ronco and Montone no longer serving as means of communication between the city and the sea. A railway, 26 miles long, unites Ravenna with Castel Bolognese on the line from Bologna to Rimini.

Ravenna owes both its great historic importance in the past and its comparative dulness and obscurity in the present to the same cause,—its position in an alluvial plain, formed and continually extended by the deposits brought down by a number of small and rapid streams from the neighbouring Apennines. Any one who glances at a map of the north-western corner of the Adriatic will see at once the general character of the coast,—broad lagunes sometimes stretching far inland; flat alluvial plains intersected by endless dykes; numerous rivers (of which the Po is by far the largest and makes the most conspicuous delta) descending from the Apennines or the Alps; and, outside of all, a barrier of islands which have a continual tendency to become adherent to the shore through the new deposits which are brought down, and thus to be turned from islands into low hills. This description suits Venice nearly as well as it suits Ravenna, and the chief difference between these two great historic cities is that the lagunes of Ravenna are about twenty centuries older than those of Venice.

The one transcendent interest of Ravenna to a modern traveller consists in its churches. No other city in the world offers so many and such striking examples of the ecclesiastical architecture of the centuries from the 4th to the 8th. The style is commonly called Byzantine, and no doubt from the close connexion of Ravenna with Constantinople considerable influence was exerted by the latter city on the former; but some of the most striking features of the churches of Ravenna—the colonnades, the mosaics, perhaps the cupolas—are not so much Byzantine as representative of early Christian art generally. It is truly said by Mr Freeman:

> "The outside of a Ravennese basilica is an unadorned and unattractive pile of brick. If it has any architectural grouping or outline about it, it owes it to the campanile which a later age has added. But if the churches of Ravenna are thus unattractive without, they are emphatically all glorious within. The eye dwells with genuine artistic delight on the long unbroken rows of pillars and arches, their marble shafts, their floriated capitals, sometimes the work of the Christian craftsman, sometimes the spoils of heathendom pressed into the service of the sanctuary. . . . The whole plan of these buildings allows a great field for void spaces; but the void spaces thus left are filled up by these wonderful mosaic paintings which look down upon us as fresh as they were thirteen hundred years back."

Every traveller to Ravenna is impressed by the vividness of these decorations, which were older when Giotto painted his first fresco than Giotto's frescos are now; but we can here only allude to the subject, referring the reader to the article MOSAIC (vol. xvi. p. 852 *sq.*).

The following are the most important churches of Ravenna, arranged in the order of the dates generally attributed to them:—

Church.	Builder.	Date.
1. Metropolitan Church, or Ecclesia Ursiana, and baptistery adjoining	S. Ursus	370-390 (?)
2. S. Giovanni Evangelista	Galla Placidia	425
3. S. Agata	Gemellus	about 430
4. S. Pier Crysologo (chapel)	S. Peter Chrysologus..	about 450
5. S. Giovanni Battista	Baduarius	,,
6. SS. Nazario e Celso	Galla Placidia	,,
7. S. Pier Maggiore (now S. Francesco)..	Bishop Neon (?)	about 458
8. S. Teodoro (now Santo Spirito)—A. ..	Theodoric (?)..........	493-526
9. S. Maria in Cosmodin (Arian baptistery)—A.	,, ...	,,
10. S. Martino in Coelo Aureo (now S. Apollinare Nuovo)—A.	,, ...	,,
11. S. Vitale	Julianus Argentarius..	about 530
12. S. Maria Maggiore	Bishop Ecclesius	,,
13. S. Apollinare in Classe	Julianus Argentarius..	about 535

(The churches marked A. were originally erected for the Arian worship.)

The cathedral (No. 1) has been so much modernized as to have lost its interest; but the baptistery adjoining it, decorated by Bishops Neon and Maximian in the 5th and 6th centuries, an octagonal building with mosaics of the apostles on the roof, is still unspoiled. SS. Nazario e Celso (No. 6) is a little building in the form of a Latin cross, and is better known as the mausoleum of Galla Placidia, whose tomb and those of three emperors, her husband, brother, and son, are deposited here. It is surmounted with a cupola surrounded with four semi-domes, on which are depicted figures of the Good Shepherd with His sheep, of evangelists, prophets, &c., and two stags drinking at a fountain. S. Apollinare Nuovo (No. 10) has above the arches of the nave what is perhaps the greatest triumph of mosaic art, two processions of virgins and of martyrs marching, the former from the city of Classis, the latter from the palace of Theodoric, to the Saviour. In the former group Christ sits upon the lap of His mother, and the Magi are interposed between Him and the procession of virgins. In the latter He is enthroned in glory and guarded by four ministrant angels. S. Vitale (No. 11) is doubly interesting as having furnished the model after which Charles the Great built his imperial minster at Aix-la-Chapelle and as containing full-length contemporary portraits in mosaic of Justinian and Theodora, surrounded by ecclesiastics, courtiers, and soldiers of the guard. It is surmounted by a dome, is circular in form, and has eight apsidal chapels all round it, one of which, corresponding to the choir in an ordinary church, is prolonged to about four times the length of the other apses. Unfortunately, only in this choir have the mosaics been preserved, but they are of the highest possible interest. S. Apollinare in Classe (No. 13), once the centre of a busy population of sailors, shopkeepers, and dock-labourers, now stands absolutely alone in a wide and desolate expanse 2 miles from the sea. The decorations of the church have suffered from damp—there are frequently some inches of water on the pavement—but the twenty-four stately marble columns with Corinthian capitals form a magnificent prelude to an apse covered with mosaics, among which is conspicuous a great jewelled cross, symbolizing the Saviour on the Mount of Transfiguration; Moses and Elias lean forth from the clouds on either side, and in the valley below the apostles wait, represented symbolically as sheep. Many mosaic portraits of bishops of Ravenna are on the walls of the church, and a mosaic picture, representing Constantine Pogonatus and his brothers bestowing a privilegium on Bishop Reparatus about the year 670.

History.—Strabo mentions a tradition that Ravenna was founded by Thessalians, who afterwards, finding themselves pressed on by the Etrurians, called in their Umbrian neighbours and eventually departed, leaving the city to their allies. Throughout the valley of the Po the Gauls took the place of the Etrurians as a conquering power; but Ravenna may possibly have retained its Umbrian character until, about the year 191 B.C., by the conquest of the Boii the whole of this region passed definitely under the dominion of Rome. Either as a colonia or a municipium, Ravenna remained for more than two centuries an inconsiderable city of Gallia Cisalpina, chiefly noticeable as the place to which Cæsar during his ten years' command in Gaul frequently resorted in order to confer with his friends from Rome. At length under Augustus it suddenly rose into importance, when that emperor selected it as the station for his fleet on "the upper sea." Two hundred and fifty ships, said Dion (in a lost passage quoted by Jordanes), could ride at anchor in its harbour. Strabo, writing probably a few years after Ravenna had been thus selected as a naval arsenal, gives us a description of its appearance which certainly corresponds more closely with modern Venice than with modern Ravenna. "It is the largest of all the cities built in the lagunes, but entirely composed of wooden houses, penetrated in all directions by canals, wherefore bridges and boats are needed for the wayfarer. At the flow of the tide a large part of the sea comes sweeping into it, and thus, while all the muddy deposit of the rivers is swept away, the malaria is at the same time removed, and by this means the city enjoys so good a sanitary reputation that the Government has fixed on it as a place for the reception and training of gladiators." On the other hand, good water was proverbially difficult to obtain at Ravenna,—dearer than wine, says Martial, who has two epigrams on the subject. And Sidonius, writing in the 5th century, complains bitterly of the "feculent gruel" (*cloacalis puls*) which filled the canals of the city, and which gave forth fetid odours when stirred by the poles of the bargemen. The port of Ravenna, situated about 3 miles from the city, was named Classis. A long line of houses called Cæsarea connected it with Ravenna, and in process of time there was such a continuous series of buildings that the three towns seemed like one.

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[1] Pied examples are not at all uncommon in some localities and wholly white varieties are said to have been seen.

[2] American birds have been described as forming a distinct species under the name of *Corvus carnivorus* or *C. cacolotl.*

[3] Mr Sharpe (*Cat. B. Brit. Museum*, iii. p. 45) separates *C. affinis* as forming a distinct genus *Rhinocorax*; but it is a hard task on any reasonable ground to break up the genus *Corvus* as long accepted by systematists.

The great historical importance of Ravenna begins early in the 5th century, when Honorius, alarmed by the progress of Alaric in the north of Italy, transferred his court to the city in the lagunes. From this date (*c.* 402) to the fall of the Western empire in 476 Ravenna was, though not the exclusive, the chief residence of the Roman emperors and the centre of the elaborate machinery of the state. Here Stilicho was slain; here Honorius and his sister Placidia caressed and quarrelled; here Valentinian III. spent the greater part of his useless life; here Majorian was proclaimed; here the Little Romulus donned his purple robe; here in the pinewood[1] outside the city his uncle Paulus received his decisive defeat from Odoacer. Through all these changes Ravenna maintained its character as an impregnable "city in the sea," not easily to be attacked even by a naval power on account of the shallowness and devious nature of the channels by which it had to be approached. On becoming supreme ruler of Italy Odoacer, like the emperors who had gone before him, made Ravenna his chief place of residence, and here after thirteen years of kingship he shut himself up when Theodoric the Ostrogoth had invaded Italy and defeated him in two battles. Theodoric's siege of Ravenna lasted for three years (489-492) and was marked by one bloody encounter in the pine-wood on the east of it. The Ostrogoth collected a fleet and established a severe blockade, which at length caused Odoacer to surrender the city. The terms, arranged through the intervention of John, archbishop of Ravenna, were not observed by Theodoric, who, ten days after his entry into the city, slew his rival at a banquet in the palace of the Laurel Grove (15th March 493). Ravenna was Theodoric's chief place of residence, and the thirty-three years of the reign of the great Ostrogoth (493-526) may probably be considered the time of its greatest splendour. In the eastern part of the city he built for himself a large palace, which probably occupied about a sixth of the space now enclosed within the city walls, or nearly the whole of the rectangle enclosed by Strada di Porta Alberoni on the south, Strada Nuova di Porta Serrata on the west, and the line of the city walls on the north and east. There still remains close to the first-named street and fronting the Corso Garibaldi a high wall built of square Roman bricks, with pillars and arched recesses in the upper portion, which goes by the name of Palazzo di Teodorico. Freeman, on account of the Romanesque character of the architecture, thinks it probable that it really belongs to the time of the Lombard kings; but at any rate it is of the very early mediæval period, and it marks the spot where part of the Ostrogothic palace once stood. A more memorable and clearly authentic monument of Theodoric is furnished by his tomb, a massive mausoleum in the style of the tomb of Hadrian at Rome, which stands still perfect outside the walls near the north-east corner of the city. It is of circular shape and surmounted by an enormous monolith, brought from the quarries of Istria and weighing more than 300 tons. In this mausoleum Theodoric was buried, but his body was cast forth from it, perhaps during the troublous times of the siege of Ravenna by the imperial troops, and the Rotunda (as it is now generally called) was converted into a church dedicated to the Virgin.

Nine years after the death of Theodoric Justinian sent an army to Italy, nominally in order to avenge the murder of Theodoric's daughter Amalasuntha, but in fact to destroy the Gothic monarchy and restore Italy to the empire. Long after the Goths had lost Rome they still clung to Ravenna, till at length, weary of the feebleness and ill-success of their own king, Vitiges, and struck with admiration of their heroic conqueror, they offered to transfer their allegiance to Belisarius on condition of his assuming the diadem of the Western empire. Belisarius dallied with the proposal until he had obtained an entrance for himself and his troops within the walls of the capital, and then threw off the mask and proclaimed his inviolable fidelity to Justinian. Thus in the year 540 was Ravenna re-united to the Roman empire. Its connexion with that empire—or, in other words, its dependence upon Constantinople—lasted for more than 200 years, during which period, under the rule of Narses and his successors the exarchs, Ravenna was the seat of Byzantine dominion in Italy. In 728 the Lombard king Luitprand took the suburb Classis; about 752 the city itself fell into the hands of his successor Aistulf, from whom a few years after it was wrested by Pippin, king of the Franks. By this time the former splendour of the city had probably in great measure departed; the alteration of the coast-line and the filling up of the lagunes which make it now practically an inland city had probably commenced, and no historical importance attaches to its subsequent fortunes. It formed part of the Frankish king's donation to the pope in the middle of the 8th century. It was an independent republic, generally taking the Guelf side in the 13th century, subject to rulers of the house of Polentani in the 14th, Venetian in the 15th (1441), and papal again in the 16th,—Pope Julius II. having succeeded in wresting it from the hands of the Venetians. From this time (1509) down to our own days, except for the interruptions caused by the wars of the French Revolution, Ravenna continued subject to the papal see and was governed by a cardinal legate. In 1859 it was one of the first cities to give its vote in favour of Italian unity, and it has since then formed a part of the kingdom of Italy.

At the beginning of the period thus rapidly sketched Charles the Great visited the city and carried off the brazen statue of Theodoric and the marble columns of his palace to his own new palace at Aix-la-Chapelle. More than five centuries later (1320) Dante became the guest of Guido Novello di Polenta, lord of Ravenna, and here he died on the 14th September of the following year. The marble urn containing the body of the poet still rests at Ravenna, where what Byron calls "a little cupola more neat than solemn" has been erected over it. In 1512 the French army under Gaston de Foix fought a fierce battle with the Spanish, Venetian, and papal troops on the banks of the Ronco about 2 miles from Ravenna. The French were victorious, but Gaston fell in the act of pursuing the enemy. His death is commemorated by the Colonna dei Francesi erected on the spot where he fell. Lord Byron resided at Ravenna for eighteen months in 1820-21, attracted by the charms of the countess Guiccioli.

Literature.—The most important authority for the history of Ravenna is Bishop Agnellus; who wrote about 840, in very bad Latin, the *Liber Pontificalis Ecclesiæ Ravennatis*. It is printed in vol. ii. of Muratori's *Rer. Ital. Scriptores*, but much the best edition is that by Holder-Egger in the *Monumenta Germaniæ Historica* (1878). Rubeus (*Hist. Ravennatum Libri Decem*, Venice, 1589) seems to have had access to some authorities besides Agnellus which are now lost. Ciampini (*Vetera Monumenta*, 1690-99, and *Synopsis Historica*, 1693) gives some fair representations of the mosaics, and Quast's *Ravenna* (Berlin, 1842) is a careful and well illustrated monograph. Dr Ricci in a popular guide, *Ravenna e i suoi Dintorni* (1878), has included some of the results of a very careful study of the antiquities of his native city. Professor Freeman's essay *The Goths at Ravenna* is the best account in English of the city in its historical connexion, and Mr J. A. Symonds in his *Sketches in Italy and Greece* has gracefully touched on its picturesque qualities and literary associations. (T. H.)

RAVENSBURG, an industrial town of Würtemberg, is pleasantly situated amid vine-clad hills on the small river Schussen, 12 miles to the north of Friedrichshafen on the Lake of Constance. Its aspect is quaint and mediæval, and above its houses rise nine picturesque towers, the most prominent of which, dating from the 15th century, is known as the "Mehlsack" or sack of flour. The town-house is also a 15th-century building. The industrial products of Ravensburg are varied, including linen, cotton, embroidered muslins, pottery, glass, and playing-cards. The fruit market is of considerable importance, and trade is also carried on in cattle, grain, and wood. The population in 1880 was 10,550, of whom 2620 were Protestants.

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[1] The great pine-wood to the east of the city, which, though injured by an unusually severe winter and threatened by a projected railway, is still one of the great glories of Ravenna, must therefore have been in existence already in the 5th century. Byron's description,

"[The] immemorial wood
Rooted where once the Adrian wave flowed o'er,"

is probably true; but there is no evidence that it was in historic time that this change took place. Our conjecture is that the *Pineta* grew up a large peninsula somewhat resembling the Lido of Venice.

Ravensburg was founded in the 11th century by the Guelfs, one of whose ancestral castles lay on the Veitsberg, to the south of the town. In 1180 the town passed into the hands of the Hohenstaufens, and a century later it became a free town of the empire. Annexed to Bavaria from 1803 to 1810, it was ceded to Wurtemberg in the latter year.

RÁWAL PINDÍ or Rawul Pindee, a district of British India, in the division of the same name,[1] under the jurisdiction of the lieutenant-governor of the Punjab, lying between 33° and 34° N. lat. and 71° 46′ and 73° 41′ E. long. It is situated on the southern slopes of the north-western extremities of the Himálayas, and contains large mountain tracts, with rich valleys traversed by many mountain torrents. Its area is 1861 square miles; it is bounded on the N. by Hazára district, on the E. by the river Jhelum, on the S. by Jhelum district, and on the W. by the Indus. From its north-eastern extremity to its western limits the district is traversed by hills more or less linked together, causing those peculiarities of surface and of climate by which it is distinguished. The eastern range, known locally as the Murree (Marri) Hills, from the sanatorium erected at the north-eastern extremity of the district, is a continuation of the great Himálayan system; it descends in a southerly and westerly direction, and is clothed with magnificent forest trees and a rich undergrowth of brushwood. Southward these hills follow the course of the Jhelum, decreasing in height, but gaining in picturesqueness what they lose in sublimity, until they subside into a comparatively level country. The mountains in the western half of the district belong to the trans-Indus system; the chief range, known as the Chitta Pahar or White Hills, is composed chiefly of nummulitic limestone. To the north lies the fertile valley of Chach, one of the rare oases which relieve the wildness of this savage waste. The Indus and the Jhelum are the chief rivers of Ráwal Pindí. The former bounds the district along its whole western edge, where it is very picturesque, and in parts navigable for steamers; the latter, forming the eastern frontier, is equally picturesque though less important for navigation. Other chief rivers are the Sohan and the Haroh, both tributaries of the Indus. The climate of Ráwal Pindí is noted for its salubrity; the mean annual temperature is 69°·4, and the average annual rainfall 33·15 inches. The Punjab Northern State Railway runs through its whole length, with a branch from Golra junction, north of the town of Ráwal Pindí, to Khusalgari on the western frontier.

The population in 1881 was 820,512 (males 449,287, females 371,225), Hindus numbering 86,162, Mohammedans 711,546, Sikhs 17,780, Christians 3822, and "others" 202. The only town with a population exceeding 10,000 is the capital (see below). The inhabitants are mostly scattered in small hamlets over the surface of the country. The staple product is wheat in the spring and bajra in the autumn. Inferior grains are giving place to more valuable cereals, and to cotton and potatoes. Of the total area 1517 square miles are cultivated and 379 cultivable. Owing to the rugged nature of the country there is very little commerce, and that little is concentrated principally at the headquarters town. Imports consist of sugar, spices, cotton goods, and salt; while exports are confined to the raw materials of agriculture. The only manufacture of any importance is cotton-weaving. The total revenue of the district in 1882-83 was £105,316, of which the land-tax yielded £68,715.

Ráwal Pindí with the rest of the Sikh dominions passed to the British in 1849, under whose administration it enjoyed comparative peace until the mutiny in 1857. The events of that year afforded an outlet for the smouldering passions engendered by ancestral feuds, and the Murree Hills became the scene of an attempted insurrection. The authorities, however, having been warned of this by a faithful native, took steps for defence, so that when the enemy arrived they were compelled to withdraw in disorder, and they shortly afterwards disbanded themselves. Since then the district has remained comparatively tranquil. Among recent events is the great durbar held by the viceroy of India (Earl Dufferin) on 8th April 1885 in honour of the amir of Afghanistan (Abdur Rahman). The district abounds in objects of great antiquarian interest, chief of which are those of Dehri Shahan (or Shah Dheri), a village situated in 33° 17′ N. lat. and 72° 49′ E. long. Dehri Shahan has been identified with the site of the ancient city of Taxila or Takshásila, which in the time of Alexander was "a large and wealthy city, the most populous between the Indus and Hydaspes" (Jhelum). The ruins of Taxila consist of several distinct portions, and rank as the most interesting, extensive, and best preserved memorials of antiquity in the Punjab province.

RÁWAL PINDÍ or Rawul Pindee, principal town and administrative headquarters of the above district, lies in 33° 37′ N. lat. and 73° 6′ E. long. The present town is of modern origin; it is well built and has an air of considerable prosperity; its streets are broad and handsome, and several fine buildings add to its appearance. It is chiefly a grain mart. The population of the town in 1881 was 52,975 (35,985 males and 16,990 females).

RÁWANDÍS. See Mohammedanism, vol. xvi. p. 579.

RAWITSCH (Polish *Rawicz*), a small manufacturing town of Prussia in the province of Posen, lies near the Silesian frontier, 37 miles to the north of Breslau. It is regularly built and contains a handsome Protestant church and a substantial town-hall. The principal industry is the manufacture of snuff and cigars, for the first of which in particular it enjoys a considerable reputation. Trade is carried on in grain, wool, cattle, hides, and timber. The population in 1880 was 12,260, made up of 7587 Protestants, 3539 Roman Catholics, and 1123 Jews. Rawitsch is of comparatively modern origin, having been founded by Protestant refugees from Silesia during the Thirty Years' War.

RAWMARSH, a large village and urban sanitary district in the West Riding of Yorkshire, is situated on the ridge of a hill above the valley of the Don and on the Midland Railway, 2 miles north of Rotherham and 12 south-west of Doncaster. It possesses extensive iron-works and steel rolling-mills, and there are collieries in the neighbourhood. The church of St Lawrence was rebuilt in 1839 with the exception of the old Norman tower. There are several almshouses and other charities. At the time of the Conquest the manor was granted to Walter d'Eincourt, and in the 12th century it was divided among the three daughters of his subinfeudatory Paganus, who is supposed to have been the founder of the church. The population of the urban sanitary district (area, 2578 acres) in 1871 was 6869, and in 1881 it was 10,179.

RAWTENSTALL, a town of east Lancashire, is situated on the Lancashire and Yorkshire Railway, 8 miles north of Bury and 12 south-east of Blackburn. At the beginning of the century it contained only a few houses, but since the rise of the manufacturing industry it has steadily increased, till it is now a considerable town. The cotton and woollen mills are very extensive, and in the neighbourhood there are stone quarries. The church of St Mary, in the Gothic style, erected in 1837, has lately been restored; and several of the denominational chapels are large and handsome buildings. The town has also good schools. There is a public cemetery, 15 acres in extent. Near the town is the Haslingden Union workhouse, erected in 1869. The population of the urban sanitary district (area, 1667 acres) in 1871 was estimated at 11,307, and in 1881 it was 12,571. Now (1885) by the incorporation of Newchurch, Goodshaw, and Crawshaw Booth the population is over 30,000

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[1] Ráwal Pindí division comprises the four districts of Ráwal Pindí, Jhelum, Gujrát, and Sháhpur, with a total area of 15,435 square miles and a total population (1881) of 2,520,508 (males 1,346.573, females 1,173,935).

RAY. The Rays (*Batoidei*) together with the Sharks (*Selachoidei*) form the suborder *Plagiostomata* of Cartilaginous fishes, and are divided into six families, as already noticed in ICHTHYOLOGY, vol. xii. pp. 685, 686.

The first family contains only the Saw-fishes (*Pristis*), of which five species are known, from tropical and subtropical seas. Although saw-fishes possess all the essential characteristics of the rays proper, they retain the elongate form of the body of sharks, the tail being excessively muscular and the sole organ of locomotion. The "saw" (fig. 1) is a flat and enormously developed prolongation of the snout, with an endoskeleton which consists of from three to five cartilaginous tubes; these are, in fact, merely the rostral processes of the cranial cartilage and are found in all rays, though they are commonly much shorter. The integument of the saw is hard, covered with shagreen; and a series of strong teeth, sharp in front, and flat behind, are embedded in it, in alveolar sockets, on each side. The saw is a most formidable weapon of offence, by means of which the fish tears pieces of flesh off the body of its victim, or rips open its abdomen to feed on the protruding intestines. The teeth proper, with which the mouth is armed, are extremely small and obtuse, and unsuitable for inflicting wounds or seizing animals. Saw-fishes are abundant in the tropics; in their stomach pieces of intestines and fragments of cuttle-fish have been found. They grow to a large size, specimens with saws 6 feet long and 1 foot broad at the base being of common occurrence.

The rays of the second family, *Rhinobatidæ*, bear a strong resemblance to the saw-fishes, but lack the saw. Their teeth are consequently more developed, flat, obtuse, and adapted for crushing hard-shelled marine animals. There are about sixteen species, from tropical seas.

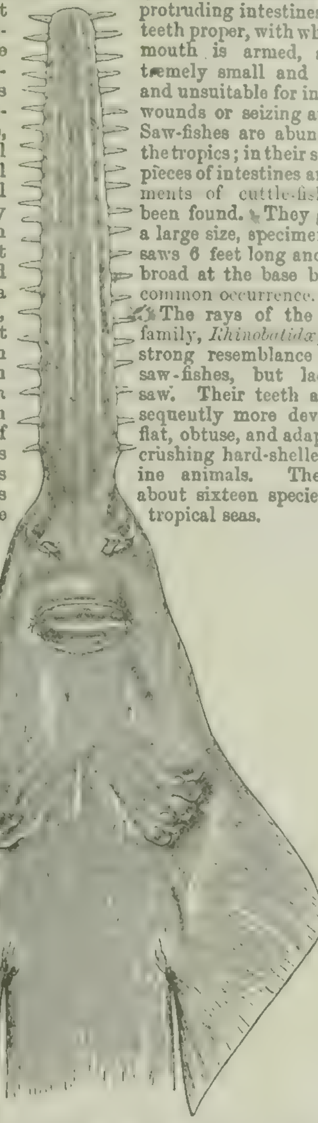

FIG. 1.—*Pristis perrotteti.*

The third family, *Torpedinidæ*, includes the Electric Rays. The peculiar organ (fig. 2) by which the electricity is produced has been described in vol. xii. p. 650. The fish uses this power voluntarily either to defend itself or to stun or kill the smaller animals on which it feeds. To receive the shock the object must complete the galvanic circuit by communicating with the fish at two distinct points, either directly or through the medium of some conducting body. The electric currents created in these fishes exercise all the other known powers of electricity: they render the needle magnetic, decompose chemical compounds, and emit the spark. The dorsal surface of the electric organ is positive, the ventral negative. Shocks accidentally given to persons are severely felt, and, if proceeding from a large healthy fish, will temporarily paralyse the arms of a strong man. The species of the genus *Torpedo*, six or seven in number, are distributed over the coasts of the Atlantic and Indian Ocean, and two reach northwards to the coasts of Great Britain (*T. marmorata* and *T. hebetans*). They are said to attain to a weight of from 80 to 100 lb, but fortunately such gigantic specimens are scarce, and prefer sandy ground at some distance from the shore, where they are not disturbed by the violent agitation of the surface-water. Other genera, comprising species of smaller size, inhabit different parts of the tropical and subtropical seas. All the rays of this family have, like electric fishes generally, a smooth and naked body.

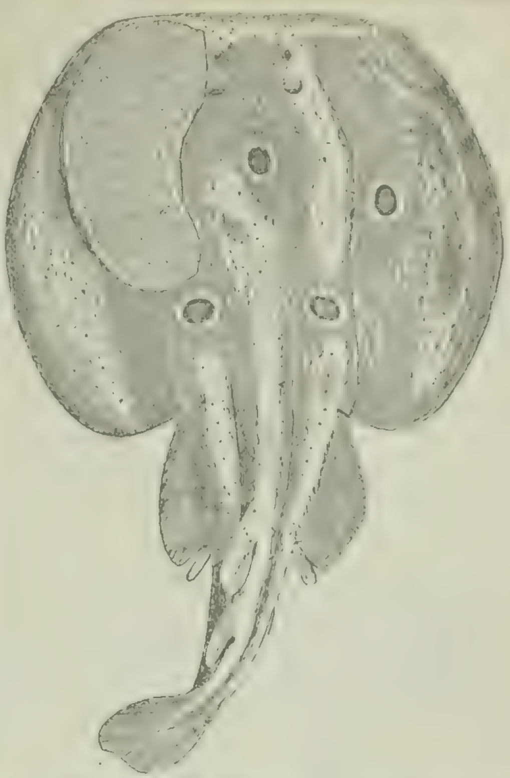

FIG. 2.—*Torpedo narce* (Mediterranean). A portion of the skin on the left side has been removed to show the electric organ.

The fourth family, *Raiidæ*, comprises the Skates and Rays proper, or *Raia*. More than thirty species are known, chiefly from the temperate seas of both hemispheres, but much more numerously from the northern than the southern. A few species descend to a depth of nearly 600 fathoms, without, however, essentially differing from their surface congeners. Rays, as is sufficiently indicated by the shape of their body, are bottom-fishes, living on flat sandy ground, generally at no great distance from the coast or the surface. They lead a sedentary life, progressing, like the flat-fishes, by an undulatory motion of the greatly extended pectoral fins, the thin slender tail having entirely lost the function of an organ of locomotion, and acting merely as a rudder. They are carnivorous and feed exclusively on molluscs, crustaceans, and fishes. Some of the species possess a much larger and more pointed snout than the others, and are popularly distinguished as "skates." The following are known as inhabitants of the British seas:—(*a*) Short-snouted species: (1) the Thornback (*R. clavata*), (2) the Homelyn Ray (*R. maculata*), (3) the Starry Ray (*R. radiata*), (4) the Sandy Ray (*R. circularis*); (*b*) Long-snouted species, or Skates: (5) the Common Skate (*R. batis*), (6) the Flapper Skate (*R. macrorhynchus*), (7) the Burton Skate (*R. marginata*), (8) and (9) the Shagreen Skates (*R. vomer* and *R. fullonica*). A deep-sea species (*R. hyperborea*) has recently been discovered near the Faroe Islands at 600 fathoms. Most of the skates and rays are eaten, except during the breeding season; and even the young of the former are esteemed as food. The skates attain to a much larger size than the rays, viz., to a width of 6 feet and a weight of 400 and 500 lb.

The members of the fifth family, *Trygonidæ* or Sting-rays, are distinguished from the rays proper by having the vertical fins replaced by a strong spine attached to the upper side of the tail. Some forty species are known, which inhabit tropical more than temperate seas. The spine is barbed on the sides and is a most effective weapon of defence; by lashing the tail in every direction the sting-rays can inflict dangerous or at least extremely painful wounds. The danger arises from the lacerated nature of the wound as well as from the poisonous property of the mucus inoculated. Generally only one or two spines are developed. Sting-rays attain to about the same size as the skates and are eaten on the coasts of the Mediterranean and elsewhere. One species (*Trygon pastinaca*) is not rarely found in the North Atlantic and extends northwards to the coasts of Ireland, England, and Norway

The rays of the sixth and last family, *Myliobatidæ*, are popularly known under various names, such as "Devil-fishes," "Sea-devils," and "Eagle-rays." In them the dilatation of the body, or rather the development of the pectoral fins, is carried to an extreme, whilst the tail is very thin and sometimes long like a whip-cord (fig. 3). Caudal spines are generally present and similar to those of the sting-rays; but in the pectoral fin a portion is detached and forms a "cephalic" lobe or pair of lobes in front of the snout. The dentition consists of perfectly flat molars, adapted for crushing hard substances. In some of the eagle-rays the molars are large and tessellated (fig. 4), in others extremely small. Of the twenty species which are known, from tropical and temperate seas, the majority attain to a very large and some to an enormous size: one mentioned by Risso, which was taken at Messina, weighed 1250 lb. A fœtus taken from the uterus of the mother (all eagle-rays are viviparous), captured at Jamaica and preserved in the British Museum, is 5 feet broad and weighed 20 lb. The mother measured 15 feet in width and as many in length, and was between 3 and 4 feet thick. At Jamaica, where these rays are well known under the name of "devil-fishes," they are frequently attacked for sport's sake, but their capture is uncertain and sometimes attended with danger. The eagle-ray of the Mediterranean (*Myliobatis aquila*) has strayed as far northwards as the south coast of England. (A. C. G.)

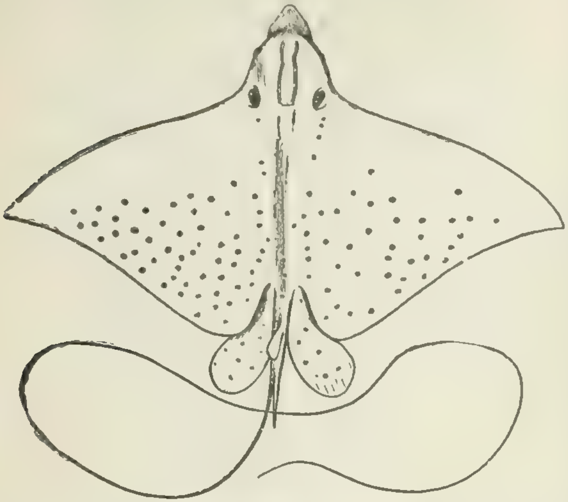

Fig. 3.—*Aetobatis narinari* (Indo-Pacific Ocean).

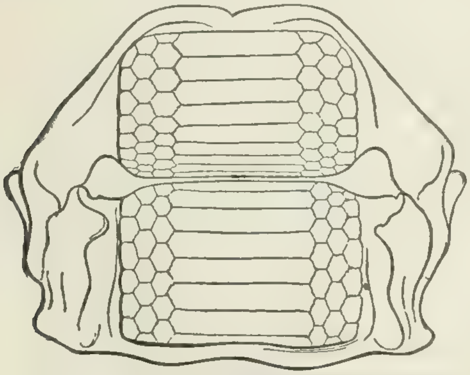

Fig. 4.—Jaws of an Eagle-Ray, *Myliobatis aquila*.

RAY or **Wray** (as he wrote his name till 1670), **John** (1628-1705), sometimes called the father of English natural history, was the son of the blacksmith of Black Notley near Braintree in Essex. There he was born on 29th November 1628, or, according to other authorities, some months earlier. From Braintree school he was sent at the age of sixteen to Catherine Hall, Cambridge, whence he removed to Trinity College after about one year and three-quarters. His tutor at Trinity was Dr Duport, regius professor of Greek, and his intimate friend and fellow-pupil the celebrated Isaac Barrow. Ray was chosen minor fellow of Trinity in 1649, and in due course became a major fellow on proceeding to the master's degree. He held many college offices, becoming successively lecturer in Greek (1651), mathematics (1653), and humanity (1655), prælector (1657), junior dean (1657), and college steward (1659 and 1660); and according to the habit of the time he was accustomed to preach in his college chapel and also at Great St Mary's before the university, long before he took holy orders. Among his sermons preached before his ordination, which was not till 23d December 1660, were the famous discourses on *The Wisdom of God in the Creation*, and on the *Chaos, Deluge, and Dissolution of the World.* Ray's reputation was high also as a tutor; he communicated his own passion for natural history to several pupils, of whom Francis Willughby is by far the most famous.

Ray's quiet college life came to an abrupt close when he found himself unable to subscribe to the Act of Uniformity of 1661, and was accordingly obliged to give up his fellowship in 1662, the year after Isaac Newton had entered the college. We are told by Dr Derham in his *Life* of Ray that the reason of his refusal "was not (as some have imagined) his having taken the 'Solemn League and Covenant,' for that he never did, and often declared that he ever thought it an unlawful oath; but he said he could not declare for those that had taken the oath that no obligation lay upon them, but feared there might." From this time onwards he seems to have depended chiefly on the bounty of his pupil Willughby, who made Ray his constant companion while he lived, and at his death left him £60 a year, with the charge of educating his two sons.

In the spring of 1663 Ray started together with Willughby and two other of his pupils on a Continental tour, from which he returned in March 1666, parting from Willughby at Montpellier, whence the latter continued his journey into Spain. He had previously in three different journeys (1658, 1661, 1662) travelled through the greater part of Great Britain, and selections from his private notes of these journeys were edited by George Scott in 1760, under the title of *Mr Ray's Itineraries.* Ray himself published an account of his foreign travel in 1673, entitled *Observations topographical, moral, and physiological, made on a Journey through part of the Low Countries, Germany, Italy, and France.* From this tour Ray and Willughby returned laden with collections, on which they meant to base complete systematic descriptions of the animal and vegetable kingdoms. Willughby undertook the former part, but, dying in 1672, left only an ornithology and ichthyology, in themselves vast, for Ray to edit; while the latter used the botanical collections for the groundwork of his *Methodus plantarum nova* (1682), and his great *Historia generalis plantarum* (1685). The plants gathered on his British tours had already been described in his *Catalogus plantarum Angliæ* (1670), which work is the basis of all later English floras.

In 1667 Ray was elected a fellow of the Royal Society, and in 1669 he published in conjunction with Willughby his first paper in the *Philosophical Transactions* on "Experiments concerning the Motion of Sap in Trees." They demonstrated the ascent of the sap through the wood of the tree, and supposed the sap to "precipitate a kind of white coagulum or jelly, which may be well conceived to be the part which every year between bark and tree turns to wood, and of which the leaves and fruits are made." Immediately after his admission into the Royal Society he was induced by Bishop Wilkins to translate his *Real Character* into Latin, and it seems he actually completed a translation, which, however, remained in manuscript; his *Methodus plantarum nova* was in fact undertaken as a part of Wilkins's great classificatory scheme.

In 1673 Ray married Margaret Oakley of Launton (Oxford); in 1676 he went to Sutton Coldfield, and in 1677 to Falborne Hall in Essex. Finally, in 1679, he removed to Black Notley, where he afterwards remained. His life there was quiet and uneventful, but embittered by bodily weakness and chronic sores. He occupied himself in writing books and in keeping up a very wide scientific correspondence, and lived, in spite of his infirmities, to the age of seventy-six, dying on 17th January 1705.

Ray's first book, the *Catalogus plantarum circa Cantabrigiam nascentium* (1660, followed by appendices in 1663 and 1685), was written in conjunction with his "amicissimus et individuus comes," John Nid. The plants, 626 in number, are enumerated alphabetically, but a system of classification differing little from Caspar Bauhin's is sketched at the end of the book; and the notes contain many curious references to other parts of natural history. The stations of the plants are minutely described; and Cambridge students still gather some of their rarer plants in the copses or chalk-pits where he found them. The book shows signs of his indebtedness to Joachim Jung of Hamburg, who had died in 1657 leaving his writings unpublished; but a MS. copy of some of them was sent to Ray by Hartlieb in 1660. Jung invented or gave precision to many technical terms that Ray and others at once made use of in their descriptions, and that are now classical; and his notions of what constitutes a specific distinction and what characters are valueless as such seem to have been adopted with little change by Ray. The first two editions of the *Catalogus plantarum Angliæ* (1670, 1677) were likewise arranged alphabetically; but in the *Synopsis stirpium Britannicarum* (1690, 1696, also re-edited by Dillenius 1724, and by Hill 1760) Ray applied the scheme of classification which he had by that time elaborated in the *Methodus* and the *Historia plantarum*. The *Methodus plantarum nova* (1682) was largely based on the works of Cæsalpini and Jung, and still more on that of Morison of Oxford. The greatest merit of this book is the use of the number of cotyledons as a basis of classification; though it must be remembered that the difference between the monocotyledonous and dicotyledonous embryo was detected by Grew. After dividing plants into flowerless and flowering, Ray says, "Floriferas dividemus in Dicotyledones, quarum semina sata binis foliis anomalis, seminalibus dictis, quæ cotyledonorum usum præstant, e terra exeunt, vel in binos saltem lobos dividuntur, quamvis eos supra terram foliorum specie non efferunt; et Monocotyledones, quæ nec folia bina seminalia efferunt nec lobos binos condunt. Hæc divisio ad arbores etiam extendi potest; siquidem Palmæ et congeneres hoc respectu eodem modo a reliquis arboribus differunt quo Monocotyledones a reliquis herbis." But a serious blemish was his persistent separation of trees from herbs, a distinction whose falsity had been exposed by Jung and others, but to which Ray tried to give scientific foundation by denying the existence of buds in the latter. At this time he based his classification, like Cæsalpini, chiefly upon the fruit, and he distinguished several natural groups, such as the grasses, *Labiatæ*, *Umbelliferæ*, and *Papilionaceæ*. The classification of the *Methodus* was extended and improved in the *Historia plantarum*, but was disfigured by a large class of *Anomalæ*, to include forms that the other orders did not easily admit, and by the separation of the cereals from other grasses. The first volume of this vast book was published in 1685, the second in the next year, and the third in 1704; it enumerates and describes all the plants known to the author or described by his predecessors, to the number, according to Adanson, of 18,625 species. In the first volume a chapter "De plantis in genere" contains an account of all the anatomical and physiological knowledge of the time regarding plants, with the recent speculations and discoveries of Cæsalpini, Grew, Malpighi, and Jung. And Cuvier and Dupetit Thouars, declaring that it was this chapter which gave acceptance and authority to these authors' works, say that "the best monument that could be erected to the memory of Ray would be the republication of this part of his work separately." The *Stirpium Europæarum extra Britannias nascentium Sylloge* (1694) is a much amplified edition of the catalogue of plants collected on his own Continental tour. In the preface to this book he first clearly admitted the doctrine of the sexuality of plants, which, however, he had no share in establishing. Here also begins his long controversy with Rivinus, which chiefly turned upon Ray's indefensible separation of ligneous from herbaceous plants, and also upon what he conceived to be the misleading reliance that Rivinus placed on the characters of the corolla. But in the second edition of his *Methodus* (1703) he followed Rivinus and Tournefort in taking the flower instead of the fruit as his basis of classification: he was no longer a fructicist but a corollist.

Besides editing his friend Willughby's books, Ray wrote several zoological works of his own, including *Synopses of Quadrupeds* (1693), that is to say, both mammals and reptiles, of *Birds*, and of *Fishes* (1713); the last two were published posthumously, as was also the more important *Historia Insectorum* (1710). The *History of Insects* embodied a great mass of Willughby's notes, and the *Synopses of Birds and Fishes* were mere abridgments of the "Ornithology" and "Ichthyology."

Most of Ray's minor works were the outcome of his faculty for laborious compiling and cataloguing; for instance, his *Collection of English Proverbs* (1670), his *Collection of out-of-the-way English Words* (1674), his *Collection of Curious Travels and Voyages* (1693), and his *Dictionariolum trilingue, or Nomenclator classicus* (1675). The last was written for the use of Willughby's sons, his pupils; it passed through many editions, and is still useful for its careful identifications of plants and animals mentioned by Greek and Latin writers. But Ray's permanent influence and reputation have probably depended most of all upon his two books entitled *The Wisdom of God manifested in the Works of the Creation* (1691), and *Miscellaneous Discourses concerning the Dissolution and Changes of the World* (1692). The latter includes three essays, on "The Primitive Chaos and Creation of the World," "The General Deluge, its Causes and Effects," and "The Dissolution of the World and Future Conflagrations." The germ of these works was contained in sermons preached long before in Cambridge. Both books obtained immediate popularity; the former, at least, was translated into several languages; and to this day their influence is apparent. For, as Sir J. Smith says in his biography of Ray, "this book [*The Wisdom of God*, &c.] is the basis of all the labours of following divines, who have made the book of nature a commentary on the Book of Revelation." In it Ray recites innumerable examples of the perfection of organic mechanism, the multitude and variety of living creatures, the minuteness and usefulness of their parts. Many, if not most, of the familiar proofs of purposive adaptation and design in nature were suggested by Ray. The structure of the eye, the hollowness of the bones, the camel's stomach, the hedgehog's armour, are among the thousand instances cited by him of immediate creative interpositions. But, though his application of natural history to apologetic theology has made his reputation peculiarly wide, it must be acknowledged that none of his scientific discoveries at all equal in value those of the physiological botanists who immediately preceded him, and that even in classificatory insight he was surpassed by several of his contemporaries.

Authorities.—Select Remains, Itineraries, and Life, by Dr Derham, edited by George Scott, 1740; notice by Sir J. E. Smith in Ree's *Cyclopædia*; notice by Cuvier and A. Dupetit Thouars in the *Biographie Universelle*; all these were collected under the title *Memorials of Ray*, and edited (with the addition of a complete catalogue of his works) by Dr Edwin Lankester, 8vo (Ray Society), 1846; *Correspondence* (with Willughby, Martin Lister, Dr Robinson, Petiver, Derham, Sir Hans Sloane, and others), edited by Dr Derham, 1718; *Selections*, with additions, edited by Lankester Ray Society), 1848. For accounts of Ray's system of classification see Cuvier, *Leçons Hist. s. Sci. Nat.*, p. 488; Sprengel, *Gesch. d. Botanik*, ii. p. 40; also Whewell, *Hist. Ind. Sci.*, iii. p. 332 (ed. 1847), and Wood, art. "Classification" in Ree's *Cyclopædia*. (D. W. T)

RAYMOND LULLY. See LULLY.

RAYMOND OF SABUNDE (Sebonde, Sebeyde, &c.) appears to have been born at Barcelona towards the end of the 14th century. He combined the training of a physician and a theologian, and was professor of theology at Toulouse, seemingly from the year 1430 onwards. He published there in 1436 his chief work, *Theologia Naturalis, sive liber creaturarum*. This book was reprinted pretty frequently during the next two centuries, and has recently been republished at Sulzbach (1852), but without the introduction, which, for some not very intelligible reason, was placed upon the *Index* by the council of Trent. It was translated into French by Montaigne at the command of his father (see Montaigne, *Essais*, ii. 12). The six *Dialogi de natura hominis* are an extract from the larger work made by Raymond himself. Raymond is a scholastic of the period of decline. The chief thought of the *Theologia Naturalis* is the parallelism between the book of nature and the book of revelation. The second of these two books is more sacred on account of its supernatural character, but a foundation must be laid by the study of the first. Nature culminates in man, who alone of the creatures possesses all the four properties which mark off the different grades of existence (*esse, vivere, sentire, intelligere*). But man himself points forward to a self-existent unity in which individual differences disappear. Everything that we find in the creatures is present in God without limitation or negation, so that God's being is the universal being of all things. Hence it is true that God created the world out of nothing. Raymond endeavours to deduce the principal dogmas of the church by the natural light in a similar fashion. Man's own advantage and the glory of God are the ultimate rules of conduct, and the coincidence of the two is maintained on the ground of the joys of knowledge. Knowledge has its natural consummation in the knowledge of God; man's knowledge of God is at the same time the love and gratitude which he, as representative of the creatures and mediator between them and God, continually offers to the divine majesty. The fact that self-love and the love of God are at present often in conflict is traced by Raymond to the fall of the first human pair; and this gives him occasion to deduce the doctrine of the incarnation, almost in the words of Anselm's *Cur Deus homo*.

RAYNAL, Guillaume Thomas François (1713-1796), was born on 12th April 1713 in the province of Rouergue, and was educated at Pézenas by the Jesuits. He took orders, and, going to Paris, did parish work; but he left the priesthood (being indeed deprived for misconduct) and betaking himself to literature soon became one of the minor members of the *philosophe* coterie. He did not a little journalism and bookmaking of divers kinds; but his name would be entirely forgotten were it not for the *Histoire philosophique et politique des Établissements et du Commerce des Européens dans les Deux Indes.* This book is not, and indeed was not in its own day, of any substantive value as a book of reference on its nominal subject; but it exercised considerable influence: it was exceedingly characteristic of the period and society which produced it, and passages of it are still worth reading. The secret of its merits and its faults is to be found in the manner of its composition. Raynal himself wrote but a small part of it, and he took not the slightest pains to make it a homogeneous work. But he borrowed from books and he begged from his own friends all manner of diatribes against superstition and tyranny, often illustrated by lively anecdotes and eloquent tirades. Grimm assigns a full third of the book to Diderot, which is probably an exaggeration, but that Diderot had a great hand in it no judge of style can doubt. It was published in 1772, and brought the author many compliments, even from men like Gibbon, who should have known better. A new edition in 1780 was even bolder. It was condemned and burned (29th May 1781), and tho author had to fly the country. He returned just before the Revolution, but having apparently a natural tendency to opposition he became a strong Royalist. He died on 6th March 1796.

No other work of Raynal's deserves notice here. The best account in English of the *Histoire des Indes* will be found in Mr John Morley's *Diderot*, vol. ii. chap. xv.

RAZORBILL or Razor-billed Auk, known also on many parts of the British coasts as the Marrot, Murre, Scout, Tinker, or Willock—names which it, however, shares with the Guillemot (vol. xi. p. 262), and to some extent with the Puffin (see above, p. 101)—a common sea-bird of the Northern Atlantic,[1] resorting in vast numbers to certain stations on rocky cliffs for the purpose of breeding, and, its object being accomplished, returning to deeper waters for the rest of the year. It is the *Alca torda* of Linnæus[2] and most modern authors, congeneric with the Gare-fowl (vol. x. p. 78), if not with the true Guillemots, between which two forms it is intermediate—differing from the former in its small size and retaining the power of flight, which that presumably extinct species has lost, and from the latter in its peculiarly-shaped bill, which is vertically enlarged, compressed, and deeply furrowed, as well as in its elongated, wedge-shaped tail. A fine white line, running on each side from the base of the culmen to the eye, is in the adult bird in breeding-apparel (with a few very rare exceptions) a further obvious characteristic. Otherwise the appearance of all these birds may be briefly described in the same words—head, breast, and upper parts generally of a deep glossy black, and the lower parts and tip of the secondaries of a pure white, while the various changes of plumage dependent on age or season are alike in all. In habits the Razorbill closely agrees with the true Guillemots, laying its single egg (which is not, however, subject to the same amazing variety of coloration that is pre-eminently the Guillemot's own) on the ledges of the cliffs to which it repairs in the breeding-season, but it is said then as a rule to occupy higher elevations, and when not breeding to keep further out to sea. On the east side of the Atlantic the Razorbill has its stations on convenient parts of the coast from the North Cape to Britanny, besides several in the Baltic, while in winter it passes much further to the southward, and is sometimes numerous in the Bay of Gibraltar, occasionally entering the Mediterranean but apparently never extending to the eastward of Sicily or Malta. On the west side of the Atlantic it breeds from 70° N. lat. on the eastern shore of Baffin's Bay to Cape Farewell, and again on the coast of America from Labrador and Newfoundland to the Bay of Fundy, while in winter it reaches Long Island. (A. N.)

RAZZI, Gianantonio. See Soddoma.

RÉ, Isle of, a long, low island 3 miles off the coast of the French department of Charente Inférieure, runs south-east and north-west with a breadth of about 3 miles and a length of 18½ miles. The north-west point (Pointe des Baleines) has a lighthouse of the first class. The Pertuis Breton separates the island from the coast of La Vendée to the north, and the Pertuis d'Antioche from the Isle of Oléron to the south. With a surface of 18,259 acres, the Isle of Ré has 15,370 inhabitants, whose chief source of income is the salt marshes, producing annually 31,500 tons of salt. The island has also a vineyard and corn lands, and boasts of the excellence of its figs, pears, and cream. Apart from the orchards it is now woodless, though once covered with forests. Oysters are successfully cultivated, the annual supply of these molluscs being 35,000,000. The coast facing the Atlantic is rocky and inhospitable, but there are numerous harbours on the landward side. The island seems once to have been united to the continent, with which it is still connected by a line of sunken rocks; its existence is not mentioned before the 8th century. Tradition says that the city of Antioche on the west coast was destroyed by the Atlantic storms, which still constantly threaten to cut the island in two at the isthmus (only 230 feet wide) formed by the gulf called Fier d'Ars. There are two cantons—St Martin and Ars-en-Ré—in the arrondissement of La Rochelle. St Martin, with a secure harbour, was fortified by Vauban, and is the depôt for convicts on their way to New Caledonia.

READE, Charles (1814-1884), holds a high and distinctive place among the English novelists of the third quarter of the 19th century. The son of an Oxfordshire squire, he was born at Ipsden in 1814, and was educated for the bar. He entered Magdalen College, Oxford, proceeded B.A. in 1835, with a third class in classics, was elected Vinerian Reader in 1842, and was called to the bar (Lincoln's Inn) in 1843. It was comparatively late in his life that he made his first appearance as an author, but he showed at once that he had subjected himself to a laborious apprenticeship to the study of life and literature.

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[1] Schlegel (*Mus. des Pays-Bas, Urinatores*, p. 14) records an example from Japan; but this must be in error.

[2] The word *Alca* is simply the Latinized form of this bird's common Teutonic name, *Alk*, of which Auk is the English modification. It must therefore be held to be the type of the Linnæan genus *Alca*, though some systematists on indefensible grounds have removed it thence, making it the sole member of a genus named by Leach, after Aldrovandus (*Ornithologia*, bk. xix. chap. xlix.), *Utamania*—an extraordinary word, that seems to have originated in some mistake from the no less extraordinary *Vuttamaria*, given by Belon (*Observations*, i. c. xi.) as the Cretan name of some diving bird, which certainly could not have been the present species.

He began as a dramatist, and this his first ambition shaped and coloured his work to the end. It was his own wish that the word "dramatist" should stand first in the description of his occupations on his tombstone. He was dramatist first and novelist afterwards, not merely chronologically but in his aims as an author, always having an eye to stage-effect in scene and situation as well as in dialogue. *Gold*, his first play (1850), was but a moderate success. He did not achieve popularity till 1856, when he produced *It's Never Too Late to Mend*, a novel written with the purpose of reforming abuses in prison discipline and the treatment of criminals. The prosecution of his moral purpose carried him too far for most of his readers; he described prison life with a minuteness and fidelity—the result of laborious studies of blue-books and newspapers and personal inquiries—which become at times tedious and revolting; but the power of the descriptions was undeniable, and the interest of the story, in spite of all over-elaboration of painful details, was profound and thrilling. The truth of some of his details was challenged, and the novelist showed himself a pungent controversialist. From first to last he defended himself with vigour and great strength of language against all attempts to rebut his contentions or damage his literary property. *It's Never Too Late to Mend* was his first great success, but before this he had gained the respect of critics with two shorter novels, *Peg Woffington* (1852), a close study of life and character behind the scenes, and *Christie Johnstone* (1853), an equally close study of Scotch fisher folk, an extraordinary *tour de force* for the son of an English squire, whether we consider the dialect or the skill with which he enters into alien habits of thought. He had also established his position as a dramatist by writing (in combination with Mr Tom Taylor) a stage version of *Peg Woffington* under the title of *Masks and Faces* (1854), the most successful and the most frequently reproduced of his plays, besides three that were less successful, *The Courier of Lyons* (a powerful melodrama), *Two Loves and a Life*, and *The King's Rivals* (1854). From 1856 onwards he kept his position in the foremost rank of contemporary novelists. Five minor novels followed in quick succession,—*The Course of True Love never did Run Smooth* (1857), *Jack of all Trades* (1858), *The Autobiography of a Thief* (1858), *Love Me Little, Love Me Long* (1859), *The Double Marriage, or White Lies* (1860). Then appeared, in 1861, what most critics regard as his masterpiece, *The Cloister and the Hearth*. He had dealt with the subject two years before in a short story in *Once a Week*, but, seeing its capabilities, he returned to it and expanded it into its present form. As a picture of manners it is broad and full; yet amply as the novelist illustrates the times he very rarely becomes tedious or allows the thrilling interest of the story to lapse. Returning from the 15th century to modern English life, he next produced another startling novel with a purpose, *Hard Cash* (1863), in which he strove to direct attention to the abuses of private lunatic asylums. Three more such novels, in two of which at least the moral purpose, though fully kept in view, was not allowed to obstruct the rapid flow of thrilling incident, were afterwards undertaken,—*Foul Play* (1869), in which he exposed the iniquities of ship-knackers, and paved the way for the labours of Mr Plimsoll; *Put Yourself in his Place* (1870), in which he grappled with the tyrannous outrages of trades-unions; and *A Woman-Hater* (1877), in which he gave a helping hand to the advocates of woman's rights. The *Wandering Heir* (1875), of which he also wrote a version for the stage, was suggested by the Tichborne trial. Outside the line of these moral and occasional works Reade produced three that might be classified as psychological, inasmuch as they were elaborate studies of character,—*Griffith Gaunt* (1866), *A Terrible Temptation* (1871), *A Simpleton* (1873). The first of these was in his own opinion the best of his novels, and his own opinion was probably right. He was wrong, however, in his own conception of his powers as a dramatist. At intervals throughout his literary career he sought to gratify his dramatic ambition, hiring a theatre and engaging a company for the representation of his own plays. An example of his persistency was seen in the case of *Foul Play*. He wrote this in 1869 in combination with Mr Dion Boucicault with a view to stage adaptation. The play was more or less a failure; but he produced another version alone in 1877, under the title of *A Scuttled Ship*, and the failure was pronounced. His greatest success as a dramatist attended his last attempt—*Drink*—an adaptation of Zola's *L'Assommoir*, produced in 1879. At his death in 1884 (11th April) Reade left behind him a completed novel, *A Perilous Secret*, which showed no falling off in the art of weaving a complicated plot and devising thrilling situations.

It was characteristic of Reade's open and combative nature that he admitted the public freely to the secrets of his method of composition. He spoke about his method in his prefaces; he introduced himself into one of his novels—"Dr Rolfe" in *A Terrible Temptation*; and by his will he left his workshop and his accumulation of materials open for inspection for two years after his death. It appears that he had collected an enormous mass of materials for his study of human nature, from personal observation, from newspapers, books of travel, blue-books of commissions of inquiry, from miscellaneous reading. This vast collection of notes, cuttings, extracts, gathered together week by week and year by year, is classified and arranged in huge ledgers and note-books duly paged and indexed. He had planned a great work on "the wisdom and folly of nations," dealing with social, political, and domestic details, and it was chiefly for this that his collection was destined, but in passing he found the materials very useful as a store of incidents and suggestions. A collector of the kind was bound to be systematic, otherwise his collection would have fallen into inextricable confusion, and Reade's collection contains many remarkable curiosities in classification and tabulation. On the value of this method for his art there has been much discussion, the prevalent opinion being that his imagination was overwhelmed and stifled by it. He himself strenuously maintained the contrary; and it must be admitted that *a priori* critics have not rightly understood the use that he made of his laboriously collected facts. He did not merely shovel the contents of his note-books into his novels; they served rather as an atmosphere of reality in which he worked, so that his novels were like pictures painted in the open air. His imagination worked freely among them and was quickened rather than impeded by their suggestions of things suited to the purpose in hand; and it is probably to his close and constant contact with facts, acting on an imagination naturally fertile, that we owe his marvellous and unmatchable abundance of incident. Even in his novels of character there is no meditative and analytic stagnation; the development of character is shown through a rapid unceasing progression of significant facts. This rapidity of movement was perhaps partly the result of his dramatic studies; it was probably in writing for the stage that he learned the value of keeping the attention of his readers incessantly on the alert. The hankering after stage effect, while it saved him from dulness, often betrayed him into rough exaggeration, especially in his comic scenes. But the gravest defect in his work is a defect of temper. His view of human life, especially of the life of women, is harsh, almost brutal; his knowledge of frailties and vices is obtruded with repellent force; and he cannot, with all his skill and power as a story-teller, be numbered among the great artists who warm the heart and help to improve the conduct. But as a moral satirist and castigator, which was the function he professed over and above that of a story-teller, he undoubtedly did good service, both indirectly in his novels and directly in his own name. (W. M.)

READING, a market-town and ancient borough of Berkshire, is pleasantly situated on slightly elevated ground on the banks of the Kennet, a short distance above its junction with the Thames, and on branches of the Great Western, South-Eastern, and South-Western Railways, 28 miles south-south-east of Oxford and 35½ west of London by rail. Besides the facilities on the Thames there is water communication by the Kennet to Newbury, and by the Kennet and Avon Canal to the Severn. The Thames is crossed by one bridge and the Kennet by three. The town is well built, with wide and regular streets and many good villas in the suburbs. Of the magnificent Benedictine abbey founded in 1121 by King Henry I., originally one of the three wealthiest in England, all that now remains is a mass of ruins (with the exception of the gateway, which was restored in 1861 and is now carefully preserved), a portion of the great hall (in which several parliaments have been held), and the foundation of the Norman apsidal chapel. Henry I., who died at Rouen, was buried within its precincts; but his monument was destroyed in the time of Edward VI.; and John of Gaunt was married there to Blanche of Lancaster in 1359. By Henry VIII. it was converted into a palace, which formed the occasional residence of subsequent sovereigns until its destruction during the Cromwellian wars. Of other old ecclesiastical buildings of special interest the principal are Greyfriars' church, completed about 1311, formerly the church of Greyfriars' monastery, but after the dissolution used successively as a town-hall, a workhouse, and a jail, until it was restored to its original use in 1864; St Mary's church, rebuilt, according to Camden, in 1551 from the ruins of a nunnery founded by Elfrida to expiate the murder of her stepson (Edward the Martyr); the church of St Lawrence, originally Norman, but rebuilt in the 15th century in the Early English style, containing some interesting brasses; and the church of St Giles, of mixed architecture, which was severely damaged during the Cromwellian wars. At the free grammar-school, founded in 1445, Archbishop Laud received his education, and he afterwards became a generous benefactor to it. The school was removed in 1871 to new buildings surrounded by 12 acres of ground. Other educational foundations are the Kendrick schools (1624), the blue-coat school (1656), and the green-coat school for girls (1779). The various almshouses were consolidated into one building in 1865. Among the modern structures are the municipal buildings (in the Renaissance style, erected in 1875 and enlarged in 1882, containing a large concert-room, a free library, schools for science and art, and a museum), the corn exchange, the assize courts, the athenæum, the royal Albert hall, the masonic hall, the workhouse, and the royal Berkshire hospital. The town has a large trade in corn and agricultural produce; and, in addition to an extensive biscuit manufactory which employs over 3000 hands, it possesses iron-works, iron-foundries, engine-works, and breweries. Adjoining the town are extensive seed nurseries covering about 10,000 acres. The population of the borough (area, 2186 acres) in 1871 was 32,324, and in 1881 it was 42,054.

The origin of the town is doubtful; but Reading must have been a place of some importance when the Danes in 871 brought their war-ships up the Thames as far as the Kennet and made the town for some time their headquarters. It was burned by Sweyn in 1006. In *Domesday* the name occurs as Radynges. A new and strong castle was erected here by Stephen, which was destroyed by Henry II. In 1209 the professors and students of Oxford made a temporary retreat to Reading, owing to a quarrel with King John. From the 13th to the 16th century parliaments were frequently held in the town, and in the Michaelmas term of 1625 the law courts were transferred to it on account of the prevalence of the plague in London. In 1643 it surrendered to the Parliamentary forces under the earl of Essex, and subsequently was more than once occupied by the rival armies. It is a borough by prescription and received charters and grants from Henry III. and subsequent sovereigns. It has returned members to parliament from the 23d of Edward I.; the number was reduced from two to one in 1885. By the Municipal Act of 1836 it was divided into three wards governed by a mayor, six aldermen, and eighteen councillors.

READING, a city of the United States, capital of Berks county, Pennsylvania, on the east bank of the Schuylkill river, and on the Schuylkill and Union Canals, 58 miles north-west of Philadelphia at the intersection of some fourteen railway lines, representing eight different companies. It occupies an elevated and healthy position on a plain that gradually rises towards an amphitheatre of hills, including Penn's Mount on the east and Neversink Mountain on the south. The plan is extremely regular and the principal streets cross at Penn Square, the business centre of the city. An abundant supply of excellent water helps to keep the whole place sweet and clean. Conspicuous buildings are—the court-house, the city-hall, Trinity Church (Lutheran), Christ Church (Episcopal), the opera-house, Mishler's academy of music, and the railway station. Besides a very extensive and varied manufacture of iron and iron wares from steam-boilers down to nails, Reading carries on distilling, tanning, cotton-weaving, cigar-rolling, paper-making, and many other industries, and is the seat of extensive machine-shops of the Philadelphia and Reading Railroad. The population—2385 in 1800, 15,743 in 1850, 33,930 in 1870, and 43,278 in 1880—is largely of German origin; and in 1883 one out of its five daily newspapers and six out of its eleven weeklies were in German.

Laid out in 1748 by Thomas and Richard Penn, Reading received incorporation as a borough in 1783, and was made a city in 1847.

REALEJO, a town and harbour on the Pacific coast of Nicaragua, situated in the neighbourhood of 12° 28′ N. lat. The harbour is spacious and well sheltered, and altogether the best which Nicaragua possesses on that coast; it is protected by a peninsula and two considerable islands, Cardon and Asserradores or Corinto. The town lies 9 miles inland, and as a port is now superseded by the new town of Corinto, founded about 1849, and since 1881 connected with Leon and the interior by a railway. Realejo was the terminus adopted by Bedford Pim for his scheme of an interoceanic canal; but the route actually sanctioned reaches the coast of the Pacific at Brito, some distance to the south.

REAL ESTATE. The land law of England and of countries whose law is based upon that of England stands in a peculiar position, which can be understood only by an outline of its history.

History.—Such terms as "fee" or "homage" carry us far back into feudal times. Rights of common and distress are based upon still older institutions, forming the very basis of primitive law. The conception of tenure is the most fundamental ground of distinction between real and personal estate, the former only being strictly entitled to the name of estate (see ESTATE). The division into real and personal is coincident to a great extent with that into immovable and movable, generally used by systems of law founded on the Roman (see PERSONAL ESTATE). That it is not entirely coincident is due to the influence of the Roman law itself. The Greeks and the Romans of the republic were essentially nations of citizens; the Teutons were essentially a nation of landfolk; the Roman empire bridged the gulf between the two. It is probable that the English land law was produced by the action of the policy adopted in the lower empire, finally developed into feudalism, upon the previously existing course of Teutonic custom (see FEUDALISM). It is sufficient to say here that the distinguishing features of the Teutonic system were enjoyment in common and the absence of private ownership, except to a limited extent. The history of the development of the old English land law before the Conquest will be found under ENGLAND and LAND. Its principal features, stated as shortly as possible, were (1) liberty of alienation, either by will or *inter vivos*, of such land as could be alienated, chiefly, if not entirely, bocland, subject always to the limits fixed by the *boc*; (2) publicity of transfer by enrolment in the shire-book or church-book; (3) equal partition of the estate of a deceased among the sons, and failing sons among the daughters; (4) cultivation to a great extent by persons in various degrees of serfdom, owing money or labour rents; (5) variety of custom, tending to become uniform, through the application of the same principles in the local courts; (6) subjection of land to the *trinoda necessitas*, a burden imposed for the purpose of defence of the realm. The rudiments of the conceptions of tenure and of the crown as lord paramount were found in the old English system, and lænland was an anticipation of the limited interests which afterwards became of such importance.[1] The connexion of political privileges with the ownership of land is not peculiar to the pre-Conquest or any other period. It runs through the whole of English history. Originally all freeholders seem to have voted in the county court. Finally the Reform Acts of this century, however they may have lowered the qualification, still require (except in the case of the university vote) the vote to be derived from an interest in land. No amount of consols will give a vote at a parliamentary election. A qualification from land is also necessary in the case of sheriff, justices of the peace, and other public officials.

The elements of feudalism so far existed in England under the Anglo-Saxon and Danish kings as to make it easy to introduce it in full at the Norman Conquest. Feudalism was not so much a distinct and separate creation, developed at once in its maturity, as a collection of institutions whose origin was to be found in unconnected sources. What the Norman Conquest did was not to change all at once allodial into feudal tenure, but to complete the association of territorial with personal dependence in a state of society already prepared for it.[2] "Nulle terre sans seigneur" was one of the fundamental axioms of feudalism. There might be any number of infeudations and subinfeudations to mesne lords, but the chain of seigniory was complete, depending in the last resort upon the king as lord paramount. Land was not owned by free owners owing only necessary militia duties to the state, but was held of the king by military service of a far more onerous nature. The folkland became the king's land; the soldier was a landowner instead of the landowner being a soldier. Free owners tended to become tenants of the lord, the township to be lost in the manor.[3] The common land became in law the waste of the manor, its enjoyment resting upon a presumed grant by the lord. On the other hand, the whole of England did not become manorial; the conflict between the township and the manor resulted in a compromise, the result of which affects English tenure to this day. But it was a compromise much to the advantage of the privileged class, for in England more than in any other country the land law is the law of the nobility and not of the people. One reason of this is that, as England was never so completely feudalized as were some of the Continental states, the burden of feudalism was not so severely felt, and has led to less agitation for reform.

The land forfeited to the Conqueror was regranted by him to be held by military service due to the king, not to the mesne lord as in Continental feudalism. In 1086 at the council of Salisbury all the landholders swore fealty to the crown. In the full vigour of feudalism the inhabitants of England were either free or not free. The free inhabitants held their lands either by free tenure (*liberum tenementum*, franktenement) or by a tenure which was originally that of a non-free inhabitant, but attached to land in the possession of a free man. Franktenement was either military tenure, called also tenure in knight service or chivalry (including barony, the highest tenure known to the law, grand serjeanty and the special forms of escuage, castle-guard, cornage, and others), or socage (including burgage and petit serjeanty), or frankalmoign (*libera eleemosyna*) or divine service, by which ecclesiastical corporations generally held their land.[4] The non-free inhabitants were in Domesday Book *servi*, *cotarii*, or *bordarii*, later *nativi* or *villani*, the last name being applied to both free men and serfs. All these were in a more or less dependent condition. The free tenures all exist at the present day, though, as will appear later, the military tenures have shrunk into the unimportant and exceptional tenure of grand serjeanty. The non-free tenures are to a certain extent represented by COPYHOLD (*q.v.*). The most important difference between the military and socage tenures was the mode of descent. Whether or not a feudal benefice was originally hereditary, it had certainly become so at the time of the Conquest, and it descended to the eldest son. This applied at once in England to land held by military service as far as regarded the capital fief. The descent of socage lands or lands other than the capital fief for some time followed the old pre-Conquest rule of descent. Thus in the so-called "Laws of Henry I." the lands other than the capital fief, and in Glanvill, who wrote in the time of Henry II., socage lands, if anciently partible (*antiquitus divisum*), were divided among all the sons equally. But by the time of Bracton (Henry III.) the course of descent of lands held by military service had so far prevailed that, though it was a question of fact whether the land was partible or not, if there was no evidence either way descent to the eldest son was presumed. Relics of the old custom still remain in the case of gavelkind (see below). The military tenant was subject to the feudal incidents, from which the tenant in socage was exempt. These incidents, especially wardship and marriage, were often of a very oppressive nature. Alienation of lands by will, except in a few favoured districts, became impossible; alienation *inter vivos* was restrained in one direction in the interests of the heir, in another in the interests of the lord. At the time of Glanvill a tenant had a greater power of alienation over land which he had purchased (*terra acquietata*) than over land which he had inherited. But by the time of Bracton the heir had ceased to have any interest in either kind of land. The lords were more successful. It was enacted by Magna Charta that a free man should not give or sell so much of his land as to leave an amount insufficient to perform his services to his lord. In spite of this provision, the rights of the lords were continually diminished by subinfeudation until the passing of the Statute of *Quia Emptores*. Alienation by a tenant in chief of the crown without licence was a ground of forfeiture until 1 Edw. III. st. 2, c. 12, by which a fine was substituted. The modes of conveyance at this time were only two, feoffment with livery of seisin for corporeal hereditaments, grant for incorporeal hereditaments. Livery of seisin, though public, was not officially recorded like the old English transfer of property. The influence of local custom upon the land law must have become weakened after the circuits of the judges of the King's Court were established by Henry II. Jurisdiction over litigation touching the freehold was taken away from the lords' courts by 15 Ric. II. c. 12.

The common law as far as it dealt with real estate had in the main assumed its present aspect by the reign of Henry III. The changes which have been made since that date have been chiefly due to the action of equity and legislation, the latter sometimes interpreted by the courts in a manner very different from the intention of parliament. The most important influence of equity has been exercised in MORTGAGE (*q.v.*) and trusts (see TRUST), in the doctrine of specific performance of contracts concerning real estate, and in relief from forfeiture for breach of covenant. As to legislation, it is impossible in this place to do more than direct attention to the main provisions of the principal statutes among the mass of those which from Magna Charta downwards have dealt with real estate.

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[1] The name has not remained as in Germany and Denmark. A fief is still *Lehen* in Germany, *Lehn* in Denmark.

[2] "The relation of vassalage, originally personal, became annexed to the tenure of land" (Palgrave. *Rise and Progress of the English Commonwealth*, vol. i. p. 505)

[3] It is a disputed point whether the manor organization existed before the Conquest; but its full development seems to have been later than that event.

[4] Frankalmoign was not always regarded as a distinct tenure. Thus Littleton (§ 118) says that all that is not tenure in chivalry is tenure in socage.

History of Real Estate Legislation.—The reign of Edward I. is notable for three leading statutes which are still law, all passed in the interests of the superior lords. The Statute of Mortmain (7 Edw. I. st. 2, c. 13) is the first of a long series directed against the acquisition of land by religious and charitable corporations (see CHARITIES). The statute *De Donis Conditionalibus* (13 Edw. I. c. 1) forbade the alienation of estates granted to a man and the heirs of his body, which before the statute became on the birth of an heir at once alienable (except in the case of gifts in frankmarriage), and so the lord lost his escheat. For the mode in which the statute was practically defeated and estates tail in their modern form created see ENTAIL. The statute *Quia Emptores* (18 Edw. I. c. 1) preserved those rights of the lords which were up to that time subject to be defeated by subinfeudation, by enacting that in any alienation of lands the alienee should hold them of the same lord of the fee as the alienor.[1] Since 1290 it has been impossible to create an estate in fee-simple to be held of a mesne lord, or to reserve a rent upon a grant of an estate in fee (unless in the form of a rent-charge), or to create a new manor. The statute, however, does not bind the crown. The practical effect of the statute was to make the transfer of land thenceforward more of a commercial and less of a feudal transaction. The writ of *elegit* was introduced by the Statute of Westminster II. in 1285 as a creditor's remedy over real estate. It has, however, been considerably modified by subsequent legislation. From 1290 to the reign of Henry VIII. there is no statute of the first importance dealing with real estate. The reign of Henry VIII., like the reign of Edward I., is signalized by three Acts, the effects of which continue to this day. The one which has had the most lasting influence in law is the Statute of Uses, 27 Hen. VIII. c. 10 (see CONVEYANCING, TRUST) The Statute of Uses was intended to provide against secrecy of sales of land, and as a necessary sequel to it an Act of the same year (27 Hen. VIII. c. 16) enacted that all bargains and sales of land should be duly enrolled (see SALE). Bargain and sale was a form of equitable transfer which had for some purposes superseded the common law feoffment. It applied only to estates of inheritance and not to terms of years. The unforeseen effect of 27 Hen. VIII. c. 16 was to establish as the ordinary form of conveyance until 1841 the conveyance by lease and release.[2] Uses having become legal estate by the Statute of Uses, and therefore no longer devisable, 32 Hen. VIII. c. 1 (explained by 34 and 35 Hen. VIII. c. 5) was passed to remedy this inconvenience. It is still law as to wills made before 1838 (see WILL). In the reign of Elizabeth the Acts of 13 Eliz. c. 5 and 27 Eliz. c. 4 avoided fraudulent conveyances as against all parties and voluntary conveyances as against subsequent purchasers for valuable consideration. Early in the reign of Charles II. the Act of 1661 (12 Car. II. c. 24) turned all the feudal tenures (with the exception of frankalmoign and grand serjeanty) into tenure by free and common socage and abolished the feudal incidents. The Statute of Frauds (29 Car. II. c. 3) contained provisions that certain leases and assignments, and that all agreements and trusts relating to land, should be in writing (see FRAUD). The land registries of Middlesex and Yorkshire date from the reign of Anne (see REGISTRATION). Devises of land for charitable purposes were forbidden by the Mortmain Act (9 Geo. II. c. 36). In the next reign the first general Inclosure Act was passed, 41 Geo. III. c. 109 (see COMMONS). In the reign of William IV. were passed the Prescription, Limitation, and Tithe Commutation Acts (see PRESCRIPTION, LIMITATION, TITHES); fines and recoveries were abolished and simpler modes of conveyance substituted by 3 and 4 Will. IV. c. 74; and the laws of inheritance and dower were amended by 3 and 4 Will. IV. cc. 105, 106 (see INHERITANCE, HUSBAND AND WIFE). In the reign of Victoria there has been a vast mass of legislation dealing with real estate in almost every conceivable aspect. At the immediate beginning of the reign stands the Wills Act (see WILL). The transfer of real estate has been simplified by 8 and 9 Vict. c. 106 and by the Conveyancing Acts of 1881 and 1882 (see below). Additional powers of dealing with settled estates were given by the Settled Estates Act, 1856, later by the Settled Estates Act, 1877, and the Settled Land Act, 1882 (see SETTLEMENT). Succession duty was levied for the first time on freeholds in 1853. The strictness of the Mortmain Act has been relaxed in favour of gifts and sales to public institutions of various kinds, such as schools, parks, and museums. The period of limitation has been shortened for most purposes from twenty to twelve years by the Real Property Limitation Act, 1874 (see LIMITATION). Several Acts have been passed dealing with the enfranchisement and commutation of copyholds and the preservation of commons and open spaces (see COMMONS, COPYHOLD). The Naturalization Act, 1870 (33 and 34 Vict. c. 14), enables aliens to hold and transfer land in England. The Felony Act, 1870 (33 and 34 Vict. c. 23), abolished forfeiture of real estate on conviction for felony. The Agricultural Holdings Act, 1883 (46 and 47 Vict. c. 61), gives the tenant of a tenancy within the Act a general right to compensation for improvements, substitutes a year's notice to quit for the six months' notice previously necessary, enlarges the tenant's right to fixtures, and limits distress to a year's rent. By 47 and 48 Vict. c. 71 the law of escheat is extended to incorporeal hereditaments and equitable estates. Among other subjects which have been dealt with by recent legislation may be mentioned REGISTRATION, MORTGAGE, PARTITION, EXCAMBION, FIXTURES (*qq.vv.*), taking of land in execution, declaration of title, and apportionment. Not a year passes in which the land law is not altered to a greater or less degree. Bills have been introduced within recent years, but hitherto unsuccessfully, for amending the law by the assimilation of the succession to real and personal estate, and for the compulsory enfranchisement of leaseholds.

Real estate at the present day is either legal or equitable, a difference resting mainly upon historical grounds (see EQUITY, TRUST). The following observations apply in general to both kinds of estate. The usual classification of interests in real estate regards either the extent, the time, or the mode of enjoyment. The division according to the *extent* is in the first instance into corporeal and incorporeal hereditaments, a division based upon the Roman law division of *res* into *corporales* and *incorporales*, and open to the same objection, that it is unscientific as co-ordinating subjects of rights with the rights themselves.[3] Corporeal hereditaments, says Blackstone, "consist of such as affect the senses, such as may be seen and handled by the body; incorporeal are not the objects of sensation, can neither be seen nor handled, are creatures of the mind, and exist only in contemplation." Corporeal hereditaments are all necessarily freehold ;[1] an interest in land less than freehold, such as a term of years, is personalty only. There was no room for such an interest in the feudal gradation of tenure ; it was regarded as a mere personal contract and was incapable of the incidents of tenure. By the Conveyancing Act, 1881 (44 and 45 Vict. c. 41, s. 65), the residue of a long term of years may in certain cases be enlarged into the fee-simple. A copyhold is in strict law only a tenancy at the will of the lord (see COPYHOLD). Estates of freehold are either estates for life or in fee (called also estates of inheritance), the latter being in fee-tail or in fee-simple. An estate for life may be either for the life of the tenant or for the life of another person, the latter called an estate *pur autre vie*. The former kind of estate includes estates of dower and curtesy (see HUSBAND AND WIFE). An estate in fee is called a fee simply, an obvious sign of its feudal origin. Estates tail are either general or special, the latter being in tail male or (rarely) in tail female. There may also be a quasi-entail of an estate *pur autre vie* (see ENTAIL). An estate in fee-simple is the largest estate known to English law. Its ordinary incidents are an oath of fealty (never exacted), ESCHEAT (*q.v.*), and (in a manor) suit of the court baron, and occasionally a small quit-rent and relief. All these are obviously relics of the once important feudal incidents. Incorporeal hereditaments consist chiefly, if not wholly, of rights *in alieno solo*. They are divided by Mr Joshua Williams (*Real Property*, pt. ii.) into (1) reversions, remainders, and executory interests, (2) hereditaments purely incorporeal, the last being either appendant, appurtenant, or in gross. Examples are profits *a prendre* (such as rights of common), easements (such as rights of way),[2] seigniories, advowsons, rents, tithes, titles of honour, offices, franchises. Before 1845 corporeal hereditaments were said to lie in livery, incorporeal in grant. But by 8 and 9 Vict. c. 106, s. 2, all corporeal hereditaments are, as regards the conveyance of the immediate freehold thereof, to be deemed to lie in grant as well as in livery. With regard to the *time* of enjoyment, estates are either in possession or in expectancy,—that is, in reversion or remainder or executory interests (see REMAINDER). With regard to the *mode* of enjoyment, estates are either joint, in common, in coparcenary, or in severalty.

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[1] Tenants in chief of the crown were liable to a fine on alienation until 12 Car. II. c. 24.

[2] From the reign of Edward IV. at latest up to the Fines and Recoveries Act of 1833 fines and recoveries were also recognized as a means of conveyance. They are so regarded in the Statute of Uses.

[3] In spite of this objection the division is adopted by the legislature; see, for instance, 47 and 48 Vict. c. 71.

Exceptional Tenures.—It has been already stated that there are still to be found survivals of the old pre-Conquest customary law. They are found both in the tenure and in the conveyance of land. The only customs of which judicial notice is taken are GAVELKIND (*q.v.*) and BOROUGH-ENGLISH (*q.v.*). Any other local customs, as in manors, must be proved by evidence. The tenures of frankalmoign and grand serjeanty were specially preserved by 12 Car. II. c. 24. Tenure in frankalmoign is the nearest approach in English law to absolute ownership. An estate in frankalmoign has no incidents, as it is held simply by divine service and is not subject to escheat. All tenures in frankalmoign must (except where created by the crown) be older than *Quia Emptores*. The tenure of grand serjeanty is the holding of lands by doing a personal service to the king, as carrying his banner or sword. Petit serjeanty consists in the payment to the king yearly of a bow, sword, dagger, or such other small things belonging to war (Littleton, § 159). It is in effect socage.

Title.—This is the name given to the mode of acquisition of rights over real estate. Title may arise either by alienation, voluntary or involuntary, or by succession. Voluntary alienation is either *inter vivos* or by will. The former branch is practically synonymous with conveyance, whether by way of sale, settlement, mortgage, or otherwise. As a general rule alienation of real estate *inter vivos* must be by deed since 8 and 9 Vict. c. 106. Since that Act a deed of grant has superseded the old forms of feoffment and lease and release. Considerable alterations in the direction of shortness and simplicity have been made in the law of transfer of real estate by the Conveyancing Acts, 1881, 1882 (44 and 45 Vict. c. 41, 45 and 46 Vict. c. 39). The word "grant" is no longer necessary for a conveyance, nor are the old words of limitation "heirs" and "heirs of the body." It is sufficient to use the words "in fee-simple," "in tail," "in tail male," "in tail female." Many provisions usually inserted in deeds, such as covenants for title by a beneficial owner and powers of appointment of new trustees, obtain statutory sanction. Forms of mortgage, conveyance, and settlement are appended to the Act. The Solicitors' Remuneration Act, 1881 (44 and 45 Vict. c. 44), was passed as a necessary sequel to the Conveyancing Act, and the remuneration of solicitors now stands upon a different and more satisfactory basis. For acquisition by will and succession, see WILL, INHERITANCE. Involuntary alienation is by BANKRUPTCY (*q.v.*) and by other means of enforcing the rights of creditors over land, such as distress or execution. It may also arise by the exercise by the state of its right of eminent domain for public purposes as under the Lands Clauses and other Acts.[3] In sales of real estate title is generally traced in an abstract delivered by the vendor (see SALE).

Restraints on Alienation.—The alienation of real estate may be subject to almost any conditions, provided that such conditions do not contravene the law. As a general rule there can be no restrictions upon the alienation of an estate in fee-simple ; the two ideas are incompatible. In the case, however, of a married woman a restraint on anticipation is allowed within certain limits. The power of imposing such a restraint is preserved by the Married Women's Property Act, 1882 (45 and 46 Vict. c. 75, s. 19), subject to the right of the court to bind the interest of the married woman where it would be for her benefit to do so (44 and 45 Vict. c. 41, s. 39). In another direction the imposition of a course of devolution upon property is forbidden by the law against perpetuities, under which no executory interest can be made to commence unless within the period of any fixed number of existing lives, and an additional period of twenty-one years (with a few months added, if necessary, for the period of gestation). Accumulation of income is forbidden (with a few exceptions) by the Thelusson Act (39 and 40 Geo. III. c. 98) for any longer term than the life of the grantor or settlor, or twenty-one years from his death, or during a period of minority. Certain persons are by the general policy of the law disabled from exercising full proprietary rights, such as married women (see above), convicts, infants, and lunatics. Estates tail are in general alienable under the Fines and Recoveries Act (see ENTAIL). But in a few cases estates tail are settled inalienably by Act of Parliament, generally as a reward for public services. Estates are thus settled to go with the titles of Marlborough, Wellington, Abergavenny, and Shrewsbury.

Exceptional Modes of Alienation.—In some of these cases, like those of the exceptional tenures, the influence of the old customary law is to be traced. The transfer of copyholds especially depends to a great extent upon the custom of particular manors, but, subject to that, it usually takes place by surrender and admittance (see COPYHOLD). Gavelkind lands may be conveyed by feoffment by any infant above the age of fifteen. For mines in the Forest of Dean a peculiar mode of transfer is provided by 1 and 2 Vict. c. 43. In the Isle of Portland there seems to be a distinct survival of the pre-feudal conveyance. The vendor and purchaser meet in the parish church, where a deed is signed by the parties in the presence of two householders of the island. These deeds are called "church gifts."

Procedure.—In some cases rights attaching to real estate are protected by peculiar remedies. At an early period it became more convenient to try the right to the possession of, rather than the right to the property in, real estate. Possessory tended to supersede proprietary remedies, from their great simplicity and elasticity. The general mode of trying the right to both property and possession was from the time of Henry II. the real action, the form called "writ of right" (after Magna Charta gradually confined to the Court of Common Pleas) being used to determine the property, that called "assise of novel disseisin" being the general means by which the possession was tried. About the reign of Elizabeth the action of ejectment became the ordinary form of possessory remedy. Real actions existed until 3 and 4 Will. IV. c. 27, by which they were finally abolished, with the exception of writ of right of dower, writ of dower *unde nihil habet*, *quare impedit*, and ejectment. Of these QUARE IMPEDIT (*q.v.*) appears to be the only one now in use. The assise of novel disseisin, the action of ejectment in both its original and its reformed stage (see EJECTMENT), and finally the action for the recovery of land in use since the Judicature Acts are all historically connected as gradual developments of the possessory action (see POSSESSION). The action for the recovery of land is still subject to special provisions and is not quite in the same position as an ordinary action (see Rules of the Supreme Court, 1883, Ord. xii. rr. 25-29, Ord. xviii. r. 2, &c.). There are certain matters affecting real estate over which the Court of Chancery formerly had exclusive jurisdiction, in most cases because the principles on which the court acted had been the creation of equity. The Judicature Act, 1873 (36 and 37 Vict. c. 66, s. 34), assigns to the Chancery Division of the High Court of Justice all causes and matters for (*inter alia*) the redemption or foreclosure of mortgages, the raising of portions or other charges on land, the sale and distribution of the proceeds of property subject to any lien or charge, the specific performance of contracts between vendors and purchasers of real estates, including contracts for leases, the partition or sale of real estates, and the wardship of infants and the care of infants' estates. In the case of rent a summary mode of remedy by act of the creditor still exists (see DISTRESS, RENT).

For the economical aspect of the English law, see LAND. For a list of the main points of difference between real and personal estate, see PERSONAL ESTATE.

Authorities.—Those cited at the end of LAND, and in addition Digby, *History of the Law of Real Property*; Elton, *Tenures of Kent*; Goodeve, *Modern Law of Real Property*; Pollock, *Land Laws*; Stephen, *Commentaries*, vol. i.; Seebohm, *English Village Community*; Williams, *Real Property*; Wolstenholme and Turner, *Conveyancing Acts*.

Ireland.—The law of real estate in Ireland is the English law, which finally superseded the native law in James I.'s reign, as modified by subsequent legislation. The main difference is in the law of LANDLORD AND TENANT (*q.v.*) and the operation of the Landed Estates Court, merged in the High Court of Justice in Ireland by the Supreme Court of Judicature (Ireland) Act, 1877.

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[1] In the category of corporeal hereditaments are also included certain accessories to corporeal hereditaments proper, such as growing crops, fixtures, title-deeds, &c.

[2] It should be noticed that an easement in gross cannot exist.

[3] The right of the state to contribution from land for revenue purposes and to stamp duties on deeds perhaps falls under this head. These imposts are really involuntary alienations of part of the profit of the land.

United States.—The law of real estate in the United States is the law of England modified to suit a different state of circumstances. The main point of difference is that in the United States the occupiers of land are generally wholly or in part owners, not tenants, as in England. This is to a great extent the effect of the homestead laws (see HOMESTEAD). The traces of the feudal origin of the law are, as might be expected, considerably less prominent than in England. Thus estates tail are practically obsolete; in some States they are specially forbidden by the State constitutions. The law of descent is the same in real and personal estate (see INHERITANCE). Manors do not exist, except in the State of New York, where they were created by the crown in colonial days (Bouvier, *Law Dict.*, "Manor"). Registration of deeds is general (see REGISTRATION). In some States forms of deed are prescribed by statute. Conveyancing is for the most part simpler than in England. The holding of real estate by religious or charitable corporations is generally restricted by the Act creating them rather than by anything like the English law of mortmain. In Pennsylvania such a corporation cannot hold land without an Act of the legislature, and in Territories of the United States it cannot hold real estate of a greater value than $50,000 (Act of Congress of 1st July 1862, c. 126). Perpetuities are forbidden in most States. The right of eminent domain is at once acknowledged and limited by the constitution of the United States. By art. 5 of the Amendments private property is not to be taken for public use without just compensation. A similar provision is found in many of the State constitutions. By an Act of Congress of 9th April 1866, c. 31, all citizens of the United States have the same right in every State and Territory as is enjoyed by white citizens thereof to inherit, purchase, lease, sell, hold, and convey real and personal property. In most States aliens may hold land; but in some States they cannot do so without becoming naturalized or at least filing in the specified manner a declaration of intention to become naturalized. For the State laws affecting the capacity of aliens to hold land, see Washburn, *Real Property*, vol. i. p. 64.

International Law.—The law of the place where real estate is situated (*lex loci rei sitæ*) governs its tenure and transfer. The laws of England and of the United States are more strict on this point than the laws of most other countries. They require that the formalities of the *locus rei sitæ* must be observed, even if not necessary to be observed in the place where the contract was made. The *lex loci rei sitæ* determines what is to be considered real estate. A foreign court cannot as a general rule pass title to land situated in another country. The English and United States courts of equity have to a certain extent avoided the inconvenience which this inability to deal with land out of the jurisdiction sometimes causes by the use of the theory that equity acts upon the conscience of the party and not upon the title to the foreign land. Thus in the leading case of Penn *v.* Lord Baltimore in 1750 (1 Vesey's *Reports*, 444) the Court of Chancery on this ground decreed specific performance of articles for settling the boundaries of the provinces of Pennsylvania and Maryland. The difficulty always arises that, although the court professes to act upon the conscience, it must indirectly act upon the property, and that it cannot carry its decision into execution without the aid of the local tribunals. (J. W†.)

REALISM. See SCHOLASTICISM.

RÉAUMUR, RENÉ ANTOINE FERCHAULT DE (1683-1757), the eldest son of a French nobleman, was born on 28th February 1683 at La Rochelle and received his early education there. He was taught philosophy in the Jesuits' college at Poitiers, and in 1699, when "hardly seventeen, but already possessed of the prudence of a grown man," went to Bourges to study civil law and mathematics under the charge of an uncle, canon of La Sainte Chapelle. In 1703 he came to Paris, where he continued the study of mathematics and physics. He soon made his presence felt in the highest circles, and in 1708, at the remarkably early age of twenty-four, was elected a member of the Académie des Sciences. From this time onwards for nearly half a century hardly a year passed in which the *Mémoires de l'Académie* did not contain at least one paper by Réaumur. At first his attention was occupied by mathematical studies, especially in geometry. In 1710 he was appointed to the charge of a great Government work—the official description of the useful arts and manufactures—which led him to many practical researches that resulted in the establishment of manufactures new to France and the revival of neglected industries. For discoveries regarding iron and steel the regent Orleans awarded him a pension of 12,000 livres; but, being content with his ample private income, he requested that the money should be secured to the Académie des Sciences for the furtherance of experiments on improved industrial processes. In 1731 he became greatly interested in meteorology, and invented the thermometer which bears his name. In 1735 family arrangements obliged him to accept the post of commander and intendant of the royal and military order of Saint Louis; he discharged his duties in connexion with it with scrupulous attention, but declined to receive any of the emoluments. Whatever his other occupations were, he always found time for the systematic study of natural history, in which he took great delight. He was a born naturalist, gifted with rare powers of observation and description,—indeed his friends often called him the Pliny of the 18th century. He loved retirement and lived much at his country residences, at one of which, La Bermondière (Maine), he met with an accident, a fall from horseback, the effects of which proved fatal on 17th October 1757. He bequeathed his manuscripts, which filled 138 portfolios, and his natural history collections to the Académie des Sciences.

Réaumur was a man of wide attainments and great industry. His writings, sometimes on trivial topics, were frequently diffuse, yet always interesting. His mind was original and intensely practical. As a rule he avoided theoretical questions, but when he took them up his manner of treatment was remarkably clear, chiefly on account of an ingenious use of metaphor, often expanding into allegory. His memory was retentive, his information immense, and his kindliness of disposition such that his knowledge and wealth seemed to be amassed only for the benefit of his friends. He always bore a high character, was a great favourite in society, and associated on terms of intimacy with the principal great men of the time in Europe.

Réaumur's scientific papers are too numerous to be recapitulated; they deal with nearly all branches of science. His first paper, in 1708, was on a general problem in geometry, his last, in 1756, on the forms of birds' nests. He proved experimentally the fact, afterwards demonstrated theoretically by Du Hamel, that the strength of a rope is less than the sum of the strengths of its separate strands. He examined and reported on the auriferous rivers, the turquoise mines, the forests, and the fossil beds of France. He devised the method of tinning iron that is still employed, and investigated the differences between iron and steel, correctly showing that the amount of combustible matter (sulphur in the language of the old chemistry) is greatest in cast iron, less in steel, and least in wrought iron. His book on this subject (1722) was translated into English and German. The thermometer by which he is now best remembered was constructed on the principle of taking the freezing-point of water as 0°, and graduating the tube into degrees each of which was one-thousandth of the volume contained by the bulb and tube up to the zero mark. It was purely an accident dependent on the dilatability of the particular quality of alcohol employed which made the boiling-point of water 80°; and mercurial thermometers the stems of which are graduated into eighty equal parts between the freezing and boiling points of water are *not* Reaumur thermometers in anything but name.

Réaumur wrote much on natural history. Early in life he described the locomotor system of the Echinodermata, and showed that the supposed vulgar error of Crustaceans replacing their lost limbs was an actual fact. In 1710 he wrote a paper on the possibility of spiders being used to produce silk, which was so celebrated at the time that the Chinese emperor Kang-he caused a translation of it to be made. He treated also of botanical and agricultural matters, and devised processes for preserving birds and eggs. He elaborated a system of artificial incubation, and made important observations on the digestion of carnivorous and graminivorous birds; but his greatest work is the *Mémoires pour servir à l'Histoire des Insectes*, 6 vols., with 267 plates, Amsterdam, 1734-49. It describes the appearance, habits, and locality of all the known insects except the beetles, and is a marvel of patient and accurate observation. Amongst other important facts stated in this work are the experiments which enabled Réaumur to prove the correctness of Peyssonel's hypothesis, that corals were animals and not plants, as was previously supposed.

REBUS, an enigmatical representation of some name or thing, by using figures or pictures instead of words or parts of words. Camden mentions an instance of this kind of wit in a gallant who expressed his love to a woman named Rose Hill by painting in the border of his gown a rose, a hill, an eye, a loaf, and a well; this, in the style of the rebus, reads "Rose Hill I love well." This kind of wit was long practised by the great, who took the pains to find devices for their names. It was, however, happily ridiculed by Ben Jonson in the humorous description of Abel Drugger's device in the *Alchemist* and by the *Spectator* in the device of Jack of Newberry. The name is also applied to arrangements of words in which the position of the several vocables is to be taken into account in divining the meaning. Thus "I understand you undertake to overthrow my undertaking" makes the rebus

stand take to taking
I you throw my;

or in French

pir vent venir
un vient d'un

may be read "un soupir vient souvent d'un souvenir." The original use of the word, which comes to us from France, was, however, wider: any equivoque or satirical pleasantry might be so named, and the origin of the term is ascribed by Ménage to the clerks of Picardy, who at carnival time used to put out satirical squibs called "De rebus quæ geruntur." "Rebus," in heraldry, is a coat of arms which bears an allusion to the name of the person,—as three castles for Castleton, three cups for Butler, three conies for Coningsby.

RÉCAMIER, MADAME (whose maiden name was JEANNE FRANÇOISE JULIE ADELAIDE BERNARD), was born on 4th December 1777 at Lyons, and died at Paris on 11th May 1849. She was married at fifteen to the banker Récamier, who was more than old enough to be her father. Beautiful, accomplished, with a real love for literature, she possessed at the same time a temperament which protected her from scandal, and from the early days of the consulate to almost the end of the July monarchy her salon was one of the chief resorts of literary and political society that pretended to fashion. For some time she was much under the influence of Madame de Staël, and it was partly through her that Madame Récamier became acquainted with Benjamin Constant, whose singular political tergiversations during the last days of the empire and the first of the restoration have been attributed to Madame Récamier. There is no doubt that she succeeded in inspiring a real and almost desperate passion in the heart of Constant, whose letters to her have had a singular fate, having been twice published in part, and twice interfered with by judicial proceedings on the part of the representatives of the parties concerned. In Madame Récamier's later days she lost most of the fortune which, when she was the wife of a rich banker, had given her part of her consequence; but she continued to receive visitors at the Abbaye-aux-Bois. Here Chateaubriand was a constant visitor, and in a manner master of the house; but Madame Récamier never even in old age, ill-health, and reduced circumstances lost her attraction. After her death *Souvenirs et Correspondances tirés des Papiers de Madame Récamier* were published. To compile, however, a real account of her would necessitate the ransack of all the memoirs, correspondence, and anecdotage concerning French political and literary life for the first half of this century.

RECANATI, a city of Italy, in the province of Macerata, 17½ miles from Loreto, on the highway between Ancona and Rome, is built on a hill 910 feet above the sea, and still retains portions of its 15th-century walls and gateways. It is now perhaps best known as the birthplace of the poet Leopardi, whose monument adorns the principal piazza and whose family has collected in the town a very interesting museum of Leopardiana; but it also contains fine old mansions of the Leopardi, Mazzagalli, Massucci, and Carradori in the main street, a palazzo communale with a bronze representation of the removal of the Holy House to Loreto, and a Gothic cathedral, built towards the close of the 14th century and dedicated to St Flavianus, patriarch of Constantinople. The population in 1881 was 8864 in the town and port (3040) and 19,524 in the commune.

Recanati appears as a strong castle in the 10th century or earlier. Round this gathered a community whose petty wars with Osimo (Auximum) called for the interference of Innocent III. in 1198. From Frederick II. it obtained the right of having a port on the Adriatic; and by Gregory IX. it was made a city and the seat of the bishopric transferred from Osimo. This oscillation between Guelf and Ghibelline continued characteristic of Recanati. Urban IV. abolished the "city" and bishopric; Nicholas IV. restored them. John XXII. again, in 1320, removed the bishopric and placed the city under interdict. The interdict was withdrawn in 1328 on payment of a heavy fine, but the bishopric remained in abeyance till 1357. Gregory XII., who on his deposition by the council of Constance was made papal legate of the sees of Macerata and Recanati, died in this city in 1417. The assistance rendered by Recanati to the popes in their struggles with the Sforza seems to have exhausted its resources, and it began to decline. Considerable damage was done by the earthquake of 1741; and the French, who were twice in possession of the city in 1797, pillaged it in 1799.

RECHABITES, or SONS OF RECHAB, in ancient Israel formed a sort of religious order in some respects analogous to the Nazarites, with whom they shared the rule of abstinence from wine. They went farther than the latter, however, in eschewing the luxuries and pursuits of settled life, living in tents and refusing to sow grain as well as to plant vineyards. Their origin must have been in northern Israel, for their "father" or founder, to whom they referred their rule of life, was that Jehonadab or Jonadab, son of Rechab, who lent his countenance to Jehu in the abolition of Tyrian Baal-worship (2 Kings x.). The order founded by Jehonadab must from its constitution have soon become a sort of hereditary clan, and as such the "house of Rechab" appears in Jer. xxxv., from which we learn that they had survived in Judah after the fall of the northern kingdom and continued to observe the ordinance of Jehonadab till the approach of Nebuchadnezzar drove them for protection into Jerusalem. Jeremiah promised them as a reward of their obedience that they should never lack a man to represent them (as a priest) before Jehovah. This perhaps is the origin of the later Jewish tradition that the Rechabites intermarried with the Levites and so entered the temple service.[1] Hegesippus in his account of the death of James the Just even speaks of Rechabite priests and makes one of them protest against the crime (Eus., *H.E.*, ii. 23).

RECIFE. See PERNAMBUCO.

RECOGNIZANCE, in law, is, in the words of Blackstone, "an obligation of record, entered into before some court or magistrate duly authorized, whereby the party bound acknowledges that he owes to the king or a private plaintiff (as the case may be) a certain sum of money, with condition to be void if he shall do some particular act,—as if he shall appear at the assizes, keep the peace, pay a certain debt, or the like." The term itself means that the person bound *recognizes* the existence of a debt. Recognizance was at one time used as a security for money lent, something in the nature of a mortgage. In this sense it is practically obsolete, though it is alluded to in modern Acts of Parliament, *e.g.*, 27 and 28 Vict. c. 112, by which a recognizance entered into after 29th July 1864 does not bind the land until actual delivery in execution. The principal use of recognizances at the present day is in chancery and criminal procedure. In chancery recognizances are entered into as a form of security by certain persons appointed to positions of trust, such as guardians or receivers. In criminal practice they affect either suspected or accused persons, or witnesses. As early as 1360 the Act of 34 Edw. III. c. 1 empowered justices to take of all them that were not of good fame sufficient surety and mainprize of their good behaviour. The wide terms of this provision are not acted upon at the present day. The only recognizances of this kind practically enforced are those entered into as security for keeping the peace. Such recognizances are forfeited by any act tending to a breach of the peace. The Criminal Law Consolidation Acts of 1861 provide that any court may on the conviction of a person for an offence under any of the Acts require him in addition to or in lieu of other punishment to enter into his own recognizances for keeping the peace and being of good behaviour. The power to bind witnesses by recognizance was originally conferred by an Act of 1554, 1 Ph. and M. c. 13. Recognizances are now the usual means by which a court of summary jurisdiction or a coroner binds over a prosecutor and his witnesses or an accused person and his witnesses to appear at the trial. The procedure principally depends upon 7 Geo. IV. c. 64, 11 and 12 Vict. c. 42 (one of Jervis's Acts), 30 and 31 Vict. c. 35 (Russell Gurney's Act), 42 and 43 Vict. c. 49, s. 31 (the Summary Jurisdiction Act, 1879). In proceedings in error and in appeals from courts of summary jurisdiction to quarter sessions the prosecution of the appeal by the appellant is secured by recognizance. In certain cases police authorities have by recent statutes a limited authority to take the recognizance of accused persons. Failure to comply with the conditions of recognizances leads to their forfeiture. Additional facilities for the enforcing of recognizances were given by the Summary Jurisdiction Act, 1879 (see Quarter Sessions). When recognizances are forfeited they are *estreated* (*i.e.*, extracted) from the records of the court to be enforced against the defaulter. An appeal against an order of a court of summary jurisdiction forfeiting recognizances lies to quarter sessions (3 Geo. IV. c. 46). By 28 and 29 Vict. c. 104 a recognizance does not bind the land in the hands of a *bona fide* purchaser for valuable consideration or a mortgagee unless actual execution has issued and been registered in the name of the debtor at the central office of the Supreme Court of Judicature. Registered recognizances are among the encumbrances for which search is made on a purchase of land. By 45 and 46 Vict. c. 39 an official negative of the existence of registered recognizances may be given by the proper officer on application. A discharge in bankruptcy does not release the debtor from a debt on a recognizance unless the Treasury certify in writing their consent to his discharge (46 and 47 Vict. c. 52, s. 30). Forgery of recognizances is a felony punishable by five years' penal servitude (24 and 25 Vict. c. 98, s. 32).

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[1] From the obscure passage 1 Chron. ii. 55 it would seem that in later times the Rechabites were regarded as Kenites.

In Scotland the place of recognizances is filled by cautions; a caution in law-burrows corresponds very nearly to a recognizance to keep the peace.

In the United States recognizances are used for much the same purposes as in England.

RECORDE, Robert (*c.* 1500-1558), a physician and eminent mathematician, was descended from a respectable family at Tenby in Wales and was born about 1500. He was entered of the university of Oxford about 1525, and was elected fellow of All Souls College in 1531. As he made physic his profession, he went to Cambridge, where he took the degree of M.D. in 1545. He afterwards returned to Oxford, where he publicly taught arithmetic and mathematics, as he had done prior to his going to Cambridge. It appears that he afterwards went to London, and acted as physician to Edward VI. and to Queen Mary, to whom some of his books are dedicated. He died in the King's Bench prison, Southwark, where he was confined for debt, in 1558.

Recorde published several works upon mathematical subjects, chiefly in the form of dialogue between master and scholar, viz.:—*The Grounde of Artes, teachinge the Worke and Practise of Arithmeticke, both in whole numbers and fractions*, 1540, 8vo; *The Pathway to Knowledge, containing the First Principles of Geometry . . . bothe for the use of Instrumentes Geometricall and Astronomicall, and also for Projection of Plattes*, London, 1551, 4to; *The Castle of Knowledge, containing the Explication of the Sphere both Celestiall and Materiall*, &c., London, 1556, folio; *The Whetstone of Witte, which is the second part of Arithmetike, containing the Extraction of Rootes, the Cossike Practice, with the Rules of Equation, and the Woorkes of Surde Numbers*, London, 1557, 4to. This was the first English book on algebra. He wrote also a medical work, *The Urinal of Physic*, 1548, frequently reprinted. Sherburne states that Recorde also published *Cosmographiæ Isagoge*, and that he wrote a book *De Arte faciendi Horologium* and another *De Usu Globorum et de Statu Temporum*. Recorde's chief contributions to the progress of algebra were in the way of systematizing its notation. He is said to have been the first to use the sign of equality (=) having the two parallel lines, as he says himself, because no two things could be more equal. The adaptation of the rule for extracting the square root of an integral number to the extraction of the square root of an integral algebraical function is also said to be due to him.

RECORDER. See Court and Quarter Sessions.

RECORDS, Public. According to the definition of the Record Commissioners appointed at the commencement of this century to report upon the nature of the archives, the national muniments of England constitute four great classes. The first class consists of independent documents relating to various subjects, persons, and places, but making altogether one whole, such as, for instance, Domesday Book, or the Valor Ecclesiasticus of Henry VIII. The second class consists of the series of enrolments, including within one roll great varieties of distinct and separate entries classed according to their formal character, as, for instance, the close rolls and patent rolls, or classed according to their subject-matter, as are the Liberate and the Norman rolls. The third class embraces those records which contain entries of judicial proceedings and those where each subject has a distinct roll; whilst the last class comprises all separate documents, such as letters, inquisitions, privy seals, commissions, and other various descriptions of formal instruments. Sir Edward Coke has given in his signification of the term "record" a briefer and less involved definition; but according to his rendering many important documents would have to be excluded from the list of the national archives. Hence it was decreed, on the passing of the Public Records Act (1 and 2 Vict. c. 94), which created the master of the rolls the keeper of the archives, that the word "records" should be taken to mean "all rolls, records, writs, books, proceedings, decrees, bills, warrants, accounts, papers, and documents whatsoever, of a public nature belonging to Her Majesty."

The documents of the once styled Courts of Chancery, Queen's Bench, Exchequer, and Common Pleas contain the very essence of England's antiquarian wealth: they constitute most of its bulk, much of its legal importance, and nearly all its historical interest. "The custom of recording documents on rolls of parchment," writes Sir Thomas Hardy, the late deputy-keeper of the public records, "though of very ancient date, commenced nevertheless at a period subsequent to the Conquest; for no vestige can be traced of such a system during the Anglo-Saxon dynasty. 'Apud Anglo-Saxones,' says Hickes, 'etiam mos erat leges regum latas in codicibus monasteriorum tanquam in tabulas publicas referendi.' It may be assumed that, had such a plan been then in operation, the same would have been adopted by the Conqueror to perpetuate the survey of the kingdom which he caused to be made, and for the preservation of which he evinced so much zeal and anxiety." As to the precise time when the use of rolls for the entry of matters of business first began there is still considerable doubt. That no rolls of a date antecedent to that of the 31st Henry I. are now in existence is certain. It may therefore be presumed that the practice of enrolling commenced shortly after the Conquest.

Court of Chancery.—Owing to the vast quantity of documents of this court, only the salient points of the principal series of rolls can be dealt with. Among the most important enrolments belonging to this court is the extensive series of documents known as the close rolls or Rotuli Litterarum Clausarum. Upon their well-preserved parchment membranes the historian scans entries relating —to the privileges of peers and commoners in times gone by; to measures employed for the raising of armies and the equipment of fleets; to orders for the observance of treaties, and for the fortification of castles; and to laws innumerable touching the power of the bench, the authority of the church, the extent of the civil jurisdiction, and the prerogatives of the crown. By the help of these rolls the lawyer and antiquary can learn how the coinage of the realm was regulated, how aids and imposts, tollages and subsidies, were raised, how riots and tumults were suppressed, how state prisoners were pardoned, how the writs ran for the summoning of parliaments, what deeds were enrolled between party and party, what facts were deemed worthy of record upon the birth, marriage, and death of royal and noble families; in short, there is little that concerns the naval and military, the civil and ecclesiastical, the legal and diplomatic affairs of the kingdom, which is not to be found upon the yards and yards of parchment which constitute the collection of the close rolls. The origin of the name "close" is due to the fact that the documents composing the series, being of a private nature, were despatched closed or sealed up, and were addressed to one or two persons only. The close rolls begin with the reign of John and continue without interruption to the present time. Since the days of Henry VIII. the entries on these rolls are mostly confined to the enrolments of deeds of bargain and sale, wills of papists, recognizances, specifications of new inventions, and other instruments enrolled for safe custody by warrant from the lord chancellor or master of the rolls. Next in importance, and scarcely second in historical interest, is the series of muniments, dating also from King John to the present day, called the patent rolls. Not a subject connected with the history and government of the country but receives illustration from this magnificent collection. Is a castle besieged by the king, a papal interdict removed by royal supplication, a safe-conduct granted to an unpopular prelate, credence allowed to some court witness, grace shown to a rebellious subject, church lands bestowed on begging clergy, negotiations entered into with foreign princes, powers of ambassadors regulated, lands, offices, and wardships granted to public bodies or private persons, titles of nobility created, charters confirmed, proclamations drawn up, licences to hold, sell, and marry, commands to do fealty and homage,—all, whether relating to political, social, ecclesiastical, or commercial life, are to be found recorded on the membranes of the "litteræ patentes." With the exception of a few gaps in the reigns of John and Henry III. the letters-patent extend without break or flaw from the year 1200 to our own day. Unlike the close rolls, they are unsealed and exposed to view, hence their name. The third great class of records belonging to the Court of Chancery consists of the "parliament rolls"; these, however, are far from being a perfect collection, as many of the documents containing the proceedings of various parliaments are hopelessly lost. The series begins with the 6th Edward I. and extends, though with frequent breaks, to Henry VIII. As the journals of the House of Lords do not commence till the reign of Henry VIII., it is only from the parliament rolls that proof can be obtained of a peer having sat in parliament previous to that period; such proof is always requisite in claims to an ancient barony by writ. When complete these rolls contain entries of the various transactions which took place from the opening to the close of each parliament. Unfortunately many of the lost rolls belong to those parliaments which are of the greatest importance for the history of the constitution. The enrolments of Acts of Parliament, however are of considerable help in the investigation of English parliamentary history and constitute a most important supplement to the parliament rolls. They begin with Richard III. and continue to 1849, when enrolments ceased and Acts printed on vellum were substituted. Space forbids us to enter into details respecting the other important collections belonging to the Chancery records. We only allude briefly to the charter rolls, which consist of grants of privileges to religious houses and bodies corporate, and which extend from John to Henry VIII., in which reign grants from the crown were entered on the patent rolls; the coronation rolls, which contain the commissions and proceedings of the commissioners appointed to hear and determine claims of service to be performed at coronations, as well as the oaths taken by the king or queen when crowned,—this collection, with the exception of the coronation rolls of Charles I. and George III., which are wanting, is perfect from James I. to Victoria; the fine rolls, consisting of accounts of fines paid to the king for licences to alienate lands, for freedom from knight service, for pardons, wardships, and the like, which also begin with John and go down to Charles I.; the French and Norman rolls, which relate to transactions in France whilst the English held part of that country; the oblata rolls, consisting of accounts of the offerings and free gifts to the sovereign from his subjects; and the valuable inquisitions post-mortem, frequently but erroneously referred to as escheat rolls, taken on the death of every tenant of the crown. Then in addition to these there are the hundred rolls, the decree rolls, the royal letters, the cartæ antiquæ, the privy seals and signet bills, the subsidy rolls, the Irish, Scotch, and Welsh rolls, the Almain rolls, and numerous other classes of document which it is impossible to catalogue or describe within the limits of a general review of the English archives. Suffice it to say that every class of records is carefully arranged for public inspection and that full and clear indices render research a matter of little difficulty.

Court of Queen's Bench.—As this court takes cognizance of both civil and criminal causes, the former on the crown side and the latter on the plea side of the court, the records are arranged in the two sections, crown side and plea side. Of these records the most important are the judgment or plea rolls. From the time of Richard I. to the year 1702 they were united with the crown rolls, but at that date they were separated. The plea rolls contain the general proceedings in causes, but the modern roll are very defective owing to the neglect of attorneys i bringing the records in. The crown rolls are composed o indictments, informations, and other similar proceeding to which parties have pleaded. Another division of th judgment rolls contains the controlment rolls, which comprise minutes of all the principal proceedings in crown causes, with numerical references to the judgment rolls where the proceedings are entered at length. Apart from the plea rolls the remaining records of this court are of little general interest. Among their number we may notice the attorney's oath roll, containing the oaths required to be subscribed by attorneys on their admission, the "baga de secretis," containing proceedings on attainders (of great interest to the historian), the contents of which have been admirably reported upon by Sir Francis Palgrave, the enrolment of bails, proceedings in outlawry, the jail delivery rolls, and a mass of indictments, recognizances, and other similar documents. The prayer book known as the sealed copy of the "Book of Common Prayer" pursuant to statute 14 Charles II. is also among the records of the Court of Queen's Bench.

Court of Common Pleas.—This court contains a far richer collection than the Court of Queen's Bench, and from the nature of its jurisdiction the documents possess great interest for the genealogist and topographer. Foremost among them is the valuable collection of "feet of fines or final concords," which date from Henry II. to the year 1834, when fines and recoveries were abolished and "more simple modes of assurance substituted." "The utility of these records," says the *Report* of the House of Commons' committee on the state of the public records, "to all persons desirous of tracing property and pedigree is unquestionable." Fines contain the proceedings which have been adopted to convey estates and to free them from their entail to issue and from the dower of wives. Thus we are able to learn the name of the freeholder levying the fine, and if he was married the name of his wife and often of his children, the position and value of his estate, and not unfrequently something about his ancestors. Yet perhaps the chief value of this class of records is that they prove marriages and their issue at a time when parochial registers were not in existence. Few documents show so unbroken a succession from so early a date as these "pedes finium." The king's Silver Office books are the chief indexes to the fines, but they suffered greatly from the fire at the king's Silver Office in the Temple in March 1838. The recovery rolls (since 1834 continued under the name of "disentailing assurances" on the close rolls) also constitute another important supplement to the study of the pedes finium. Next to the collection of fines may be classed the judgment rolls of this court, or, as they are more commonly designated, the "de banco" rolls. They formerly consisted of two parts, the "communia placita" or personal plea rolls, and the "placita terræ" or pleas of lands and deeds enrolled; but after the reign of Elizabeth the latter became distinct rolls, containing the king's silver and fines, assizes, deeds enrolled, and all real actions. The judgment rolls pass through three stages—first, they are plea rolls; then, when the parties join issue, issue rolls; and lastly, when judgments are entered upon them, judgment rolls. The recording of the judgments has, however, been very much neglected, for many of the judgments, instead of being entered on the plea or issue rolls, have been entered on separate pieces of parchment, and thus have given rise to certain distinct bundles called "riders." in which such entries are contained.

Court of Exchequer.—This collection contains next to that of the Court of Chancery the most interesting and valuable series of documents among the English public records. The most important and most prominent series is that of the great rolls of the Exchequer, otherwise called the pipe rolls.[1] As with the close and patent rolls, so with the rolls of the pipe, it is difficult to state what is and what is not entered upon their membranes. Everything which in former times went to swell the revenues of the crown—rents of various kinds, fines, amercements, profits of lands and tenements, and the like—is to be found enrolled upon them. The accounts of the ancient revenue of the crown, digested under the heads of the several counties and annually written out in order to the charging and discharging of the sheriffs and other accountants, are also to be seen upon their membranes. If a great man was outlawed, his goods seized, his daughter married or made a ward, the account thereof can be read in the pipe rolls. To the pedigree-hunter these records are particularly useful, since they contain the names of most men of property; while to the county historian they are invaluable. Few of the English national archives boast a more uninterrupted succession than the great rolls of the Exchequer. Beginning in the second year of Henry II., they continue to the present time with but two gaps—the rolls of the first year of Henry III. and of the seventh year of Henry IV. Of the latter of these missing rolls the antigraph or roll made by the chancellor's scribe is still in existence and supplies the place of the lost roll. At the beginning of this series there is a roll which was long looked upon as that of the first year of Henry II., or by some antiquaries as belonging to the fifth year of Stephen; but recent criticism seems to establish the fact that it is a roll of the 31st year of Henry I.,—the earliest national document, save Domesday, of any extent that now exists. Another important class of documents belonging to the Court of Exchequer and stored with a variety of information upon secular and religious matters is the memoranda rolls, which extend from Henry III. to the middle of the present century. These rolls contain enrolments of all the weighty business done in the offices of the queen's and lord treasurer's remembrancer. Upon their membranes the inquirer will read how writs ran for the recovery of debts due to the crown, how commissions were appointed to seize estates attainted or forfeited to the crown, how goods were seized in the various ports of England for the non-payment of customs, how the accounts of sheriffs and escheators were settled with the Exchequer, how cities and boroughs made claim to special privileges, and how the numerous proceedings in equity on English informations and bills were conducted. The "brevia regia" endorsed on the memoranda rolls are the most ancient writs of that description in the kingdom; in the earlier periods they assume the shape of letters and contain various wishes of the sovereigns. To the antiquary and historian the collection of archives called "originalia rolls," which extend from Henry III. to William IV., is of great service. They not only throw considerable light upon the manners and customs in vogue in the 13th and 14th centuries, but also record the descent of lands, questions relating to crown revenues and feudal tenures, the appointment of various commissions for different purposes of investigation, and other similar entries. The importance of the originalia rolls is also increased from the fact that they contain numerous extracts from early rolls now no longer in existence.

Among the documents of the ancient Exchequer there is much to interest the purely ecclesiastical historian in the collection of ministers' accounts of the issues and profits of monastic lands in the hands of the crown; in the pensions granted to abbots and others upon the dissolution of the monasteries, now enrolled among the records of the Augmentation Office; in the accounts of monasteries contained in the chartularies, the account books of first-fruits and tenths; in the taxation rolls which regulated the taxes as well to the kings as to the popes until the survey of Henry VIII.; in the Valor Ecclesiasticus of Henry VIII., which contains surveys of archbishoprics, bishoprics, abbeys, monasteries, and the like throughout the kingdom; in the visitations of religious houses; and in the Wolsey books. To the antiquary pure and simple the collection in the Exchequer which records the history of knights' service is perhaps the most interesting. The number of knights' fees throughout the kingdom was 60,215, of which the clergy had 28,015; but, as in process of time it became a doubtful question whether lands were held by knight's service or by some other tenure, inquisitions were held and each baron had to return to the king an account of what he held. Such accounts comprise the early history of landed property, with the names of the owners and the extent of the estates. For information on this subject the three great authorities are the Black and Red Books of the Exchequer, the scutage rolls, and the subsidy rolls; the Liber Niger Scaccarii, or Liber Niger Parvus as it is sometimes called, compiled by Gervase of Tilbury, nephew to Henry II., in the twenty-second year of that king's reign, is the most ancient of these. It contains a list of knights' fees of the time of Henry II., and in many of the returns there appear family names and particulars of the parents, children, wives, and occupiers of the land as well as of tenants *in capite.* In this book there are also various treaties of the same king, four bulls of Pope Alexander III., and the constitution of the royal household during the reign of Henry II. The Red Book is somewhat similar to the Liber Niger, and contains among other entries the oaths of the different officers of the Court of Exchequer; the *Dialogus de Scaccario* (formerly ascribed to Gervase of Tilbury, but clearly proved by Madox to have been written by Richard FitzNigel, at one time treasurer of the Exchequer, who held the see of London from 1189 to 1198); numerous short memoranda, &c., for the instruction and use of the officials; and collections of knights' fees and serjeanties of the reigns of Henry II., Richard I., John, and Henry III. Many of its entries are also in the Black Book. The scutage rolls, which begin in the reign of Edward I., contain the pecuniary satisfaction paid by each knight in lieu of the personal attendance upon his sovereign that was required of him. This satisfaction was called "scutagium" or "servitium scuti" (service of the shield), and in Norman-French "escuage," from *écu*, a shield. The assessment was, however, so arbitrary that it was decreed by Magna Charta that no scutage should be imposed without consent of parliament. The subsidy rolls record the fifteenths and tenths, &c., granted by parliament to the crown. In addition to the above are the marshals' rolls, which contain an account of the military service due from great tenants to the king on the eve of a war, the "testa de Nevil," and the solitary roll called the constable's roll. Among the more important documents belonging to the ancient Exchequer collection, concerning which space forbids us to particularize, are the records of the Augmentation Court, full of valuable matter to the church historian, the court rolls of manors possessed by the crown, the voluminous series of bills and answers, the collection of special commissions, the golden bull of Clement VII. conferring the title of "Defender of the Faith" upon Henry VIII., hearth-money accounts, the Jews' rolls, the vast collection of crown leases, the recusant rolls, and the very curious wardrobe accounts.

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[1] In 1883 was founded the Pipe Roll Society, which has for its object the printing of the entire series of pipe rolls from the reign of Henry II.

Obsolete Courts.—In addition to the various records which have been alluded to belonging to the Courts of Chancery, Queen's Bench, Common Pleas, and Exchequer, there is a large class of documents which appertain to obsolete courts, and many of which are of great historical value. The most important of this class are the archives belonging to the Star Chamber, the Court of Chivalry, the Court of Requests, the Court of Wards and Liveries, and the Marshals Court. The muniments of the duchy of Lancaster and also those of the abolished courts of the palatinate of Durham are now among the archives of the Record Office. An account of Domesday Book has already been given (see DOMESDAY BOOK). The amalgamation of the State Paper Office in 1854 with the Record Office has been the means of rendering the series of the English national archives an almost complete collection. With the exception of certain manuscripts in the British Museum and in a few public libraries, most of the public muniments of the realm are now placed in one repository and under the supervision of the master of the rolls.

Upon the subject of the public records Sir Francis Palgrave, under whose auspices as deputy keeper the public muniments were brought together under one roof, writes as follows :—

> "Whether we consider them in relation to antiquity, to continuity, to variety, to extent, or to amplitude of facts and details they have no equals in the civilized world. For the archives of France, the most perfect and complete in Continental Europe, do not ascend higher than the reign of St Louis, and compared with ours are stinted and jejune; whereas in England, taking up our title (so to speak) from Domesday, the documents placed under the custody of the master of the rolls contain the whole of the materials for the history of this country in every branch and under every aspect, civil, religious, political, social, moral, or material from the Norman Conquest to the present day."

History.—In consequence of the neglect and indifference from which the national archives suffered before being housed in their present quarters, it is as much a matter for wonder as for congratulation that any of them are still in existence. In the earlier periods the records of the courts were preserved in the palace of the king; but, when the law courts became stationary and were held within the precincts of the royal palace, instead of following the sovereign from place to place, all legal documents remained in the custody of their respective courts. On the business of the country increasing, the records began to assume such vast proportions that further accommodation had to be obtained. Gradually three warehouses for the custody of public documents came into existence. The records of the King's Bench and Common Pleas were removed to the palace at Westminster, to the old chapter-house, and to the cloister of the abbey of Westminster, and thus laid the foundation of the well-known "chapter-house repository." Towards the end of the reign of Richard I., the Court of Chancery becoming separated from that of the Exchequer, the wardrobe in the Tower of London was used as the chief place of deposit for all Chancery documents, and thus the Record Office in the Tower sprang up. It had been the custom of the earlier masters of the rolls to keep the records of their courts in their private houses; but after the reign of Edward IV. these documents were lodged in what is now styled the "chapel of the rolls," but which was then known as the "domus conversorum Judæorum," or the house for converted Jews and infidels, which had been annexed to the office of the master of the rolls in the reign of Edward III.; an office was subsequently attached to the chapel, and thus arose the record depository known as the "rolls chapel office." For many years these three places of deposit—the chapter-house, the Tower, and the rolls chapel office—constituted the chief repositories for public records; but, as the accommodation that these buildings offered was limited, rooms in private houses, vacant vaults, and even stables had to be taken by the ministers of the day for the storing of the ever-increasing archives. Little care was, however, paid to the preservation of the parchments. They were put into houses and forgotten; their various removals were most carelessly superintended; and they were often left a prey to the pilferings of the curious. Now and again a sovereign or a secretary of state turned his attention to the disgraceful condition in which the muniments of the kingdom were preserved and a sweeping reform was announced; but more important matters always appear to have shelved the subject. In 1567 Queen Elizabeth was informed of the confused and perilous state of the records of her parliament and her chancery, and orders were given for rooms to be prepared in the Tower for the reception of these parchments, Her Majesty declaring that "it was not meet that the records of her chancery, which were accounted as a principal measure of the treasure belonging to herself and to her crown and realm, should remain in private houses and places for doubt of such danger and spoil as theretofore had happened to the like records in the time of Richard II. and Henry VI." This order was, however, never executed. On the accession of Charles II., William Prynne, then keeper of the records in the Tower, implored the king "to preserve these ancient records not only from fire and sword, but water, moths, canker, dust, cobwebs, for your own and your kingdom's honour and service, they being such sacred reliques, such peerless jewels that your noble ancestors have estimated no places so fit to preserve them in as consecrated chapels or royal treasuries and wardrobes where they lay up their sacred crowns, jewels, robes; and that upon very good grounds, they being the principal evidences by which they held, supported, defended their crowns, kingdoms, revenues, prerogatives, and their subjects, their respective lands, lives, liberties, properties, franchises, rights, laws." This earnest appeal was not urged before it was required. On his appointment to office Prynne made an inspection of the records under his custody. He found them "buried together in one confused chaos, dust, and filth in the dark corners of Cæsar's chapel in the White Tower." He employed soldiers and women to remove and cleanse them, "who soon growing weary of this noisome work left them as foul, dusty, and nasty as they found them." He then begged the aid of the clerks of his department, but these officials, "being unwilling to touch the records for fear of fouling their fingers, spoiling their clothes, endangering their eyesight and healths by their cankerous dust and evil scent," declined the task. To the energetic Prynne the labour of methodizing the papers in his charge seemed hopeless; he saw them in confused heaps hidden here and scattered there and destitute of anything approaching to an inde He lamented that it would require "Briareus his hundred hands, Argus his hundred eyes, and Nestor's centuries of years to marshal them into distinct files and make exact alphabetical tables of the several things, names, places, comprised in them." Still nothing was done to remedy the evils complained of. Addresses were presented to parliament upon the subject; reports were drawn up and committees frequently sat; but it was not until the beginning of this century that a complete and satisfactory investigation of the public records was entered into. In the summer of 1800 a very able report upon the state of the archives was drawn up; and a commission was appointed "to methodize, regulate, and digest the records." But the commission directed its attention exclusively to the printing of antiquarian matter, and nothing was attempted for the better preservation of the archives. Dissatisfaction arose, and a select committee of the House of Commons was appointed to inquire into the working of the Record Commission. The result of its sittings was the passing of a special Act of Parliament, which placed the public records in the custody and under the superintendence of the master of the rolls for the time being, and directed the treasury forthwith to provide a suitable building. In 1851 the foundations of the present Record Repository were laid, and seven years afterwards the public records were removed from their different places of deposit and housed in their new quarters, where they are now most carefully preserved.

The history of the custody of the state papers which run from Henry VIII. to the present time is but a repetition of the neglect and ill-treatment which the public records had to endure. When they first began to be preserved they were locked up in chests, then confined in the larder of the privy seal, then lodged in the tower over the gateway of Whitehall Palace, then transferred to the upper floor of the lord chamberlain's lodgings, then despatched to an old house in Scotland Yard; and it was not till 1833 that the State Paper Office in St James's Park was specially erected for their accommodation. Twenty years later it was deemed advisable by the Government of the day to amalgamate the state papers with the public records; the State Paper Office was therefore pulled down and its contents transferred to the repository in Fetter Lane. On making a careful examination of the state of the documents, it was found that many of them had "greatly suffered from vermin and wet," and that the list of those which had been stolen or had strayed from the collection was no small one. Theft and destruction for private ends appear to have been the two chief agents of mischief. During the reign of Henry VIII. many of the despatches were appropriated by Lord St Albans and Lord Cherbury, to whom they were entrusted. In the reign of Queen Elizabeth most of the private business papers of Her Majesty, especially her letters on matters of secret importance, came into the hands of the earl of Leicester and finally into the possession of his secretary and his descendants; and, "though they were ultimately recovered, a great part had perished by time and the distraction of the wars, &c.; being left in England during the Rebellion, many had been abused to the meanest purposes." Upon the outbreak of the Civil War the king's papers from the time he was in the north till the surrender of Oxford were designedly burned; whilst "a fair cabinet of the king's, full of papers of a very secret nature, which had been left by the king upon his retirement to the Scots, amongst which were thought to be all the queen's letters to the king and things of a very mysterious nature," was also destroyed. In the turbulent days of the Commonwealth Bradshaw, in his capacity as president of the council, managed to obtain possession "of divers books, treaties, papers, and records of state," some of which, in spite of all the efforts of Charles II., were not regained. At the Restoration "all the papers of state during the time of the usurpation remained in Thurloe's hands, and Sir Samuel Morland advised a great minister to have them seized, being then privately in four great deal desks; but for reasons left to be judged, that minister delayed to order it, and Thurloe had time to burn them that would have hanged a great many, and he certainly did burn them except some principal ones culled out by himself." During the reign of Charles II. various papers were sent out of the country to The Hague and Sweden for the convenience of ambassadors, many of which were never returned. Indeed so carelessly did ministers watch their own documents that a treaty concluded with Holland in 1654 was bought at an auction, and the original treaty with Portugal in the same year was found on a stall in the street. Within almost a comparatively recent date there were instances of documents sent out of the State Paper Office which were never returned,—a fact which may account for many of the purely official papers to be found in the manuscript collections of private individuals.

In spite, however, of past thefts and negligence, the state papers, like the public records, are a most wealthy and valuable collection. Their contents were considered so important that at one time it was a matter of the greatest difficulty for any outsider to obtain access to them. The keeper of the state papers was bound by oath "to let no man see anything in the office of His Majesty's papers without a warrant from the king." He was also "tied by a strict oath and by His Majesty's commands to deliver nothing out of the office unless to the lords and others of the council." During the whole history of the State Paper Office the keeper never had power to grant on his own authority leave to consult the papers; such permission could only be obtained from the secretary of state, to whose office the documents belonged. Among the persons fortunate enough to have this favour accorded them, we find that in 1670 Evelyn was lent several documents which related to Holland; that in 1679 Dr Gilbert Burnet was permitted by warrant "from time to time to have the sight and use of such papers and books as he shall think may give him information and help in finishing his history of the Reformation of the Church of England"; and that in the same year Prince Rupert made a personal request to the king on behalf of Roger L'Estrange, who was writing a history of the Civil War in England. In later times permission was more freely given, though the "library of MSS." was still most vigilantly guarded, and applications were more often refused than granted. As an instance of the strictness with which the state papers were preserved, we find that as late as 1775 Lord North, though he was then prime minister, had to beg the king's permission to have free access to all correspondence in the Paper Office; and that in 1760 it was necessary for the Ordnance Office to have permission to search the Paper Office for any documents that regarded their department. These restrictions have now been entirely removed, thanks to the late Lord Romilly; when he was master of the rolls, the public records were thrown open to the public free of all the charges that were formerly demanded for investigation, whilst the same liberal course has been pursued with regard to the state papers down to the year 1760. After that date special permission has to be obtained. Calendars and indexes of the public records are annually published in the appendices to the reports of the deputy-keeper of the public records. Large volumes—entitled *Calendars of State Papers*—consisting of condensations of the documents in the Public Record Office and elsewhere from the days of Henry VIII. to the 18th century are now in course of publication.

See Sir T. D. Hardy, *Introduction to the Close and Patent Rolls*; *Fine Rolls*, ed. C. Roberts; *Feet of Fines*, ed. Joseph Hunter; Thomas Madox, *History and Antiquities of the Exchequer*; *Great Roll of the Pipe*, ed Joseph Hunter; the *Record Report* of 1800; Noel Sainsbury, "The State Paper Office," in the deputy-keeper's *Thirtieth Report* (Appendix), A. C. Ewald, *Our Public Records*. (A. C. E.)

REDBREAST, the name of a bird which from its manners, no less familiar than engaging, has for a long while been so great a favourite among all classes in Great Britain as to have gained an almost sacred character. The pleasing colour of its plumage—one striking feature of which is expressed by its ancient name—its sprightly air, full dark eye, enquiring and sagacious demeanour, added to the trust in man it often exhibits, but, above all, the cheerful sweetness of its song, even "when winter chills the day" and scarce another bird is heard—combine to produce the effects just mentioned, so that among many European nations it has earned some endearing name, though there is no country in which "Robin Redbreast" is held so highly in regard as England.[1] Well known as is its appearance and voice throughout the whole year in the British Islands, there are not many birds which to the attentive observer betray more unmistakably the influence of the migratory impulse; but somewhat close scrutiny is needed to reveal this fact. In the months of July and August the hedgerows of the southern counties of England may be seen to be beset with Redbreasts, not in flocks as is the case with so many other species, but each individual keeping its own distance from the next[1]—all, however, pressing forward on their way to cross the Channel. On the European continent the migration is still more marked, and the Redbreast on its autumnal and vernal passages is the object of hosts of bird-catchers, since its value as a delicacy for the table has long been recognized.[2] But even those Redbreasts which stay in Britain during the winter are subject to a migratory movement easily perceived by any one that will look out for it. Occupying during autumn their usual haunts in outlying woods or hedges, the first sharp frost at once makes them change their habitation, and a heavy fall of snow drives them towards the homesteads for such food as they may find there, while, should severe weather continue long and sustenance become more scarce, even these stranger birds disappear—most of them possibly to perish—leaving only the few that have already become almost domiciled among men. On the approach of spring the accustomed spots are revisited, but among the innumerable returning denizens Redbreasts are apt to be neglected, for their song not being powerful is drowned or lost, as Gilbert White well remarked, in the general chorus.

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[1] English colonists in far distant lands have gladly applied the common nickname of the Redbreast to other birds that are not immediately allied to it. The ordinary "Robin" of North America is a Thrush, *Turdus migratorius* (see FIELDFARE, vol. ix. p. 142), and one of the Bluebirds of the same continent, the *Sialia sialis* of most ornithologists, is in ordinary speech the Blue "Robin"; while the same familiar name is given in the various communities of Australasia to several species of the genus *Petrœca*, though some have no red breast.

From its abundance, or from innumerable figures, the Redbreast is too well known to need description, yet there are very few representations of it which give a notion of its characteristic appearance or gestures—all so suggestive of intelligence. Its olive-brown back and reddish-orange breast, or their equivalents in black and white, may be easily imitated by the draughtsman; but the faculty of tracing a truthful outline or fixing the peculiar expression of this favourite bird has proved to be beyond the skill of almost every artist who has attempted its portraiture. The Redbreast exhibits a curious uncertainty of temperament in regard to its nesting habits. At times it will place the utmost confidence in man, and again at times shew the greatest jealousy. The nest, though generally pretty, can seldom be called a work of art, and is usually built of moss and dead leaves, with a moderate lining of hair. In this are laid from five to seven white eggs, sprinkled or blotched with light red.

Besides the British Islands, the Redbreast (which is the *Motacilla rubecula* of Linnæus and the *Erithacus rubecula* of modern authors) is generally dispersed over the continent of Europe, and is in winter found in the oases of the Sahara. Its eastern limits are not well determined. In Northern Persia it is replaced by a very nearly allied form, *Erithacus hyrcanus*, distinguishable by its more ruddy hues, while in Northern China and Japan another species, *E. akahige*, is found of which the sexes differ somewhat in plumage—the cock having a blackish band below his red breast, and greyish-black flanks, while the hen closely resembles the familiar British species—but both cock and hen have the tail of chestnut-red. A beautiful bird supposed to inhabit Corea, the *Sylvia komadori* of Temminck, of which specimens are very scarce in collections, is placed by some writers in the genus *Erithacus*, but whether it has any very close affinity to the Redbreasts does not yet seem to be proved. It is of a bright orange-red above, and white beneath, the male, however, having the throat and breast black. (A. N.)

REDDITCH, a town of Worcestershire, is situated on an eminence near the Warwickshire border, 16 miles south-west of Birmingham by the Midland Railway. The church of St Stephen, a handsome building in the Decorated style, erected in 1854-55, contains some good stained-glass windows. A public cemetery was formed in 1854. Among the public buildings are the county court, where special sessions are held, and the literary and scientific institute. In the neighbourhood are the remains of Bordesley Abbey, founded by the Cistercians in 1138. The town is an important seat of the needle manufacture. The urban sanitary district (area about 926 acres) had a population of about 7871 in 1871, and of 9961 in 1881.

REDEMPTORISTS or LIGUORIANS. See LIGUORI, vol. xiv. p. 635.

RED RIVER. Three at least of the many Red Rivers of the world deserve to be mentioned,—(1) the Red River or Fleuve Rouge, the Songcoi or Thao of the Anamese, the Hoang-Kiang of the Chinese, which flows through the heart of TONG-KING (*q.v.*); (2) the Red River which rises in the Stake Plain in Texas (U.S.), passes through a magnificent cañon 100 miles long, and from 200 to 1000 feet deep, and furnishes a navigable channel of 1200 miles before it reaches the MISSISSIPPI (*q.v.*); (3) the Red River of the North, a somewhat smaller stream, which, rising in Elbow Lake (so called from its shape) in Minnesota (U.S.), not far from the sources of the Mississippi, crosses into Canada at Pembina, and falls into Lake Winnipeg, after a course of 565 miles (110 in Canada). The Red River of the Mississippi presents the physical geographer with a phenomenon nowhere reproduced on the same scale,—a great raft of timber and driftwood, which, in spite of the labours of Captain Shreve (1835-39) and General Williamson and Captain Linnard (1841-45), had by 1871 increased so as to block the channel for 45 miles between Spring Creek and Caroline Bluff. The Red River of the North is equally famous as the scene of some of the leading events in the history of the North-West.

RED RIVER SETTLEMENT.—In 1811 the fifth earl of Selkirk (1771-1820), who had devoted special attention to emigration as a means of providing for the surplus population of the Scottish Highlands, obtained from the Hudson's Bay Company a grant of land in what was then called the district of Ossiniboia (Assiniboia). In 1813 a settlement was founded by his agent, Mr Miles Macdonell, on the banks of the Red River, the first fort (Fort Daer) being at Pembina. By 1814 the settlers numbered 200. The North-West Fur-Traders of Manchester (a company which was the bitterest rival of the Hudson's Bay Company till the two amalgamated in 1821) did all they could by force and fraud to break up the colony, which, by 1816, had taken up its headquarters at Fort Douglas, on the site of the present town of Winnipeg. The French-Indian half-breeds (Bois-Brûlés) were incited against it, and its mills and houses were burned. The earl of Selkirk, arriving on the scene, succeeded in reorganizing the community, to which the name of Kildonan was now given, after Kildonan in Helmsdale, Sutherlandshire. He found himself personally involved in a very network of hostile intrigue; but the colony was saved, and after his premature death it continued to be more or less supported by his heirs till 1824. In 1835 Lord Selkirk's territorial claims were transferred to the Hudson's Bay Company, who undertook to pay the expenses incurred by the family. At that date the population of the settlement consisted of about 5000 Highlanders, Bois-Brûlés, English half-breeds, and retired company officials. At the transfer of territorial jurisdiction to the Canadian Government in 1869 the Bois-Brûlés, under a certain Louis Riel (son of a Frenchman who had built the first mill on the Red river), revolted and declared an independent republic. Colonel (now Lord) Wolseley was despatched with a force of 1400 men, and without bloodshed took possession of Fort Garry on 24th August 1870. The only striking feature of the expedition was the remarkable energy with which the difficulties of transport were overcome. Riel in 1885 became the leader of another unsuccessful insurrection of half-breeds in the same region.

See Halkett, *Statement respecting the Earl of Selkirk's Settlement upon the Red River*, London, 1817; G. Bryce, *Manitoba*, 1882 (which contains previously unpublished documents); "Narrative of the Red River Expedition," in *Blackwood's Magazine*, vols. cviii. and cix. (1871).

REDRUTH, a market town of Cornwall, is pleasantly situated on the West Cornwall Railway, about 9 miles west of Truro. It is almost the centre of the mining district of West Cornwall, and, though many of the rich copper mines are now abandoned, others have proved rich in tin at greater depths, and new mines have also been opened, sufficient to render Redruth one of the most busy and important towns of the county. Within the last few years a post-office, a mining exchange, and a school of science and art have been built, as well as a new church. At the foot of Carn Brea, the unique Druidical hill, surmounted by masses of granite, with an ancient castle and monument to Lord de Dunstanville, is the parish church dedicated to St Uny, with a fine old 15th-century tower and peal of bells. The industries include brewing, tin-smelting, making of safety fuses, and iron-founding. Besides the market-house, there are a granite town-hall, a masonic hall, and the public rooms with Druids' Hall. At the west end of the town is the West Cornwall Miners' Hospital (thirty beds), erected by Lord Robartes in 1863 and since added to by the same nobleman. The population of the urban sanitary district (area 4006 acres) in 1871 was 10,685, and in 1881 it was 9335.

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[1] It is a very old saying that *Unum arbustum non alit duos Erithacos*—one bush does not harbour two Redbreasts.

[2] Of late years an additional impulse has been given to the capture of this species by the absurd fashion of using its skin for the trimming of ladies' dresses and "Christmas cards."

RED SEA. The Red Sea runs north-north-west from the Gulf of Aden in the Indian Ocean for about 1200 miles, extending from 12° 40′ to 30° N. lat. The Strait of Bab-el-Mandeb at the entrance to the Gulf of Aden is 13½ miles across, and is divided by Perim Island into two channels, the north-eastern narrow and shallow, the south-western 10 miles wide, and deep. The sea widens rapidly to 140 miles in 16° N. lat., and more gradually to 205 miles off Ḳunfuda in 19° N. lat.; from this point it narrows to 115 miles in 24° N. lat., a breadth which is maintained up to 27° 45′ N. lat., where the sea divides into two gulfs, those of Suez and ‘Aḳaba. The Gulf of Suez continues in the north-north-west direction for 170 miles, with an average width of 30 miles; that of ‘Aḳaba is narrower, and runs north-north-east for 97 miles. The Sinaitic peninsula between the two gulfs bounds the Red Sea to the north; on the east the Arabian coast and on the west the coasts of Egypt, Nubia, and Abyssinia form the boundaries.

The Arabian coast (see ARABIA) is generally a narrow sandy plain backed by ranges of barren mountains abrupt in outline and of moderate height. Enormous coral reefs run along the coast in broken lines, parallel to the shore but not connected with it. They usually rise out of deep water to within a few feet of the surface; and a navigable channel of from 2 to 3 miles in width, in which the water is always calm, extends between them and the land. The Farisan Archipelago in 17° N. lat. is the largest and most important of the island groups of the eastern reef. It is entirely of organic formation. The most important harbours of Arabia on the Red Sea are Mokha in 13° 30′ N. lat. (now nearly deserted for those of Aden and Hodeida, the port of San‘a), Loḳeyyah about 200 miles farther north, Jiddah in 21° 20′ N. lat. (the only well protected harbour), and Yenbo‘ in 24° N. lat. The western coast is flat and desert in the north, but gives place farther south to high tablelands rising at some distance from the shore, and then to the lofty Abyssinian mountains (see ABYSSINIA, AFRICA, EGYPT) The parallel system of coral reefs is not so extensive as on the east coast, and being nearer the land the inshore channel is narrower. The large and curiously shaped coral-rock island of Dahlak, lying off Annesley Bay, is the most important on the reef. There are seven or eight harbours, of which the best known are Massowah, a little to the north of Annesley Bay (the largest inlet on the sea), and the port of disembarkation of the British troops in the Abyssinian War of 1868, Khor Nowarat, which, though small, is the best bay in the Red Sea, and Sawákin (Suakim) in 19° 30′ N. lat., the chief port of the Soudan trade.

The only islands of importance not already mentioned are those of the volcanic group in 14° N. lat., one of which, Jebel Zugur, 10 miles long and 7 wide, rises in a series of bare hills to the altitude of 2074 feet, and the islet Jebel Teir in 15° 30′ N. lat., on which a volcano has only recently become inactive. A dangerous reef named the Dædalus in 24° 26′ N. lat. lies right in the way of steamships traversing the sea; it is covered with a few feet of water or uncovered, according to the season, and, like most of the reefs and islands on the usual track of vessels, is furnished with a lighthouse.

The Red Sea area is in a state of gradual upheaval, the former seaport of Adulis on Annesley Bay is now 4 miles from the shore, and at Suez the former limits of the sea can be traced for several miles northwards; whereas the north coast of Egypt is undergoing gradual subsidence.

Tides.—The tides are imperceptible at many places on the Red Sea, and where observable they are extremely uncertain, varying both as to time and to amount of rise with the direction and force of the wind. At Suez, where they are most regular, the rise varies from 7 feet at spring to 4 feet at neap tides. The surface-currents of the sea are also variable and perplexing; they are chiefly produced by the wind, and change in velocity and direction accordingly.

Traffic.—From the decline of the old Indian trade with Egypt till the formation of the Peninsular and Oriental Steam Navigation Company and the overland route to India in 1840, traffic in the Red Sea was almost entirely confined to small native vessels trading with grain and fruit between Egypt and Arabia, and carrying pilgrims to Jiddah, the port of Mecca. Since 1840 passenger traffic, and since the opening of the Suez Canal in 1869 trade of all kinds in European vessels, have greatly increased. A telegraphic cable was laid from Bombay to Suez in 1859.

Meteorology.—The climate of the Red Sea region is one of the hottest in the world. The altitude of the sun, the almost continually cloudless skies, the arid rainless character of the shores, and the complete absence of rivers combine to make the mean temperature high. That of the air usually ranges from 70° to 94° Fahr., though it has been frequently observed as high as 105° in the shade on board ship, and in the northern part of the sea the clearness of the nights promotes radiation, so that by morning the thermometer may fall to the freezing-point on shore. The atmosphere over the land is very dry; the difference between the readings of the wet and dry bulb thermometers is frequently as much as 25°, and sometimes, during the prevalence of the desert wind, it rises to 40°. The evaporation from the Red Sea is naturally excessive; the humidity of the air over the water is always great in summer, and when the wind blows off the sea the atmosphere is frequently saturated on shore. From the direction of the prevailing winds, precipitation takes place chiefly on the mountains of Abyssinia. North-north-west winds prevail on shore all the year round with very slight exception; but in the middle of the sea they are only universal from June to September, and are confined to the northern half from October to May. During the latter season south-south-east winds prevail in the southern part of the sea, while a belt of calms and light variable breezes occupies a changing position near the centre. The southerly winds are often accompanied with rain squalls, and in September there are frequently calms and hazy weather. Hurricanes and heavy storms seldom occur in the sea, but moderate gales are common and sandstorms not unusual. From the admiralty temperature charts it appears that the mean temperature of the surface-water at the four typical seasons of the year, taking all available data into account, is as follows:—

	Gulf of Suez.	About 20° N. lat.	South End.	Adjacent Indian Ocean.
February	65°	75°	78°	84°
May	76°	80°	87°	85°
August	79°	85°	89°	79°
November	76°	86°	82°	82°

The temperature of the water at the south end of the sea is usually in excess of that of the air, and it is on record that on four consecutive days the temperature of the surface-water was 100°, 106°, 100°, and 96°, while at the same time that of the air was 80°, 82°, 83°, and 82°. The surface-temperature varies from 70° to 90°, according to the position and the season. The winter mean of the northern part is about 71°, and this temperature continues to the bottom at that season. When the temperature on the surface is higher than 71° it gradually falls as the depth increases, until at about 200 fathoms it becomes uniform in all parts of the sea as 71°, a temperature which is maintained from that depth to the bottom all the year round. This is in consonance with all observations made on enclosed seas, the water below the point to which the barrier reaches being of uniform temperature. According to some authorities this is the isocheimal or mean winter temperature of the surface; but the researches of the "Challenger" seem to indicate that the temperature of the external ocean at the summit of the barrier is that which extends to the bottom of the enclosed sea.

Physical Conditions.—The greatest depth, which occurs in 21° N. lat., is about 1200 fathoms, and from this point the sea shoals to each end. The general conformation of the bottom is that of a series of gradually sloping rounded elevations with rounded basins between them. The water is shallow in the Gulf of Suez and also at the Strait of Bab-el-Mandeb, where the depth in the centre of the large channel is a little under 200 fathoms. The Red Sea basin is cut off from the general oceanic circulation by a barrier rising to within 200 fathoms of the surface in a channel that has a much smaller average depth and is only 13½ miles wide. As no rivers discharge into it and little rain falls, it must be viewed as a purely evaporational area, and as such it is of extreme scientific interest. It reproduces and exaggerates all the special physical conditions of the Mediterranean; but on account of the extremely trying nature of the climate it has not been so thoroughly investigated. The average amount of evaporation at Aden is variously estimated at from 0·25 to 0·75 inch per day, or from 8 to 23 feet per year; in the Red Sea generally it must be at least equal to the smaller figure, and probably exceeds it. As the level of the Red Sea is not subject to any permanent change it is evident that water must flow in through the Strait of Bab-el-Mandeb—the slight current through the Suez Canal need not be considered—to replace loss by evaporation. If there were no return current it is estimated that the Red Sea would become a mass of solid salt in one or two thousand years. Although the salinity of the water is higher than that of the water of the ocean it does not appear to be on the increase. The density of Red Sea water at 60° Fahr. is about 1·030, corresponding to 4·0 per cent. of total salts, while that of average ocean water is 1·026, which corresponds to 3·5 per cent. of salts. In order to account for the constancy of salinity in the Red Sea it is necessary to assume the existence of strong undercurrents of salt water passing out of the sea, beneath the opposite entering current of fresher water. These undercurrents have not yet been observed, but there are indirect proofs of their existence. During the hottest months (July to September), when there is most evaporation, the prevalence of northerly winds drives the water out of the Red Sea as a rapid surface-drift; the south-west monsoon is blowing in the Indian Ocean at the same time, and the general level in the Red Sea is from 2 to 3 feet higher than during the cooler months, when evaporation is less, and when the north-east monsoon forces water into the funnel-shaped Gulf of Aden, and thence through the Strait of Bab-el-Mandeb. This is held by Dr W. B. Carpenter to be a proof of the existence of an undercurrent, for the north-east wind forms a head of water at the strait, which to equalize pressure over the area produces an under-return-current, and this greatly accelerates the flow of the regular undercurrent of the Red Sea, and so lowers the general level. In summer the outflow of dense salt water is slower, and this more than neutralizes the effect of the outward surface-drift, which to some extent reduces the volume of the entering fresher water at that season. In the Red Sea there is a constant and regular sub-surface circulation of water due solely to evaporation; the surface-drifts caused by wind, although they form rapid currents and render navigation dangerous at times, are minor agents in the system and modify it only to a slight extent. The Red Sea and the Persian Gulf serve as concentration areas for maintaining the salinity of the deep water in the Indian Ocean, in opposition to the currents of comparatively fresh-water flowing northwards from the Antarctic Ocean.

Deposits.—In a sea so nearly landlocked and so narrow the deposits which cover the bottom are naturally of the order classed as terrigenous. The large quantity of sand blown into the sea, the immense abundance of corals and other calcareous organisms in the water, and the entire absence of rivers with their suspended sediments produce deposits more nearly resembling in some of their characteristics those of the open ocean than those of inland seas. But the sand and ooze from the bottom of the Red Sea have not yet been thoroughly examined.

Fauna.—Animal life in all its forms is extremely abundant in the Red Sea, which, however, cannot be said to have been any more completely surveyed from a biological than from a physical point of view, although several eminent zoologists have studied special types. Great numbers of new species have been discovered by each investigator, and it has been ascertained that the Red Sea fauna differs considerably from that of the Mediterranean, not more than twenty species being common, it is stated, to both, thus indicating that the separation of the two seas must have taken place at a remote epoch, which appears from geological evidence to be the Eocene period. It exhibits affinities with the fauna of the Pacific, particularly with that of the coast of Japan. Corals are more plentiful and more active in the Red Sea than in almost any other piece of water of its size, a result probably due equally to the high temperature, the great salinity of the water, and the abundance of food. (H. R. M.)

REDSHANK, the usual name of a bird—the *Scolopax calidris* of Linnæus and *Totanus calidris* of modern authors—so called in English from the colour of the bare part of its legs, which, being also long, are conspicuous as it flies over its marshy haunts or runs nimbly beside the waters it affects. In suitable localities it is abundant throughout the greater part of Europe and Asia, from Iceland to China, mostly retiring to the southward for the winter, though a considerable number remain during that season along the coasts and estuaries of some of the more northern countries. Before the great changes effected by drainage in England it was a common species in many districts, but at the present day there are very few to which it can resort for the purpose of reproduction. In such of them as remain, its lively actions, both on the ground and in the air, as well as its loud notes render the Redshank, during the breeding-season, one of the most observable inhabitants of what without its presence would often be a desolate spot, and invest it with a charm for the lover of wild nature. At other times the cries of this bird may be thought too shrill, but in spring the love-notes of the male form what may fairly be called a song, the constantly repeated refrain of which—*leero, leero, leero* (for so it may be syllabled)—rings musically around, as with many gesticulations he hovers in attendance on the flight of his mate; or, with a slight change to a different key, engages with a rival; or again, half angrily and half piteously complains of a human intruder on his chosen ground. The body of the Redshank is almost as big as a Snipe's, but its longer neck, wings, and legs make it appear a much larger bird. Above, the general colour is greyish-drab, freckled with black, except the lower part of the back and a conspicuous band on each wing, which are white, while the flight-quills are black, thus producing a very harmonious effect. In the breeding-season the back and breast are mottled with dark brown, but in winter the latter is white. The nest is generally concealed in a tuft of rushes or grass, a little removed from the wettest parts of the swamp whence the bird gets its sustenance, and contains four eggs, usually of a rather warmly tinted brown with blackish spots or blotches; but no brief description can be given that would point out their differences from the eggs of other birds, more or less akin, among which, those of the LAPWING (vol. xiv. p. 308) especially, they are taken and find a ready sale.

The name Redshank, prefixed by some epithet as Black, Dusky, or Spotted, has also been applied to a larger but allied species—the *Totanus fuscus* of ornithologists. This is a much less common bird, and in Great Britain as well as the greater part of Europe it only occurs on its passage to or from its breeding-grounds, which are usually found south of the Arctic Circle, and differ much from those of its congeners—the spot chosen for the nest being nearly always in the midst of forests and, though not in the thickest part of that, often with trees on all sides, generally where a fire has cleared the undergrowth, and mostly at some distance from water. This peculiar habit was first ascertained by Wolley in Lapland in 1853 and the following year. The breeding-dress this bird assumes is also very remarkable, and seems (as is suggested) to have some correlation with the burnt and blackened surface interspersed with white stones or tufts of lichen on which its nest is made—for the head, neck, shoulders, and lower parts are of a deep black, contrasting vividly with the pure white of the back and rump, while the legs become of an intense crimson. At other times of the year the plumage is very similar to that of the common Redshank, and the legs are of the same light orange-red. (A. N.)

REDSTART, a bird well known in Great Britain, in many parts of which it is called Firetail—a name of almost the same meaning, since "start" is from the Anglo-Saxon *steort*, a tail.[1] This beautiful bird, the *Ruticilla phœnicurus* of most ornithologists, returns to England about the middle or towards the end of April, and at once takes up its abode in gardens, orchards, and about old buildings, when its curious habit of flirting at nearly every change of position its brightly-coloured tail, together with the pure white forehead, the black throat, and bright bay breast of the cock, renders him conspicuous, even if attention be not drawn by his lively and pleasing though short and intermittent song. The hen is much more plainly attired; but the characteristic colouring and action of the tail pertain to her equally as to her mate. The nest is almost always placed in a hole, whether of a tree or of a more or less ruined building, and contains from five to seven eggs of a delicate greenish-blue, occasionally sprinkled with faint red spots. The young on assuming their feathers present a great resemblance to those of the REDBREAST (*supra*, p. 314) at the same age; but the red tail, though of duller hue than in the adult, forms even at this early age an easy means of distinguishing them. The Redstart breeds regularly in all the counties of England and Wales; but, except in such localities as have been already named, it is seldom plentiful. It also reaches the extreme north of Scotland; but in Ireland it is of very rare occurrence. It appears throughout the whole of Europe in summer, and is known to winter in the interior of Africa. To the eastward its limits cannot yet be exactly defined, as several very nearly allied forms occur in Asia; and one, *R. aurorea*, represents it in Japan.

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[1] On this point the articles "Stark-naked" and "Start" in Prof. Skeat's *Etymological Dictionary* may be usefully consulted; but the connexion between these words would be still more evident had this bird's habit of quickly moving its tail been known to the learned author.

A congeneric species which has received the name of Black Redstart,[1] *Ruticilla titys*,[2] is very common throughout the greater part of the Continent, where, from its partiality for gardens in towns and villages, it is often better known than the preceding species. It yearly occurs in certain parts of England, chiefly along or near the south coast, and curiously enough during the autumn and winter, since it is in central Europe only a summer visitor, and it has by no means the high northern range of *R. phœnicurus*. The males of the Black Redstart seem to be more than one year in acquiring their full plumage (a rare thing in Passerine birds), and since they have been known to breed in the intermediate stage this fact has led to such birds being accounted a distinct species under the name of *R. cairii*, thereby perplexing ornithologists for a long while, though now almost all authorities agree that these birds are, in one sense, immature.

More than a dozen species of the genus *Ruticilla* have been described, and the greater number of them seem to belong to the Himalayan Sub-region or its confines. One very pretty and interesting form is the *R. moussieri* of Barbary, which no doubt allies the Redstart to the STONE-CHATS (*q.v.*), *Pratincola*, and of late some authors have included it in that genus. In an opposite direction the Bluethroats, apparently nearer to the Redstarts than to any other type, are by some authorities placed in the genus *Ruticilla*, by others considered to form a distinct genus *Cyanecula*, and by at least one recent writer referred to the genus *Erithacus* (see REDBREAST). If we look upon them as constituting a separate genus we find it to contain two or three distinguishable forms:—(1) *C. suecica*, with a bright bay spot in the middle of its clear blue throat, breeding in Scandinavia, Northern Russia, and Siberia, and wintering in Abyssinia and India, though rarely appearing in the intermediate countries, to the wonder of all who have studied the mystery of the migration of birds; next there is (2) *C. leucocyanea*, with a white instead of a red gular spot, a more Western form, ranging from Barbary to Germany and Holland; and lastly (3) *C. wolfi*, thought by some authorities (and not without reason) to be but an accidental variety of the preceding (2), with its throat wholly blue,—a form of comparatively rare occurrence. The first of these is a not unfrequent, though very irregular visitant to England, while the second has appeared there but seldom, and the third never, so far as is known. By the ornithologist of tolerably wide views the Redstarts and Bluethroats must be regarded as forming with the NIGHTINGALE (vol. xvii. p. 498), Redbreast, Hedge-Sparrow, Wheatear, and Chats a single group of the "Family" *Sylviidæ*, which has been usually called *Saxicolinæ*, and is that which is most nearly allied to the Thrushes (see THRUSH).

In America the name Redstart has been not unfittingly bestowed upon a bird which has some curious outward resemblance, both in looks and manners, to that of the Old Country, though the two are in the opinion of some systematists nearly as widely separated from each other as truly Passerine birds well can be. The American Redstart is the *Setophaga ruticilla* of authors, belonging to the purely New-World family *Mniotiltidæ*, and to a genus which contains about a dozen species, ranging from Canada (in summer) to Bolivia. The wonderful likeness, coupled of course with many sharp distinctions, upon which it would be here impossible to dwell, between the birds of these two genera of perfectly distinct origin, is a matter that must compel every evolutionist to admit that we are as yet very far from penetrating the action of Creative Power, and that especially we are wholly ignorant of the causes which in some instances produce analogy. (A. N.)

REDWING, Swedish *Rödvinge*, Danish *Röddrossel*, German *Rothdrossel*, Dutch *Koperwiek*, a species of THRUSH (*q.v.*), the *Turdus iliacus* of authors, which is an abundant winter visitor to the British Islands, arriving in autumn generally about the same time as the FIELDFARE (vol. ix. p. 142) does. This bird has its common English name[3] from the sides of its body, its inner wing-coverts, and axillaries being of a bright reddish-orange, of which colour, however, there is no appearance on the wing itself while the bird is at rest, and not much is ordinarily seen while it is in flight. In other respects it is very like a Song-Thrush, and indeed in France and some other countries it bears the name Mauvis or Mavis, often given to that species in some parts of Britain; but its coloration is much more vividly contrasted, and a conspicuous white, instead of a light brown, streak over the eye at once affords a ready diagnosis. The Redwing breeds in Iceland, in the subalpine and arctic districts of Norway, Sweden, and Finland, and thence across Northern Russia and Siberia, becoming scarce to the eastward of the Yenissei, and not extending beyond Lake Baikal. In winter it visits the whole of Europe and North Africa, occasionally reaching Madeira, while to the eastward it is found at that season in the north-western Himalayas and Kohat. Many writers have praised the song of this bird, comparing it with that of the NIGHTINGALE (vol. xvii. p. 498); but herein they seem to have been as much mistaken as in older times was Linnæus, who, according to Nilsson (*Orn. Svecica*, i. p. 177, note), failed to distinguish in life this species from its commoner congener *T. musicus*. The notes of the Redwing are indeed pleasing in places where no better songster exists; but the present writer, who has many times heard them under very favourable circumstances, cannot but suppose that those who have called the Redwing the "Nightingale" of Norway or of Sweden have attributed to it the credit that properly belongs to the Song-Thrush; for to him it seems that the vocal utterances of the Redwing do not place it even in the second rank of feathered musicians. Its nest and eggs a good deal resemble those of the Blackbird, and have none of the especial characters which distinguish those of the Song-Thrush. (A. N.)

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[1] The author of a popular work on British birds has suggested for this species the name of "Blackstart," thereby recording his ignorance of the meaning of the second syllable of the compound name as already explained, for the Black Redstart has a tail as red as that of the commoner English bird.

[2] The orthography of the specific term would seem to be *titis* (*Ann. Nat. History*, ser. 4, x. p. 227), a word possibly cognate with the first syllable of Titlark and Titmouse.

[3] Many old writers assert that this bird used to be known in England as the "Swinepipe"; but, except in books, this name does not seem to survive to the present day. There is no reason, however, to doubt that it was once in vogue, and the only question is how it may have arisen. If it has not been corrupted from the German *Weindrossel* or some other similar name, it may refer to the soft inward whistle which the bird often utters, resembling the sound of the pipe used by the swineherds of old when collecting the animals under their charge, whether in the wide stubbles or the thick beech-woods; but another form of the word (which may, however, be erroneous) is "Windpipe," and this might lead to a conclusion very different, if indeed to any conclusion at all. "Whindle" and "Wheenerd" have also been given as two other old English names of this bird (*Harl. Miscellany*, 1st ed., ii. p. 558), and these may be referred to the local German *Weindrustle* and *Winsel*.

RED WING, a city of the United States, capital of Goodhue county, Minnesota, occupies a commanding site on a plateau encircled by high bluffs (nearly 300 feet high), on the west bank of the Mississippi, 41 miles south of St Paul on the La Crosse division of the Chicago and St Paul Railroad; it is also the eastern terminus of the Cannon Valley branch of the same railway. Red Wing has an opera-house and a music-hall; it trades in lumber, manufactures earthenware, waggons and carriages, furniture, flour, leather, and boots and shoes, and exports large quantities of wheat. The population was 4260 in 1870 and 5876 in 1880; in 1885 it was estimated at 8000, including 1050 employés in manufactories.

REDWOOD. See Sequoia.

REED, a term applied to several distinct species of large, water-loving grasses. The common or water reed, *Phragmites communis*, Trin. (*Arundo phragmites*, L.), occurs along the margins of lakes, fens, marshes, and placid streams, not only throughout Britain but over the Palæarctic and Nearctic regions, and even in South Australia. Another very important species is *Psamma arenaria*, R. and S. (*Ammophila* or *Arundo arundinacea*, Host.), the sea-reed or marram grass, a native of the sandy shores of Europe and North Africa. Both species have been of notable geological importance, the former binding the soil and so impeding denudation, and actually converting swamp into dry land, largely by the aid of its tall (5 to 10 feet) close set stems, which not only break the currents of water around them, and so cause deposition of their sediment, but furnish in themselves an important annual contribution to the incipient soil. The latter species, of which the branching rootstocks may be traced 30 or even 40 feet, is of still greater importance in holding sand-dunes against the encroachments of the sea, and for this purpose has not only been long protected by law but has been extensively planted on the coasts of Norfolk, Holland, Gascony, &c. Other reeds are *Calamagrostis* (various species), *Gynerium argenteum* (pampas grass), *Deyeuxia*, &c., also *Arundo Donax*, the largest European grass (6 to 12 feet high), which is abundant in southern Europe. Reeds have been extensively used from the earliest times in thatching and in other branches of construction, and also for arrows, the pipes of musical instruments. &c. Reed pens are still used in the East (see Pen). Plants belonging to other orders occasionally share the name, especially the bur-reed (*Sparganium*) and the reed-mace (*Typha*), both belonging to the natural order *Typhaceæ*. The bulrushes (*Scirpus*), belonging to the natural order *Cyperaceæ*, are also to be distinguished. See Grasses; also Sowerby's *British Grasses*, &c.

REED, in music. See Oboe, vol. xvii. p. 705; Harmonium, vol. xi. p. 483; and Organ, vol. xvii. p. 828 *sq*.

REEVE, Clara (1725-1803), one of the imitators of Horace Walpole in Gothic romance, was born at Ipswich in 1725. She was an industrious woman of letters, and produced many works in prose and verse, including an interesting sketch of the *Progress of Romance*; but her only eminent success was the romance of *The Old English Baron* (1777). In her theory about the use of the supernatural, as in chronological position, she stands midway between Walpole and Mrs Radcliffe. Though she owned Walpole as a master, she declined to follow as far as he went in supernatural incident; she admits a castle and a haunted wing and the ghost of a murdered man, but draws the line before statues dropping blood, pictures that groan and walk out of their frames, and suchlike improbabilities. She was the daughter of a Suffolk clergyman, and died at Ipswich in 1803.

REFEREE, in law, is a person to whom a matter is delegated by a superior for report or decision. The principal use of the word occurs in the practice of the House of Commons and of the High Court of Justice. The Court of Referees is a court to which the House of Commons commits the decision of all questions of *locus standi*,—that is, the right of petitioners to be heard in opposition to private Bills. A referee is also associated with members of the House as a member of every committee on an opposed Bill, but may not vote. Under the Judicature Act, 1873, cases are submitted to either official or special referees for inquiry and report, or for trial. Inquiry and report may be directed in any case,—trial only by consent of the parties, or in any matter requiring any prolonged examination of documents or accounts, or any scientific or local investigation which cannot be tried in the ordinary way (36 and 37 Vict. c. 66, ss. 56, 57; Rules of the Supreme Court, 1883, Ord. xxxvi.).

REFLEXION. See Light, vol. xiv. p. 586 *sq*.

REFORMATION

THE period occupied by the great movement known as the Protestant Reformation stands identified, for the most part, with the period which marks the transition from the mediæval to the modern era in European history. Taken within its narrowest limits, it may be looked upon as commencing with the year 1517 and as finding a certain consummation with the year 1545. In the former year Luther's theses, published at Wittenberg,[1] represent the commencement of that direct and open renunciation of mediæval doctrine which he initiated; in the latter year the assembling of the council of Trent marks the renewed sanction and promulgation of that doctrine whereby an insuperable barrier was erected between the communion of Rome and the churches of Protestantism. From that time each communion possessed its distinctive organization and formulary of faith, and the struggles which subsequently took place between Romanism and Protestantism represent, not attempts to bring about or to resist reform (whether of discipline or of doctrine), but endeavours on the part of both communions to bring about, if possible, the extinction of the opposed form of faith.

But, although the contest which Luther initiated had, long before his death, resulted in complete and irreparable rupture between the contending parties, it is certain that in order to understand the true nature and origin of that contest we must go back to events long anterior to 1517; while in order fully to estimate its effects we must follow the history of events long after 1545. In Germany, for example, the Reformation can hardly be regarded as finding even a formal consummation before the peace of Augsburg (1555); in Switzerland the movement went on with important modifications down to the death of Calvin in 1564; in France the onward progress was not materially checked before the massacre on the eve of St Bartholomew (1572); in Bohemia its independent and peculiar fortunes found a final solution only with the battle of the White Hill in 1620; while in England and in Scotland, in the Netherlands, in Scandinavia, in Italy and in Spain, the movement assumed so much variety of character, and was decided by circumstances of time and place of so different a kind, that its essential features often become merged and almost lost in their combination with other and altogether extraneous elements.

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[1] Most of the details of the main facts connected with the German Reformation during Luther's lifetime are given under Luther.

Nor are the considerations arising out of diversities of race, divergencies of political interests, and varied issues the only difficulties which attach to any attempt to treat the movement as a whole. We must also bear in mind the very different conceptions of the end to be attained which at successive stages of its history have modified its teaching and its organization, and eventually in a great measure determined its geographical limits. These conceptions may be distinguished as those involving (1) a reform of discipline, (2) a reform of doctrine, (3) a modification of the current dogmatic teaching. Of these three distinct conceptions the first, taking its rise in the generally admitted corrupt practice of the Roman Church, aimed at little more than a restoration of discipline,—a reform of morals, that is to say, among the clergy and the monastic orders, and the abolition of those various abuses which had grown up under the lax administration and baneful examples of successive popes and of the Curia; the second, although demanding a reform of doctrine as well as of discipline, sought simply to restore what was believed to be the teaching of the primitive as opposed to the mediæval church; while the third, guided in the first instance rather by an only half-conscious instinct than by any avowed standard of belief, sought eventually to establish the right of private judgment, to the almost entire repudiation of authority, whether as expressed in the decrees of councils, in the confessions of the Reformed churches, or in the creed of Trent. And it is from this last point of view that the Reformation has gradually come to be regarded as a new commencement rather than as a restoration of belief,—as a point of departure towards a higher and more enlightened faith rather than as a return to an ancient, imperfectly ascertained, and possibly obsolete standard.

But, by whichever of these aims the movement in favour of reformation was guided, the dominant conception has not unfrequently operated quite independently of the other two. Demands for reform of discipline not unfrequently resulted in disunion where disagreement with respect to doctrine did not exist. The further definition of already accepted doctrine, again, even when made in connexion with some minor article of belief and involving but an almost imperceptible divergence of interpretation, often proved productive of a serious schism where in questions of discipline there was perfect unanimity. The right of private judgment, when urged in contravention of any of the newly formulated standards of discipline or belief, involved an equally decisive rupture with those who recognized only the traditional sources of doctrine. It is evident, therefore, that the Reformation, when regarded from a fairly comprehensive point of view, must appear as a highly complex movement carrying in itself the elements of further controversy and conflict. Even the theory which would seem to afford the most satisfactory solution of its varied phenomena—that which teaches us to look upon it as a Teutonic revolt, intellectual no less than religious, against the traditions which the Latin Church in the course of centuries had invented and imposed on the faith and habits of thought of Western Christendom—often fails us as a clue to its widely different manifestations, and other disturbing causes seem to forbid the effort to refer them to any general principle. The character and policy of the reigning Roman pontiff, the jealousies and divergent interests of the several European states and the special aims of their several rulers, the spell which imperial institutions and traditions long continued to exercise over the minds of all but the most advanced and independent thinkers, are all important factors in the movement. If, however, we endeavour to assign the causes which prevented the Reformation from being carried even to but partial success long prior to the 16th century, we can have no difficulty in deciding that foremost among them must be placed the manner in which the mediæval mind was fettered by a servile regard for precedent. To the men of the Middle Ages, whether educated or uneducated no measure of reform seemed defensible which appeared in the light of an innovation. Precedent was the standard whereby every authority, lay or clerical, was held to be bound; and to this rule the only exceptions were a general council and the supreme pontiff. Even Gregory IX. or Clement V., when he assumed to promulgate additions to the existing code of the Universal Church, was understood to do so simply in his capacity of infallible expounder of essential and unalterable doctrine; while no reform, however seemingly expedient or however recommended by its abstract merits, was held to be justifiable if it could be shown to be in conflict with ancient and authoritative tradition. The Reformers themselves always maintained that the doctrines which they enforced rested on Scriptural precedent and primitive example. Their assertion was frequently challenged by their antagonists; and it may reasonably be doubted whether even Luther or Calvin could have commanded any considerable following had not their doctrinal teaching been combined with a demand for a reformation of discipline which rested on undeniable precedent, and to which the circumstances of the time imparted new and irresistible force,—a force, however, which had been long accumulating and had been derived in no small measure from the blind obstinacy of the Roman see in times long antecedent.

Desire for reform of discipline

The existence long before the 16th century of a strong desire to bring about a reformation of discipline within the church itself is attested by evidence which it will suffice to pass by with little more than an allusion. Among the most notable instances are those afforded by the rise of the Dominican and Franciscan orders in the 13th century and of the Brethren of St Jerome (or the Brethren of the Common Life) in the 14th century,—efforts based upon general conviction, which resulted in spontaneous combinations. Similar in origin, though more strictly ecclesiastical in character, were the designs of the great councils which successively assembled at Pisa (1409), at Constance (1414), and at Basel (1431). Among those who were distinguished in these assemblies by their strenuous advocacy of reform, Pierre d'Ailly and his pupil Jean Charlier de Gerson, both successively chancellor of the university of Paris, and Nicholas de Clémenges, archdeacon of Bayeux, were especially conspicuous. Each alike upheld in the plainest language the superiority of a general council to the pope, and the obligation that rested on such a body to address itself to the task of church reform whenever the necessity might arise, and the supreme pontiff himself be found either incapable of such a labour or unwilling to initiate it. Of the widespread necessity for such reform, as shown by the condition of the clergy and the monasteries, the remarkable treatise by Nicholas de Clémenges,[1] *De Corrupto Ecclesiæ Statu*, affords alone sufficient evidence. By Michelet[2] this powerful tractate has been compared, for its vigour and the effect which it produced, to the *De Captivitate Ecclesiæ Babylonica* of Luther; and it is a striking proof of the deep-rooted corruption of the whole church that such flagrant abuses should have continued to exist for another century with little or no abatement.

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[1] Or by Dietrich of Niem, the authorship is disputed.

[2] *Hist de France*, bk. viii. c. 3.

Clémenges deplores in the strongest terms the state of the church in his day,—a condition of appalling degeneracy, which he ascribes mainly to the increase in wealth and luxury that had followed upon the development of a worldly spirit in its midst. His strictures leave no order or degree of either the ecclesiastical or the monastic life untouched,—the overwhelming ostentation of the Curia; the pride and rapacity of the cardinals, their immorality and addiction to simony; the prevalence of the same vices among the episcopal order, filled with beardless youths, who, scarcely liberated from the dread of the schoolmaster's ferule, hastened to assume the pastoral office; the lower clergy in general so sunk in vice and sloth that scarcely one in a thousand ("vix inter mille unus") was to be found living a godly and sober life; the nunneries, which he declares were brothels rather than sanctuaries ("non dico Dei sanctuaria, sed Veneris execranda prostibula"). We can feel no surprise at finding that in the 16th century Clement VII. thought it necessary to place this burning diatribe by a great doctor of the church in the *Index Expurgatorius.* A few years later we find the evils to which Clémenges called attention emphasized by one of the most eminent ecclesiastics of the age,—the cardinal Julian Cesarini, when he was endeavouring to dissuade Pope Eugenius IV. from his design of dissolving the council of Basel (see POPEDOM, vol. xix. p. 502). In this letter he affirms that so strongly is popular feeling stirred against the clergy by their neglect of their duties and scandalously immoral lives that there is reason to fear that, if some remedy be not devised, the whole fabric of the Roman Church may be overturned.[1]

The complete failure of these successive efforts to bring about any comprehensive measure of church reform is a familiar fact in European history. And not only were the evils which it was sought to abolish suffered to continue with but little abatement, but dissent even from the recognized discipline of the church was placed under a ban, and made, in common with dissent from doctrine, an offence punishable with the severest penalties. The mediæval theory of the Roman hierarchy had indeed been reaffirmed by Eugenius IV. and his successors with a success which seemed almost to preclude the possibility of its ever being again challenged. But the main point here to be noted is that in none of these several efforts in the direction of reform, whether resulting from conciliar or popular action, was the doctrine of the church once called in question. The fate that overtook John Huss and Jerome of Prague appears to have been very generally regarded as a necessary example of just rigour in the suppression of heresy. We find, accordingly, that, when in the following century it was sought to associate the efforts of the reformers in the direction of doctrinal change with the efforts of a party within the church itself in the direction of disciplinary reform, the defenders of the traditional Catholic faith challenged the assumed precedent and altogether denied the parallel. "It is," wrote Bossuet in the 17th century, "an obvious illusion; for among all the passages which they adduce there is not one in which those teachers have ever dreamed of changing the belief of the church, of amending its worship, which consisted chiefly in the sacrifice of the mass, or of overthrowing the authority of her prelates and especially that of the pope, all which was the primary design of this new reformation of which Luther was the architect."[2] It is not easy to gainsay the reasonableness of Bossuet's criticism. It was the fundamental theory of the Reformation that it involved the setting aside of the development given in mediæval times to the doctrines and teaching of the early church, and proposed to substitute for these a totally different interpretation, which rejected the successive decisions of councils and popes as arbitrary and erroneous. Such a theory, however, necessarily imposed on the Reformers the task of proving the validity of their own position, by showing that their repudiation of a practice and of precedents which had been accepted for so many centuries was justified by an appeal to yet more ancient and unquestionable authority. If indeed they failed in so doing, they must look forward to sinking in the estimation of Christendom to the level of heretics, and be prepared to stand before posterity in the same category as the Arians, the Albigenses, the Lollards, and the Hussites, and those other sects which, by their unwarranted assertion of the right of private interpretation, had provoked and incurred the formal condemnation of the church. It is not within the scope of this article to attempt to estimate the justice of the theological arguments by which the Reformers sought to vindicate their position; but there is good reason for concluding that the argumentative powers and personal influence of Luther and Calvin would have failed, just as the efforts of preceding reformers had failed, in effecting the desired result, had not the conditions and circumstances of the age been such as to lend new force to the arguments which they urged in favour of a fundamental change in the standpoint of religious faith.

The most notable feature in connexion with traditional belief which challenges our attention at the commencement of the 16th century is the manner in which the popedom was becoming less and less in harmony with the spirit of the age, and with those new forces which were now developing in the midst of Teutonism. The intolerance of the church in the repression of heresy had become more pronounced and was pressing with increasing rigour on free thought, when, owing to the influences of the New Learning, that thought was everywhere on the point of seeking to break through the traditional trammels; the corruption of the Curia and of both the regular and the secular clergy, the extension of the temporal power of the pontiffs in Italy, and the extortion of their emissaries in other countries had reached a climax just as, owing to the more independent spirit generated by the consolidation of the nationalities, the ruler and the people in each kingdom or principality were becoming increasingly impatient of the existence of such abuses. A brief consideration of these several features becomes, accordingly, quite indispensable, if we wish rightly to comprehend the forces at work in Europe at the time when the Reformers arose to combine them and give them more definite direction.

Efforts for reform of doctrine

Not a few, and some very memorable, efforts had been made before the 16th century to bring about a reformation of doctrine, but these had almost invariably been promptly visited with the censure of the church. Long after the "heresies" of the 4th century had died away and after the controversies of the turbulent 9th century—such as those on the Eucharist between Paschasius Radbertus and Ratramnus, and on predestination between John Scotus Erigena and Gottschalk—had been silenced by the decisions of the pontiffs, we find movements arising, which, however much they differ in other characteristics, all attest the existence of a widespread desire among large sections of the community to revert to a simpler form of religious belief and practice. The Paulicians (or Manichæans of the East), the Albigenses (or Manichæans of the West), the Waldenses, the Cathari, and the Leonists (or Poor Men of Lyons)—sects which made their appearance mainly in the 12th and 13th centuries, and for the most part in Switzerland, Languedoc, and northern France the

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[1] "Dissolutio cleri Alemanniæ, ex qua laici supra modum irritantur adversus statum ecclesiasticum . . . inclinatus est arbor ut cadat, nec potest diutius persistere." See Æn. Sylvius, *Opera* (ed. 1551), pp. 63, 70.

[2] *Œuvres* (1865), ii. 303

Lollards in England and the Hussites in Bohemia, may be looked upon as the ancestors in faith of the Huguenots and the Puritans of after-times, and were all more or less characterized by an aversion to the Roman ritual, to splendid churches, to crosses and crucifixes, combined with a more definite denial of such doctrines as that of baptismal regeneration, of transubstantiation, of masses for the dead, and of the obligation to observe Lent. The ultimate fate of these different sects was singularly similar. Of their earlier history, indeed, we have but few memorials, for their records, if any existed, have mostly perished; and, as with their prototypes in the earlier Christian centuries, it became almost necessarily their policy to avoid all external demonstrations which would be likely to arrest the attention of the world. An inquisitor of the 13th century, when describing the Leonists (*c.* 1250), whom he speaks of as both the most ancient and the most widely spread of the sects then existing, represents them as by no means guilty, to all external appearance, of practices which could fairly be stigmatized as blasphemous, but as wearing a great semblance of piety, as being of good repute among their neighbours, and chiefly blamable as given to speaking against the Roman Church and its clergy and thus gaining, only too easily, the ears of the laity at large.[1] To such characteristics, however, the Albigenses in the 12th century had presented a remarkable exception. At the commencement of the pontificate of Innocent III. (1198) his legates had found nearly the whole of the rich and prosperous territory extending from Carcassonne to Bordeaux dominated by this powerful heresy,—a form of doctrine associated, moreover, not with austerity but with voluptuousness of life, with a profound contempt for the priestly profession, and with a warm admiration for the conceptions of chivalry and the poetry of the troubadour,—a heresy enriched by the devotion of its adherents to an extent which made it far wealthier than the church itself in those regions, and before which the representatives of the Roman orthodoxy seemed threatened almost with extinction. The suppression of this heresy by Simon de Montfort is a well-known episode, and would seem to have formed the point of departure for a new and more rigorous policy on the part of the church in its dealings with like manifestations of disobedience. In the year 1229 the statutes of the council of Toulouse formulated, as it were, the code of persecution, and, aided by the Inquisition, which probably took its rise about the same time, supplied a new machinery for the detection and suppression of heresy. To the terrorism thus established, after the sword of De Montfort had done its work, we may fairly refer the changed characteristics of the adherents of the heresies in France, as above described, in the middle of the 13th century.

But, the suspicions of the church having once been thoroughly roused and the secular power incited and guided to its task, external conformity and inoffensive life, the mountain hamlet and the secluded valley, proved alike unavailing to avert the cruelty of the persecutor. The Cathari in Italy did not long survive the fall of the Hohenstaufens, from whom they had received effective protection and support; and it added not a little to the offence of the doctrines proclaimed by the Spiritual Franciscans, whose tenets were condemned by the council of Vienne in 1311, that, while the order had taken its rise in a spirit of protest against the corruptions of the Curia, its members were known to be ready to favour and aid by all the means in their power the restoration of the imperial ascendency in Italy. The Spiritual Franciscans were the forerunners of the Apostolic Brethren, one of the most widely spread of the new sects, and must also be looked upon as the precursors of the Lollards. The intimate connexion between theological doctrine and political opinion that existed among the latter sect is well known. We find, accordingly, that heresy, long before Reformation times, was regarded by the papal power as associated with hostile political interests, and that a new incentive to its rigorous suppression was thus supplied.

On the other hand, the popedom itself, during the long sojourn of the pontiffs at Avignon (1309-78), became involved in a political alliance, whereby it alienated the sympathies of Europe at large to an extent which it was never afterwards able to regain. During that long and humiliating episode in its history the office was filled almost exclusively by Frenchmen, whose policy was conceived in complete subservience to that of the reigning French monarch; and the pontiff at Avignon thus came to be regarded both by the empire and in England as the pliant ally of a hostile power. During the following century it recovered much of its influence in Germany, where its pretensions were sometimes regarded not unfavourably by the electors as an equipoise to the too despotic sway of the emperor. Somewhat later we find it receiving the most efficient support from Spain. But it could never again command the same universal deference in Western Christendom; and the apparently genuine devotion to its interests which may from time to time be discerned manifesting itself, now in one nation and now in another, was largely inspired by political considerations, and often dearly purchased at the expense of a corresponding hostility provoked among another people

To the manner in which theological tenets, often purely speculative in their origin and innocuous in their bearing upon practice, thus came to be regarded as identified with secular questions of grave import and pressing for an immediate solution, we must partly attribute the jealousy with which the first symptoms of heresy were now watched for by Rome. Early in the 14th century the Fraticelli and the Apostolic Brethren, with other heretical sects, were anathematized. In the year 1324 Pope John XXII. demanded of the emperor the suppression of the Waldenses,[2] who had reappeared in Lombardy; and, ably as Marsilius of Padua assailed the pretensions of the papacy, his protest seemed ineffectual amid the supreme humiliation of his patron, Louis of Bavaria. Driven alike from Italy and from France, the persecuted sect took refuge in Savoy and in Switzerland, and in the year 1489 the papal legate reported that their numbers were not less than 50,000. Lollardism was suppressed with unsparing hand in England; and John Sawtrey, the first of Wikliffe's followers to suffer martyrdom, was burnt to death in 1401, for refusing to worship the cross and for denial of the doctrine of transubstantiation. Fifteen years later John Huss and Jerome of Prague suffered the same fate at Constance, and the indignation excited among their fellow-countrymen, intensified as this feeling was by differences of race, gave rise to a memorable resistance, which eventually won religious freedom for the land. At the diet of Kutna Hora (Kuttenberg) in 1485 a truce was made between the Utraquists and the Catholics for thirty-two years, and the complete religious equality then established was made permanent at the diet of 1512. In England, on the other hand, the Lollard movement was almost completely extinguished. The political doctrines with which it had become associated made it the object of suspicion alike to the ecclesiastical and to the civil power; and Sir John

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[1] *Max. Bibl. Patrum* (1676), vol. xxv. p. 264.

[2] They were not, however, known under this name; in the 15th and at the commencement of the 16th century they never so styled themselves, and were rarely so styled by others. The name by which they were known among themselves was that of "The Brethren." See Ludwig Keller, *Die Reformation und die älteren Reformparteien* (1885), p. 296.

Oldcastle, its chief leader, although he suffered martyrdom, altogether failed to win the popularity or the reverence which waited on the memories of the two Hussite leaders. The religious tenets of his followers were not, indeed, altogether suppressed, and continued to command a certain following down to the 16th century. As a tradition, however, they would seem to have survived in connexion with the early English Puritanism rather than with the Reformation; while between the Hussite movement and the Reformation the connexion is unquestionable and was recognized by Luther himself.

During the very time that the Roman pontiffs were wielding thus effectually the weapons of bigotry and persecution against all manifestations of independent religious thought, their influence and patronage were largely given to the fostering of other influences, which ultimately proved highly favourable to that very freedom of judgment and of philosophic speculation which the Roman see has invariably sought to suppress. The relations in which the "New Learning," as it was then called, is to be found successively standing to the representatives of orthodox belief constitute an interesting and instructive study. At one time Greek had been held in reverence as the official language of the Roman Church; but, from the period when the popes were first enabled to shake off the yoke of the Eastern emperor in Italy, the use of the Greek language had been discontinued, its literature placed under a ban, and the study of both systematically discouraged in Western Christendom. Then came the Renaissance; and under the patronage of pontiffs like Nicholas V. (1447-1455), and cardinals like Julian and Bessarion, Greek became as much in favour at the Curia as it had before been discredited. At first it seemed not improbable that this literary revolution might prove a powerful aid not only in promoting Christian culture but in diffusing a more genuinely Christian and catholic spirit. While eminent ecclesiastics sought to bring about the reconciliation of the churches of the East and West, original thinkers like Pius II. and Maffeus Vegius put forth views on the whole subject of education which involved a decisive rupture with the traditions of mediævalism. It is unnecessary to describe the manner in which this promising future became overclouded; how learning in Italy became associated at once with scepticism and immorality; and how men of letters like Politian and Poggio and Bembo and Beccadelli, under the favour of pontiffs like Leo X., at once scandalized the devout and amused the fancy of the polite scholar. "This fable of Christ has been to us a source of great gain," a cardinal at the Vatican was overheard to observe. Such a tone of feeling, however, was not consonant with the spirit of the persecutor, and if the religious spirit was shocked by profanity it was less disgraced by bigotry. Earnestness of conviction was derided and disbelieved in; and the prevalent sentiments at the Curia at the outbreak of the Reformation were those of idle and careless security. Signs, however, were not wanting to prove to a later generation how little that false security was justifiable. Foremost among those who advocated reform and a policy of reconciliation in the first half of the 15th century was Nicolas de Cusa, who, though German by birth, embraced with ardour the schemes projected for the regeneration of Italy and of the church at large. Neither Pius II. nor Nicholas V., who alike promoted him and honoured him, appears to have discerned the dangerous element that lurked in his bold spirit of inquiry. From Cusa, however, Laurentius Valla derived the guidance which led him on to his memorable attack on the fiction of the Donation of Constantine, and to that more general investigation of the claims of the popedom which marks the commencement of the historical scepticism which now began to develop with such startling results. To Valla succeeded Gregory of Heimburg, who exposed the papal pretensions with equal vigour, and made it for the first time apparent how formidable a weapon the New Learning might prove in the defence of those imperial and popular rights in Germany which Rome at that time contemptuously ignored. The conflict between Heimburg and Eugenius IV. foreshadowed, indeed, the greater contest between the Teutonic and the Latin power, and Heimburg has more than once been designated the prototype of Ulrich von Hutten.

In the whole history of the Reformation, and of the period by which it was immediately preceded, the political relations of the popedom to the other European powers and more especially to Germany, constitute, in fact, elements of primary importance. In the latter part of the 15th century those relations were still further embittered by the personal character and aims of the reigning pontiffs. At the very time when the existence of the popedom as a temporal power was menaced by the rising spirit of innovation, the reverence and sympathy of Europe were still further alienated by the spectacle of the career of Alexander VI. and of his end,—the result, it was commonly reported, of the poison which he had designed for the destruction of another. The character of his successor, Julius II. (1503-1513), might well seem virtuous by comparison; but at no period in the history of the pontificate does its religious character seem more completely lost sight of in purely secular interests. It had long before (see POPEDOM) been the aim of each more ambitious pope to become a great territorial prince and thus to lay the foundation of the private fortunes of his house. But Julius aimed at something more than this,—at the assertion of political supremacy throughout Italy and of the right to rank with the great powers of Europe as wielding at once material resources but little inferior to theirs, and as commanding a widespread organization to the like of which not one of them could aspire. Such were the objects to which his untiring energies were systematically directed. Within four years of his accession he had added Perugia and Bologna to the possessions of the church, and from Piacenza to Terracina his sway extended over all the great strongholds and the most fertile territory; even the great powers of France and Spain, notwithstanding their newly consolidated strength, could not but regard with jealousy and apprehension his genius and his policy. "Before," wrote Machiavelli, "there was no baron so petty as not to look with contempt on that popedom which now even a king of France regards with respect." The means by which this remarkable change was effected involved, however, a recourse to fiscal expedients which eventually proved eminently detrimental to the Roman see;[1] while for nearly a quarter of a century we find the policy of the great powers in relation to Rome almost entirely determined by purely political considerations and Italy itself becoming the arena of their contending ambitions. In the year 1494 Charles VIII. of France effected his memorable passage of the Alps to grasp the crown of Naples. It was currently believed that he had been incited to the enterprise by Alexander VI. himself,—a circumstance which alone suffices to explain the failure which attended that pontiff's efforts when he subsequently sought to prevail upon the invader to submit his claims to the arbitration of the holy see. In the year 1508 the invasion by the emperor Maximilian I. took place, with the object of re-establishing the imperial supremacy in Italy,—an expedition which was in some respects the counterpart of that of Charles, and to which Julius II. opposed a vacillating policy not unlike that of his predecessor. To the expedition of Maximilian succeeded the league of Cambray, designed to humble the republic of Venice, and warmly supported by Julius II. as a means whereby to gratify his resentment at the resistance offered by that powerful state to the encroachments of the popedom. No sooner was Venice sufficiently humiliated than Julius proceeded to concert measures for carrying out the great object of his ambition,—the expulsion of the foreigner from Italy. Never before had the aims of the papacy seemed so completely in conflict with those of every European power.

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[1] "Sub quibus" (*i.e.*, Alexander VI. and Julius II.) "etiam in negotiatione prebendaria multæ novæ technæ repertæ sunt ad pecunias undique corradendas, et ab illis receptæ sunt approbatæque, *magis fisci quam Christi rem agentibus.*" See the remarkable letter of Eubulus Cordatus to Montesius, prefixed to the reprints of the *Treatises* of Nicolas de Clémenges, ed. 1519.

Relations of popedom with France;

In France, Louis XII., on appealing to the representatives of the Gallican Church (council of Tours, September 1510), soon found that national feeling entirely prevailed over Ultramontane sympathies, and that he might count on their effectual support. Notwithstanding, therefore, the remonstrances of his devout consort, Anne of Brittany, he resolved upon a vigorous anti-papal policy. In concert with the emperor Maximilian, he revived the long-dormant demand for a general council; and a mimic assembly, consisting of four cardinals, twenty Gallican prelates, certain abbots and other dignitaries, was actually convened at Pisa in 1511. In this extremity Julius exhibited his usual fertility of resource by organizing the Holy League, and thus inducing Ferdinand of Aragon and the Venetians to combine with him in opposing the designs of schismatic France. The council, transferred to Milan, issued from thence in April 1512 an edict suspending Julius from all pontifical functions as a "notorious disturber of the council, the author of schism, contumacious, incorrigible, hardened" (Raynaldus, *sub ann.*). The pontiff thereupon excommunicated Louis XII., who rejoined by a formal protest and by causing coins to be struck and circulated bearing the arms of France and the ominous inscription *Perdam Babylonis nomen.* In the meantime the fifth Lateran council, the rival council convened by Julius, commenced its sittings (May 1512), and forthwith declared the acts of the assembly held at Milan to be those of a schismatical body, while it proceeded to confirm the papal censure on the king of France. The expulsion of the French from Italy, after the fall of their heroic leader, Gaston de Foix, seemed to threaten only a further widening of the schism, when the death of Julius in 1513 opened the door for negotiation—an opportunity of which Louis eagerly availed himself—while the pliant disposition of the new pontiff, Leo X. (1513-1521), afforded additional facilities for arriving at an agreement. The French monarch now disavowed the proceedings of the council which he had before supported, and acknowledged the validity of the acts of the council at the Lateran. Other points were still under discussion when Louis died and was succeeded by Francis I., January 1515.

In the following year the Catholic king Ferdinand of Aragon died. The relations of Spain to the papacy during his reign and before that time had been very far from representing a policy of complete subserviency. By a concordat made in the year 1482 Pope Sixtus IV. had conceded to the sovereigns of Castile and Aragon the right of nominating to the higher ecclesiastical offices, although he had reserved to himself a corresponding power in connexion with the inferior benefices,—a privilege which soon resulted in the customary abuses and rendered the papal supremacy for a time scarcely more popular in Spain than in Germany. At nearly the same time the institution of the Inquisition in the former country is generally supposed to have first taken place (see INQUISITION),—an event which must not, however, be construed into a proof of the ascendency of papal influence. In its earlier stage the Inquisition was quite as much a civil as an ecclesiastical tribunal, being especially directed against the exclusive privileges and immunities claimed by the hereditary nobility; and, although under Cardinal Ximenes the repression of heresy became one of its chief functions, it was long regarded with no friendly feelings by Rome. The Roman doctrine and discipline were rigorously imposed on the Spanish population, but Ferdinand himself showed little disposition to submit to the dictation of the Roman pontiff. In the year 1508 he sharply rebuked his viceroy, the count of Rivarzoga, for allowing a papal bull to be promulgated in the provinces without having previously obtained his sanction, and declared that if the bull were not forthwith withdrawn he would withdraw the two crowns from the obedience of the holy see. Five years later Cardinal Ximenes, in a like spirit, openly denounced the abuses that accompanied the traffic in indulgences.

with Germany

The tone that Germany at this period was able to assume was very different. The several states and principalities, feebly protected by the imperial authority, which could no longer be asserted as of yore, yielded an easy prey to the extortion of the papal emissaries. The national clergy, perhaps more corrupt than in any other Teutonic country, showed themselves completely subservient to the worst malpractices of Rome. It was from the laity at large that the first warning came that either reform or revolution must before long ensue. In the year 1511 a notable document, purporting to emanate from the German people at large, was laid before the emperor. Drawn up in the form of a petition, it enumerated and described the various abuses associated with the prevailing ecclesiastical practice and suggested the remedies. Foremost among the specified grievances it placed the utter want of good faith shown by successive pontiffs in the manner in which they were accustomed altogether to disregard (often at the instance of most unworthy favourites) the privileges and immunities solemnly granted by their predecessors. It complained of the frequent nullifying of the elections of prelates canonically elected by their respective chapters, of a like disregard for such elections even in cases where large sums had been paid to the Curia by the chapters in order to secure the ratification of their choice, of the manner in which all the richest benefices were reserved for cardinals and proto-notaries, of the frequent anticipation of reversions (*expectativæ gratiæ*) and of the concentration of numerous benefices in the hands of single individuals, of the incessant lawsuits generated by these malpractices and the consequent waste of considerable sums both on the lawsuits themselves and on the obtaining of bulls which eventually proved inoperative,—"so that," said the petitioners, "it has become a common saying that, on obtaining a reversion from Rome, one ought to lay by one or two hundred gold pieces wherewith to defend the actions to which the maintenance of one's rights will infallibly give rise." Other matters of complaint were the frequency with which annates were demanded; the bestowal of livings on those utterly incompetent for the discharge of their duties,—"fitter," in fact, "to be muleteers than to be the instructors of their fellow-men"; the frequent issuing of new indulgences and revocation of the old, notwithstanding the repeated remonstrances of the laity; the levying of tenths under pretext of an expedition against the Turks when no such expedition was designed; and the petition closed with the complaint, which had been rife almost ever since the days of Hilary of Arles, of the continual summoning of suits to Rome which could be as satisfactorily and far more promptly decided before the national tribunals.[1]

While the popular feeling in Germany was being thus effectually alienated from the papal see, the learning of Germany was also pursuing that ominous track, first delineated by Gregory of Heimburg, which marks its complete divergence from the Italian humanism. The names of Johann von Goch (d. 1475), Johann Wessel (d. 1489), Johann Reuchlin (d. 1522), and Erasmus stand associated, although in different ways, with a great movement which, by attacking at once the doctrine and the discipline of the church, opened up the way for Luther. Goch and Wessel were among the first to give systematic form to the opposition to the existing ecclesiastical system, and their criticism included both popes and councils as ultimate authorities in matters of faith. They inveighed with especial force against the doctrines of indulgences, veneration of saints, and purgatory, and they denied that confession, the Lord's Supper, and extreme unction were to be regarded as sacraments of divine institution. During the years 1511 to 1516 Reuchlin carried on a memorable struggle against the monks of Cologne in defence of the New Learning and of improved canons of textual criticism. In the year 1516 Erasmus put forth the first edition of his *Novum Instrumentum.* Side by side with these more elaborate efforts there was going on another literary movement which in its influence on the popular mind was not less considerable. Ever since the days of the early Lollards satire had been found a not altogether ineffectual weapon in assailing those abuses in the church which argument and remonstrance seemed powerless to reform. The *Praise of Folly*, from the pen of Erasmus, which appeared in 1511, seconded the graver efforts of Reuchlin, and successfully held up to ridicule those monastic orders of whose greed and dull obstructive activity Germany was already so weary. But even this brilliant effort paled in its effects when compared with the *Epistolæ Obscurorum Virorum*, which appeared in 1515-16. These letters, of which Ulrich von Hutten and his friend Crotus Rubianus were the principal authors, were a series of broadly humorous fabrications, purporting to be written by members of the obscurantist party themselves. A more skilful mode of exposing the ignorance and imbecility of thought which characterized the average intelligence of the monks of those days could hardly have been devised; and the success of the artifice appeared complete when it became known that certain stolid monks had been led to approve the volume and even aid in its circulation as a genuine and valid defence of the views which they upheld.

These effective demonstrations, it is to be noted, were not merely the outcome of that widespread discontent above described, but resemble rather a series of sparks elicited by immediate contact between the German mind and Rome; and it is of no little interest to mark the effect produced on three of the most eminent representatives of the new movement by their visit, within a few years of each other, to the capital and by the contemplation of the splendour of the Curia and the moral degradation of its members. Of these three observers the first was Erasmus, who visited the capital in 1506. His lively sense of the incongruous was not a little excited by the spectacle of the warlike pontiff, Julius II., whom, in his *Praise of Folly*, written a few years later, he describes as subverting alike the laws, peace, and religion. But Erasmus himself does not appear to have been greatly scandalized. He affects, indeed, to be somewhat uncertain whether it is Germany that has copied Rome or whether Rome has not rather copied a certain class of German prelates, who seem to look upon the battlefield as the fitting place where to render up their souls to God. Somewhat later, writing in a graver mood, he declares that nothing will ever efface his more pleasing recollections of the great city,—its freedom of discourse, its intellectual illumination, its works of art, its libraries, and its scholars. Four years after Erasmus came an Augustinian monk from Erfurt, full of reverence for the traditions, the grandeur, and the sanctity of Rome. Martin Luther appears to have been less struck than was Erasmus by the unpriestly character of Julius II., who, as he admits, maintained order and watched over the sanitary condition of the Sacred City. But he was shocked beyond measure by the corruption, the profanity, and the immoral lives of the Roman clergy. The fond illusion of his monastic life was at an end; and he returned to Germany not only prepared to counsel resistance to papal extortion but shaken in his whole allegiance to the holy see. A few months after Luther came Ulrich von Hutten. It would be difficult to select a better representative of the temper and feeling of the higher classes in Germany at that time. To pride of birth and devotion to the New Learning he united a love of adventure which no physical suffering or misfortune seemed able to subdue, and a chivalrous spirit which could but impatiently brook the assertion of even legitimate authority. Already burning with resentment at the systematic extortion to which his countrymen were subjected, his feelings were still further intensified as he listened to the contemptuous language and observed the supercilious demeanour which marked the Roman estimate of those who bore the German name. He heard from an eye-witness a description of Julius II. as that pontiff had presented himself to the world at the siege of Mirandola, with "wild eye, brazen front, and threatening mien." On his return to his fatherland Hutten condensed into epigrammatic Latin verse, beside the suppressed fury of which the polished satire of Erasmus seems to pale, a description of what he had seen and heard, and denounced with terrible effect the whole system of bulls, indulgences, and other devices whereby an avaricious prelate was wringing dishonest gains from a long-suffering nation. Few literary assailants have ever possessed a greater power of irritating an antagonist than did Ulrich von Hutten, and considerations of generosity or expediency rarely deterred him. It was generally expected when Leo X. ascended the pontifical throne that he would be anxious to sheathe the sword which his predecessor had wielded so vigorously and his countrymen already hailed him as the "restorer of peace." By that epithet Hutten too vouchsafed to address him, but it was in a dedication to the pontiff of a reprint of Laurentius Valla's *Treatise on the Donation of Constantine*, and the seeming act of homage was thus artfully appended to pages exceptionally calculated to wound the papal susceptibilities.

Ulrich von Hutten

It must, however, be admitted that the character of the German episcopate at this time was such that it scarcely appeared to advantage even when compared with that of the ecclesiastics of the Roman Curia. Its members were generally scions of princely houses, caring little for the spiritual interests of their dioceses, but delighting in field sports and martial exercises, given to building palaces for their own residence rather than to the erection of churches, and often without the slightest tincture of learning. Their primate at this time was Albert, brother of the elector of Brandenburg, archbishop of Mainz and Magdeburg, a young and ambitious voluptuary, caring for little but pleasure and display. On the great prelates the extortion of Rome sometimes fell not less heavily than on the laity; and the archbishop, before he could receive his pallium, was called upon to pay the sum of 30,000 gulden into the papal exchequer. Leo X. was at that time intent on carrying out the great design of his predecessor, the rebuilding of St Peter's. It has been observed by Pallavicino that the millions devoted to the erection of the material church were acquired at the cost of many more millions to the spiritual church. Leo proclaimed a fresh issue of indulgences, and the archbishop Albert was appointed his commissioner to carry out the sale in a large portion of Germany. He seized the occasion to prevail upon the pope to allow him to appropriate one half of the money collected for the indulgences in order to pay for his pallium. As his chief agent in the sale he imprudently selected one Tetzel, a Dominican friar, whose unscrupulousness in such work was so notorious that the papal collector at Mainz refused to employ him. In the course of his progress Tetzel came to Jüterbogk, near Wittenberg, and his superstitious traffic and the impudent devices which he employed to cajole the people were thus brought directly under the notice of Luther. The young professor seized the opportunity of directing the attention of the university, where he was already highly popular, to the abuses associated with the sale of indulgences. He did not as yet impugn the doctrine of indulgences itself, and he expressed his conviction that their good father the pope must be altogether unaware of the extent to which such abuses were allowed to prevail. His celebrated theses were forwarded by himself to the archbishop, as well as to the elector of Saxony, his patron, and also the munificent founder of the university. The elector, who had seen with no slight dissatisfaction the manner in which his provinces were being plundered in order to pay for the extravagance of a neighbouring prelate, extended his protection to the courageous polemic, and Luther thus gained the all-precious interval of freedom from molestation which enabled him to compose the memorable treatises whereby he produced such an immense effect on the minds and consciences of his countrymen. The nailing of his theses to the door of the church at Wittenberg, it is to be noted, was a very common method of procedure on the part of a university disputant; and nearly a year passed away before the events which so deeply agitated Wittenberg were recognized in their full importance by the world at large. Luther himself, indeed, in his notable letter to Leo X., written in 1518, tells us[1] that, *contrary to his wishes*, his theses were translated into German, and circulated throughout the nation, and that his antagonists declared that he had set the world in flames. But in this language there is evidently something of exaggeration. Some two months after the appearance of Luther's theses Tetzel, by way of rejoinder, published at the university of Frankfort-on-the-Oder a hundred and six anti-theses, and these were subsequently burnt by the students of Wittenberg in the market-place. To Leo, however, the vague reports that reached Rome conveyed only the impression of a dispute between the two monastic orders of which Luther and Tetzel were respectively the representatives. He declared that Luther was a man of genius, and refused to interfere. Even Ulrich von Hutten, at that time residing not far from Wittenberg, seems to have shared in this misapprehension, and, writing to his patron, he expresses the hope that the two contending parties may eventually tear each other to pieces.

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[1] See "Gravamina Germanicæ Nationis cum Remediis et Avisamentis ad Cæsarem Maximilianum," in Freherus, *Germanicarum Rerum Scriptores*, ii. 313. The existence of such grievances and their non-redress may serve partly to explain the obduracy with which the subjects of the empire received the simultaneous proposals of Maximilian in the direction of state reform. See Janssen, *Gesch. d. deutschen Volkes*, i. 557-561. Janssen, it may be observed, makes no reference to the document above cited.

But in the course of a few months the importance of the struggle began to be more clearly apprehended. John Eck of Ingoldstadt drew attention to the resemblance between the doctrines put forth in the theses and those of the Hussites, and at the mention of that undoubted heresy not a few of Luther's supporters recoiled. His conduct was certainly not wanting in astuteness, however genuine his enthusiasm. In 1518 he republished his theses, with additions and explanations, under the title of *Solutions*. Like Hutten, he selected the supreme pontiff himself as the person to whom he dedicated the treatise. In the letter of dedication (the letter above referred to) he professes to make his unqualified submission to him whom he addresses, and at the same time endeavours to exculpate himself for thus republishing the theses. Notwithstanding the popular form, the vernacular language, in which they had already appeared, they were still so encumbered with the technicalities of the schools that he could not conceive how they could be intelligible to the laity at large ("sic editæ ut mihi incredibile sit eas ab omnibus intelligi"). He was therefore anxious, with the pontiff's sanction and approval, to republish them in a form less liable to misinterpretation. If, however, that sanction were withheld, he could only bow to Leo's decision as to that of God's vicegerent on earth ("vocem tuam vocem Christi in te præsidentis et loquentis agnoscam"). While Luther was thus labouring under misapprehension, affected or real, with respect to the kind of doctrinal teaching that was likely to find favour in Rome, it would seem that Leo himself was very imperfectly informed regarding the state of feeling in Germany. The conditions which moulded his political action and his personal sympathies alike tended to distract his attention from the events which had recently been occurring in Saxony. The representative of a princely house, well versed in European affairs and in questions of statecraft, gifted with more than an ordinary share of Italian subtlety and powers of dissimulation, he was well qualified to cope with the difficulties by which he found himself surrounded. But his aims, chief among which was his desire to establish his brother Julian on the throne of Naples, were directed more to family aggrandizement than to national unity. They ran strongly counter to the growth of Spanish influence, while with that stern policy which guided the rule of Ximenes, dictated by the desire to restore mediæval doctrine and discipline and to suppress heresy, he had no sympathy. The ecclesiastic was almost lost in the patron of the arts, the urbane and polished scholar and voluptuary, the admirer of wit and epigram. In politics it was his main purpose to trim the balance between France and Spain; in church matters it was chiefly to stifle controversy. So indifferent was he to German affairs, and so little cognizant of the state of feeling among the people, that at the very moment when irritation at the extortion of his emissaries was at its height, and the fraudulent nature of that extortion had been thus ably exposed by Luther, he conceived it to be a suitable time for levying a contribution throughout the empire under pretext of an expedition against the Turks. The proposal roused a spirit of opposition even among the clergy themselves; and one of their number, a prebendary at Würzburg, issued a manifesto, in the form of a pamphlet, in which he roundly declared that the true Turks were to be found in Italy. This pamphlet fell into Luther's hands, and with the instinct of genius he recognized the opportunity afforded by such a state of feeling for an appeal to a wider audience than he had hitherto addressed. He now took his stand as the denouncer both of abuses in the matter of discipline and of the extortion and oppression under which his countrymen laboured. And from that day to the day of his death he filled a place in their affection and esteem to which no other of their leaders could make pretence. The turning-point in his public career is marked by his appearance at

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[1] *Werke*, ed. 1883, i. 528

Augsburg before the papal legate Cajetan and his subsequent flight from the city. In the disputation at Leipsic he could go so far as to repudiate the divine institution of the papacy and even pronounce against the infallibility of councils. He was still further confirmed in his doctrinal divergence by the influence of Melanchthon, who now began to call in question the doctrine of transubstantiation; and Valla's *Treatise on the Donation of Constantine*, with which he first became acquainted in February 1520, would seem to have dispelled the last vestige of doubt in his mind with respect to the essential falsity of the claims of the papacy to temporal power. The contrast now presented by the tone and language of his writings to that of his letter to Leo, written two years before, is startling. In the month of April 1520 appeared his discourse *De Libertate Christiana*, inveighing against the abuses of the Curia and referring to Leo himself in terms of open irony. To this succeeded in the following August his appeal, written in the vernacular German, "To the Christian nobility of the German nation," wherein he frankly confesses that his reliance is upon none of the ecclesiastical orders, but upon the newly-elected young emperor and the nobles; and he reiterates his demand for a general council,—one that shall be really free, bound by no arbitrary canons, and holding its deliberations free from papal control. This again was succeeded in the ensuing October by his treatise on *The Babylonian Captivity of the Church*, wherein he examines, and for the most part repudiates, the sacramental theories of the mediæval church. The cause which he advocated now began to assume genuinely European proportions. From Nuremberg came an effective tribute from the youthful meistersänger Hans Sachs to the "Wittenberg Nightingale," one of the earliest efforts of his genius. Ulrich von Hutten, at length perceiving the true character of the contest, followed up the address to the German nobility by translating into the vernacular his own treatise *To Germans of every Class*, and owing to his persuasions the powerful and chivalrous free knight Franz von Sickingen hastened to declare himself an uncompromising supporter of the Lutheran movement. Together they already discussed plans which included nothing less than the establishment of a national church altogether independent of Rome, with the archbishop of Mainz as its primate. The danger that menaced the Roman see could now no longer be disguised; and in June 1520 Leo fulminated his bull of excommunication against Luther. On the 8th of the following July he addressed a letter to Frederick of Saxony in which he deplores that he can no longer speak of Luther as a son. He feels certain that the elector will prove loyal to the church, although he does not disguise the fact that he has heard of his friendship for the heretical leader and that the latter relies on his support. He has ordered the bull to be circulated among the nobility of Saxony, and he feels equally assured that he may reckon on their assistance in extinguishing this "incendiary conflagration." As for Luther himself, he denounces him as one who is seeking to revive the heresies of the Waldenses, the Hussites, and the Bohemians, and who, by the manner in which he has condemned the burning of heretics, has clearly shown that he sympathizes with the Turks and aims at the destruction of the true church.[1]

The bull of excommunication, along with numerous volumes of the decretals, was burnt by Luther himself at Wittenberg in the following December,—a proceeding by which he formally intimated his repudiation of the decrees and canons of the church. Such a measure necessarily roused the opposition of those learned bodies by whom the canon law was taught and elaborated, and on 21st April 1521 the university of Paris condemned as "heretical, schismatical, impious, and blasphemous" more than a hundred propositions extracted from Luther's writings; while, skilfully following up the line of attack indicated by the supreme pontiff, they enlarged upon the view that Lutheranism was little more than a specious reproduction of errors long ago proscribed and exploded. The university at the same time decreed that Luther's writings should be burnt; and the sentence was subsequently carried into effect in most of the capitals of Europe. In London the ceremony was performed at Paul's Cross on the 12th May, and Bishop Fisher in his sermon on the occasion declared that Luther by burning the decretals had made it clear that he would not have hesitated to burn the pope himself had the latter been in his power.

Reformation in England

The Reformation in England had, however, already commenced, and its origin must be looked upon as in a great measure independent of the Lutheran movement; as in Germany, it had been preceded by a kindred movement, an endeavour to bring about a reform of discipline. The nation was not compelled, as in Italy, to witness the corruptions of the papal court, nor were the laity equally oppressed with the people of Germany by imposts and exactions of every kind. But the unsparing extortion practised by Wolsey's agents after his appointment as *legatus a latere* was severely resented, and appeared all the more grievous when contrasted with that immunity from arbitrary taxation which it was the Englishman's special boast to inherit as his birthright; and the arbitrary procedure of the ecclesiastical courts and the licentious lives of the clergy were the subjects of loud and continual complaint. In the year 1514 the notable case of Richard Hunne roused popular indignation to the highest pitch. He had been so bold as to resist what he regarded as an unjust exaction of mortuary fees, by pleading in the ecclesiastical court that the action brought against him was unlawful by the Statute of Præmunire,—a plea which virtually raised the whole question of benefit of clergy. Hunne was committed to the Lollards' Tower and was shortly after found dead,—murdered, as it was popularly believed, by the contrivance of the chancellor of the bishop of London. The case gave rise to a fierce legal controversy, in which the authority of an Act of Parliament was opposed by the precedents established by a decretal of the church. It was followed by the memorable trial of Dr Standish (1515), by which the question of the royal supremacy was distinctly raised, and Henry himself not improbably led to conceive that theory of his legitimate authority in matters ecclesiastical which was afterwards attended with such important results. The state of discipline among the clergy at large was but little, if any, better than in Germany, and their addiction to secular pursuits and pleasures, their covetousness, ambition, and licentiousness are attested not only by satirists like Roy and Skelton, but by grave and temperate censors such as Dean Colet, Archbishop Warham, Bishop Fisher, and Sir Thomas More, and form the subject of their earnest remonstrance and appeals for reform. Wolsey himself, than whom no statesman more clearly discerned the tendencies of the age, was especially anxious to raise the reputation of the whole body for learning and exemplary lives, and it was with this view that he founded Cardinal College (afterwards Christ Church) at Oxford, and invited some of the most promising young scholars at Cambridge to become instructors within its walls.

It is also in connexion with the two universities that we meet with the first indications of a reformation of doctrine. During the years 1511-14 Erasmus had filled the post of Lady Margaret professor of divinity at Cambridge, and the publication of his *Novum Instrumentum* in 1516 was directly the outcome of his labours during that period. Thomas Bilney, the martyr, a member of Trinity Hall and one of the most eminent of the Reformers, expressly attributes his conversion to the influence of Erasmus's *New Testament.* Around Bilney there gathered a little band of Cambridge scholars,—Shaxton, Crome, Skip, Rogers, Lambert, Heynes, Taverner, Parker, and others. It was their custom to meet together at an inn known by the sign of the "White Horse." In the first instance, their attention was chiefly given to the Scriptures themselves, but subsequently to the writings of Luther. The inn then began to be styled "Germany" by their enemies; and such would appear to be the first commencement of the Reformation in England. That commencement was illustrated by an incident which not a little resembles the better-known incident associated with the career of Luther. On the appearance of the papal proclamation of indulgences in 1517 a copy had been affixed to the gate of the common schools in the university. The same night a young Norman student, of the name of Peter de Valence, wrote over the proclamation a few Latin words denouncing the theory of indulgences as a superstition. He was forthwith summoned to appear before the vice-chancellor in order to account for his conduct, and on failing to do so was formally excommunicated.

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[1] Balan, *Monumenta Reformationis Lutheranæ* (1884), pp. 1-3. This letter, published for the first time in this collection, differs entirely from that given in the Jena edition of Luther's works; and Cardinal Balan in his preface (pp. 5-10) adduces satisfactory reasons for concluding that the letter which he prints from an original in the archives of the Vatican is the true letter, and that the other, if not a forgery, is a reproduction from some untrustworthy source.

Henry VIII., Francis I., and Charles

In the month of January 1519 the emperor Maximilian I. died, and the imperial dignity, declined by Frederick of Saxony, descended to Charles V. Of the three monarchs who had aspired to this supreme honour Henry VIII. was now in his twenty-ninth year, Francis I. in his twenty-sixth, and Charles V. in his nineteenth. The English monarch, at this time both zealous and devout, was eager to give some proof of his loyalty to the Catholic Church, and had he occupied the place of Charles the career of Luther would probably have been soon arrested. The great Reformer owed his safety at this critical period mainly to the armed chivalry of Germany, which rallied ominously to his support. On no occasion was its presence more sensibly felt than at the diet of Worms (May 1521). The memorable edict (see **Luther**), signed on the same day as that on which the pope and the young emperor concluded their compact for the reconquest of Milan from the French, marks the crowning triumph of the policy of Leo and Alexander. But Charles, who looked upon Luther as a means of bringing pressure to bear upon the pontiff which might prove useful in a future emergency, was determined not to surrender the bold professor, for the present, to his enemies. To Henry, who was influenced by no such secular considerations, Luther's contumacy appeared to call for authoritative rebuke in every land; and in July 1521 he produced, in reply to the treatise on *The Babylonian Captivity*, his *Defence of the Sacraments.* The book passed rapidly through several editions, was translated into German, and, to quote the expression of Cochlæus, "filled the whole Christian world with joy and admiration." Such an effort from such a quarter called for distinguished recognition. Francis was already styled the eldest son of the church. The imperial dignity presupposed a not less conspicuous fidelity. The titles of "Most Christian" or "Most Catholic" could not accordingly be vouchsafed to the English monarch. He was therefore rewarded with the newly-coined title of "Defender of the Faith." Sir Thomas More and Bishop Fisher both imitated their royal master's example by also compiling a tractate in reply to Luther; but the Reformer, in his rejoinder to the royal polemic, called its author a fool and designated him the "Pharaoh of England."

The death of Leo X. in 1521 was coincident with an important crisis in Italian history. Milan had been wrested from the French by the allied papal and imperial forces, and the realization of that scheme of national unity and independence for which he and his predecessor had laboured seemed no longer a dream of the future. In the midst of his exultation—partly, it is said, as the result of it—Leo died, and seldom in the annals of the papacy had an election to the office been attended with equal interest and excitement. Wolsey eventually was out-manœuvred by the imperial party, and the emperor's former preceptor, the irreproachable, austere, and rigidly devout Adrian (VI.) of Utrecht (1522-1523) succeeded to the papal chair. After a few months' tenure of the office he too gave place to another, and the house of Medici was again represented in the person of Clement VII. (1523-1534). In this election Wolsey was again a candidate, and a second time he had reason to believe that he owed his defeat to the emperor, an injury which he never forgave. In not a few respects Clement was admirably qualified to cope with the difficulties by which he found himself surrounded. He had been at once the most trusted and the ablest of Leo's advisers; his attainments and experience were such as in every way corresponded to the requirements of his office, for, while well versed in philosophy and theology, he had also mastered the political and ecclesiastical questions of the day, and his clear perception enabled him to grasp the essential features of his policy with remarkable skill and promptitude. His position, however, was one of extreme perplexity, alike in its diplomatic and its theological relations. To no power had he and his house rendered greater services than to Spain; ever since, indeed, the pontificate of Alexander VI., the papacy had, often without designing it, been the instrument of imperial aggrandizement. With the accession of Clement, however, these relations are to be seen assuming a new phase. The election of Charles V. as emperor awoke in the proud representative of the great house of the Medici the sense of a new danger; and the prospect of Milan, Naples, and the empire being concentrated in a single hand was one which no Italian potentate could be expected to contemplate with equanimity. The retreat of Bourbon from Italy, on the other hand, had caused the Curia to look with altered sentiments on the policy of France; and if Clement's advice and good wishes could have availed aught the great disaster at Pavia would have been averted. The emperor was far from unaware how little he had throughout been indebted to Clement's good offices, and before he led his army into Italy had been heard to avow his intention of avenging himself "on that poltroon the pope." "Some day or other," he added, "perhaps Martin Luther may become a man of worth." The battle of Pavia (February 1525) followed, and its results seemed to threaten the overthrow of that balance of power which it was the aim of the chief leaders of the new nationalities to maintain; both Wolsey and Clement VII. alike now regarded with dismay the proportions which the power of Spain was assuming. "It is no trivial question, no single state, that is concerned in the coming contest," exclaimed Clement's minister; "this war will decide the freedom or the eternal slavery of Italy." In July 1526 the papal troops had already entered Lombardy.

Such were the circumstances under which the Clementine League (22d May 1526) was formed, with the general assent of the Italian states, but with the usual disregard of the state of opinion north of the Alps. But it was hardly reasonable to expect that Ferdinand of Austria would be solicitous to uphold the papal interests in Germany when the imperial interests were being thus vigorously assailed in Italy. Three months before, the sanction of the emperor had been given to the publication of certain "provisions" in matters of faith which had filled the Lutheran party with alarm. At Gotha and again at Torgau the Protestant leaders began to concert measures for actively repelling the policy of coercion which they anticipated would shortly be commenced. When, however, the diet assembled at Spires in June they found their apprehensions dispelled in an unexpected manner by the newly-aroused animosity towards the Roman pontiff and his policy. Never had the electors shown themselves more unanimous in counsel or submitted with better grace to the contributions imposed upon them. It was even proposed that the recently issued provisions should be publicly burnt and the Bible adopted as the only rule of faith. However, it was finally resolved that the respective states should be declared to be at full liberty, in relation to all questions of belief raised by the edict of Worms (see LUTHER), "to conduct themselves as each should hereafter be ready to answer for towards God and the emperor,"—terms which virtually implied permission to proceed according to their own discretion. "Such an enactment," observes Ranke, "containing as it does no mention whatever of the supreme pontiff, may be looked upon as the commencement of the Reformation properly so called, involving, in fact, the institution of a new church in Germany."

The effects of the concurrent action of religious and national sentiment thus brought about were soon to receive a memorable illustration in Italy. The soldiers who made their way under the leadership of Frondsberg, Ferdinand's lieutenant, across the Alps, in the snows of November 1526, into the plains of Lombardy, and afterwards mingled with the Spanish forces which Bourbon led on to the assault on Rome, were almost entirely avowed supporters of Luther's cause and full of fierce hatred of popery. Frondsberg himself loudly declared that as soon as he had taken Rome he would hang the pope. The Spaniards, notwithstanding their unshaken devotion to Catholicism, entered the city burning with the spirit of national antipathy, and eager to revenge the long series of wrongs and exactions which their countrymen had suffered at the hands of Italian ecclesiastics. Among the horrors which followed upon the capture of the capital (May 1527) nothing more completely shocked the sense of Latin Christendom than the savage contempt manifested by the German soldiery for everything that symbolized the Roman faith, their wanton destruction of relics and images, mock religious services, and especial brutality in the treatment of priests. Even their Spanish confederates, though equally merciless in their excesses, looked on with indignation as they saw them disguising themselves as cardinals and holding a mock consistory under the windows of St Angelo for the purpose of electing Luther as pope. But even the impressions thus produced were evanescent when compared with the constantly renewed and unavailing regret which filled the breast of the scholar and the churchman in after years, as he realized the irreparable losses inflicted upon art and learning, the destruction of unique manuscripts and ancient records. Nor can it be a matter of surprise that a sentiment of deep revenge should have arisen in Rome against the Lutheran destroyer, and that even the Swabian and the Spanish invader alike should have afterwards been solicitous in a manner to disguise their own responsibility, by professing to look upon the blow thus struck at the sanctity and inviolability of the sacred city as a direct judgment of God. For a time, though only for a few months, it was believed, even by politicians so shrewd and well informed as Wolsey, that the emperor himself was designing to aid the Reformation. The approach of the Turks, who had overrun Hungary, and the hostility of France demonstrated the urgent necessity of maintaining concord among his subjects in the empire; and it is possible that he may really have contemplated placing himself at the head of the Lutheran movement and keeping Clement VII. permanently a prisoner at Gaeta. But his Spanish blood, his education under Adrian of Utrecht, and the traditions of the imperial dignity proved too powerful a counterpoise, and Charles eventually not only deigned to lay before the courts of Europe a partial explanation and apology for the tragedy at Rome, but in a treaty (26th November 1527) with the pontiff he entered upon an agreement for the adoption of a distinct anti-Reformation policy. It has been asserted that Clement also undertook on this occasion not to declare the marriage of Henry VIII. and Catherine illegal, but no such stipulation appears in the existing treaty.

In pursuance of his anti-imperial policy Wolsey did not fail to seek to turn to the best account the sensation caused by the triumph of the imperial arms. He enjoined the observance of a three days' fast and the offering up of prayers in every church in England for the captive pontiff's deliverance. He could not, however, but be conscious that his policy was regarded with but little favour by the nation at large. The young emperor was highly popular among the citizens of London, and the ancient amicable relations with the house of Burgundy and the actual important commercial relations with Flanders combined to render Spain in the eyes of Englishmen their natural ally, while France they still regarded as their hereditary foe. An expedient to which he had recourse about this time only served still further to fan this feeling. He had sought to render France, instead of the Low Countries, the main channel of the commerce between England and the Continent by making Calais the chief port for merchandise. The merchants of the Hanse towns took alarm; and, as it was in their vessels that Luther's writings, which were now eagerly purchased in England, even at exorbitant prices, chiefly found their way across the Channel, the preachers of the Reformation found no difficulty in representing to their countrymen that an Anglo-French alliance could not fail to prove inimical to the gospel. On the other hand, the Catholic party both in England and in Germany, as soon as the project of the divorce became noised abroad, could not but recognize in Catherine the representative of the interests of the true church, while they looked upon the emperor as her champion, and upon Wolsey as a traitor to the cause of truth and justice. During the last five years the cardinal's efforts to reform the clergy and repress the Reformation in England had been strenuous and constant. In the year 1521 he had enjoined all the bishops "to take order that any books, written or printed, of Martin Luther's heresies and errors should be brought in to the bishop of each diocese."[1] The movement at Cambridge continued, however, to progress, and in 1523 some of the bishops suggested the appointment of a visitation to the university "for trying who were the fautors of heresy there." This proposition was not acted upon by Wolsey, who probably in his heart sympathized with the genuine spirit of learning developing in the university, and the matter was subsequently made the ground of an accusation against him by his enemies.[2] We find, accordingly, George Stafford, a member of Pembroke Hall, venturing in the following year to adopt the example set by Luther, of taking the Scriptures themselves, instead of the *Sentences* of Peter Lombard (the theological text-book of the universities), as the basis of a course of divinity lectures. In the following year William Tyndal published at Antwerp the first edition of his translation of the New Testament, and in 1526 we hear of its introduction into Oxford by Thomas Garret, and of the volume being burnt at Paul's Cross. On 27th November 1527 Bilney and Arthur were examined at the Chapter House at Westminster before Wolsey and other ecclesiastics, as to whether they had preached or taught to the people the opinions of Luther or any others condemned by the church. Owing to the proximity of Cambridge to the seaports and commercial towns of the eastern counties, such as Yarmouth, Harwich, and Norwich, the university would appear to have become familiarized with the Lutheran doctrines much sooner than Oxford. From 3d July to 20th September 1527 Wolsey was in France, intent on bringing about the marriage of Princess Mary with the duke of Orleans, and on gaining the support of Francis in the matter of the royal divorce.

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[1] Strype, *Memorials*, i. 56.

[2] Burnet. *Hist. of the Reform.*, ed. Pocock, i. 70.

Henry himself had at this time fully resolved to carry the latter project into effect, and the doubts raised with respect to the validity of his marriage and the legitimacy of Mary cannot be regarded as anything more than official formalities, designed to give a veil of decency to his real purpose. While in France Wolsey learned from Flanders that the emperor had become apprised of Henry's real intentions, and he himself now proceeded (to quote his own words) to employ "all possible ways and practices for the obtaining of the pope's consent." Unfortunately for the success of his efforts, Henry at this juncture conceived the design of sending another agent to Rome, to act altogether independently of Wolsey, and charged to procure, not only the appointment of a commission empowered to dissolve the marriage with Catherine, but also a dispensation removing all obstacles to the king's second marriage with Anne Boleyn. Clement was still a prisoner in the castle of St Angelo, but on the evening of the 9th December 1527, disguised in a blouse and carrying a basket and an empty sack on his back, he effected his escape, and with the assistance of a guide arrived the next morning at Orvieto. From that day his resolve was probably definitively taken, and, notwithstanding his previous promises and his subsequent apparent concessions, he would seem to have been firmly resolved not to grant his consent to a measure deeply humiliating to himself and certain to expose him to the full brunt of the emperor's resentment. But at Orvieto Henry's delegate, Knight, although untrained and ill qualified for the task of a diplomatist, obtained both a commission and a dispensation, which, however, on his reaching England, were both found to be worthless, owing to designed non-observance of the necessary technicalities. In the following year Foxe and Gardiner were despatched on a like errand. The latter was far better suited for the work than Knight; and he did not scruple to threaten the trembling pontiff with the complete withdrawal of Henry's support, and to predict as the inevitable consequence the collapse of the already tottering apostolic see,—a result which, he declared, "would be attended by the applause and satisfaction of the whole world." By such menaces Clement was eventually induced again to grant a commission and a dispensation. A decretal bull, formally annulling Henry's first marriage, was handed to Campeggio, which he was instructed to show to the king and then to destroy. But in the meantime the celebrated brief executed by Julius II., in which the dispensation for Henry's first marriage was re-enacted in more precise and unqualified terms, was discovered in the Spanish archives. It was sought to show that the brief was a forgery, but to this view of the matter Clement altogether refused to assent. At length, however, in May 1529 the legate proceeded to open his court at Westminster. The courageous conduct of Catherine put honourable men to shame; and no slight impression was produced by Bishop Fisher's heroic declaration of his willingness to stake his life that her marriage with the king was perfectly valid. Campeggio, under various pretexts, still hesitated and delayed. In July the news of the peace of Cambray arrived, and it was known that the influence of the emperor would henceforth be paramount in Italy, while it was believed that the projected marriage between the French monarch and the sister of the emperor augured a durable peace between the empire and France. Then the legate adjourned the court and the pontiff revoked the cause to Rome. All around Wolsey saw the plans which he had laid with so much toil and skill breaking up, and on him the royal displeasure vented itself. He died 30th November 1530, a victim to the wanton caprice of one whom he had served only too faithfully, and with him the ablest supporter of papal influence and the most formidable opponent of Reformation principles in England disappeared.

Henry would not condescend to appear before a Roman court, and as a last expedient it was proposed that the question of the legality of his first marriage should be submitted to the learned bodies, the universities and eminent canonists of Europe. This scheme had already been recommended by the episcopal bench, but to Cranmer's ingenuity is attributed the further suggestion that the opinion thus obtained should be carried into effect by a court convened in England. Commissioners, among whom Richard Croke appears as the most conspicuous and indefatigable, were accordingly despatched on the proposed errand. The means to which they had recourse in order to obtain opinions such as their royal employer desired are plainly described by a contemporary writer, who says that "there was inestimable sums of money given to the famous clerks to choke them, and in especial to such as had the governance and custody of their universities' seals."[1] The evidence more recently brought to light enables us to accept this statement as substantially correct.[2] The unpopularity of the divorce among the nation at large was especially shown at the two universities, where the junior members made demonstrations of the greatest dissatisfaction, while their seniors were mostly bribed or intimidated into acquiescence by the royal agents; nor could the authorities at either Oxford or Cambridge disguise the fact that they found themselves at variance with the feeling of the country at large.

It is at this juncture that Cranmer assumes a foremost place as a leader of the English Reformation. He had written in defence of the divorce, and had taken a part in embassies sent by Henry to treat on the question with the emperor and the pope; and Clement had shown his sense of the value of his influence by appointing him to the lucrative post of grand penitentiary for England, in the hope of winning him over to the papal interests. Cranmer's whole policy, however, had been directly opposed to that of Wolsey. He had used his best efforts to confirm the commercial relations with the Netherlands, and had superintended the negotiation of a commercial treaty between that country and England. He had resided for some months in Germany, and while there had married Margaret, the daughter of Andrew Osiander, a distinguished preacher and leader of the Lutheran party at Nuremberg. From Germany he was now summoned back to England to become the successor of Warham, the primate, who had died in August 1532. As there had as yet been no formal rupture with the see of Rome, it became necessary for him to apply to Clement for the customary bull of consecration, and also for his pallium as metropolitan, and on receiving these it was also requisite that he should take the oaths of canonical obedience and subjection to the Roman pontiff. His conduct in this dilemma has been generally regarded as indefensible. In order to show that he disclaimed the right of the pontiff to nominate to ecclesiastical offices in England, he surrendered the several bulls, eleven in number, into Henry's hands; and, having done this, he took the usual oath of obedience to the see of Rome.[1] Before doing so, however, he made a protestation to the effect that he did not intend thereby to bind himself to do anything contrary to the laws of God, the king's prerogative, or the commonwealth and statutes of the kingdom. On 23d May 1533 he proceeded, as archbishop and legate of the apostolic see, to pronounce the king's marriage with Catherine of Aragon null and void *ab initio*, as contrary to the divine law: and five days later he gave judicial confirmation to the royal marriage with Anne Boleyn. In the following year (23d March 1534) Clement rejoined by a manifesto declaring the validity of the first marriage, and calling upon Henry to take back his first wife and to observe "a perpetual silence" in relation to the question for the future.[2] This decisive step was mainly the result of the parliamentary action that had in the meantime been going on. The parliament of 1529 had in various ways limited the privileges of the clergy, and by the Act 21 Hen. VIII. c. 13 had deprived them of the power of holding pluralities by virtue of licences obtained from Rome for money. Fisher, from his place in the House of Lords, vainly sought to combat these reforms by declaring that Lutheranism was spreading in the nation and by reminding his audience of Germany and Bohemia and the miseries that had already befallen those countries. The allusion to the Lutheran movement appears to have been, indeed, singularly injudicious, and there can be no doubt that at this period it was the aim not only of the king but of the bishops to dissociate the Reformation movement in England from the movement that was in progress in Germany. As yet the repudiation of the papal supremacy and a reform in matters of discipline were all that was contemplated either by the crown or the parliament. In 1531 appeared a proclamation making it penal to introduce bulls from Rome, and this was shortly followed by an Act visiting with severe penalties all who should be found going about the country for the purpose of carrying on the sale of indulgences; while under the famous Statute of Præmunire the whole body of the clergy were convicted of having recognized the validity of Wolsey's acts as papal legate, and thereby placed both their liberties and their possessions at the mercy of the king. In April 1533 there followed the Act providing that all causes should henceforth be tried in the courts of the kingdom, and forbidding appeals to Rome under any circumstances whatever,—the body "now being usually called the English Church" being held "sufficient and meet of itself to declare and determine all such doubts and duties as to their rooms [*i.e.*, offices] spiritual doth appertain." These successive enactments had already paved the way for Henry's final rejoinder to Clement's demands,—the Act of Supremacy (November 1534), whereby the king was not only declared to be supreme head of the Church of England, but was at the same time invested with full power "to repress and amend all such errors and heresies as, by any manner of spiritual jurisdiction, might and ought to be lawfully reformed."

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[1] Cavendish, *Life of Wolsey*, ed. Singer, p. 206.

[2] See Croke's and other letters in *Records of the Reformation*, ed. Pocock, Nos. xcix.-cxxvi., cxxviii.-cxlvi., clvii.-cciii.

Political condition of Switzerland

While such was the progress of events in England and in Germany there had been going on in Switzerland a corresponding movement, second only in importance to that initiated by Luther. The political relations of the Swiss confederation at this period exercised a very appreciable influence over the whole course of the Reformation. With the commencement of the century the cantons had already reached the number of thirteen; and the confederates, in combination with the Leaguers, represented Italian as well as German interests. In great crises they were not incapable of presenting a combined front to the common foe; but more generally they were divided by political jealousies and differences, while the majority of the men in each canton were mere military adventurers, ready to serve under the banner of the empire, France, the pope, or the duke of Milan, according as the one or the other power seemed likely best to reward their services. An important change in the ecclesiastical relations of the cantons had recently brought them into closer connexion with Rome. The six bishoprics into which Switzerland was divided—Lausanne, Sion (Sitten), Como, Basel, Chur, and Constance—had formerly been severally subject to the metropolitan jurisdiction of Mainz, Besançon, and Milan. But this jurisdiction had been superseded by the creation of the nunciatures, whereby each bishopric was brought into direct connexion with the papal see. The nuncios often exercised a potent influence on the political relations of the confederates. They negotiated with large bodies of Switzers the conditions of military service under the pope; they directed the traffic in indulgences; and they watched with especial jealousy the first appearance of schism. The experience, however, of those of the confederates who accepted military service in Italy did not serve to increase their reverence for the Curia and its aims. They carried back with them to their homes a contempt for the whole administration of the Roman see and its dependencies which communicated itself to their countrymen, and at no centres were opinions adverse to Catholicism now spreading more rapidly than at Zurich, Bern, and Basel.

Zwingli

Born in the same year as his brother Reformer, Ulrich Zwingli was scarcely less distinguished by commanding powers, devotion to study, and a yet more notable devotion to truth; but in the enlightened tolerance which marked his whole career we recognize the contrast between his early associations and those which nurtured the somewhat narrow though fervid patriotism of Luther. The latter, in the retirement of his monastic cell, had pondered over the profound speculations of Augustine, the imaginative subtleties of De Lyra, and the mysticism of Tauler. The other, at the universities of Vienna and Basel, had become familiarized with classic models, and his genius had gained a brighter inspiration from converse with the masterpieces of antiquity. It was in connexion with the church at Glarus that Zwingli first assumed the discharge of pastoral duties. It was characteristic of his true and discerning patriotic feeling that he strongly disapproved of the acceptance of mercenary service by his countrymen, and more especially of the service of France, and his outspoken sentiments on the subject eventually rendered it necessary for him to quit Glarus for Einsiedeln. Here he was for a short time in receipt of a pension from the pope and was generally regarded as a supporter of Catholic institutions. In conjunction with the abbot of Einsiedeln he aimed, however, at the development of a less superstitious spirit among both the clergy and the laity, who resorted in great numbers to the monastery (a noted centre for pilgrimages). It was here that he formed the acquaintance of one of the most eminent of the Reformers, Oswald Geisshäusler (better known as Myconius), and through his friend's influence received in 1518 an invitation to settle in Zurich as the parish priest of the cathedral in that city. Here he at once began to discard the traditional mode of exposition which limited the preacher to certain prescribed sections of the Bible, and commenced instead a connected series of lectures on the New Testament. In the course of four years he thus completed a course of sermons on the whole of that portion of the Bible. This innovation, peculiar to the Reformed Church, was never adopted by Luther, although followed by most of the theologians of Switzerland and the upper Rhineland. It was in the year 1519 that Zwingli first became acquainted with Luther's early treatises; but his own views appear to have been formed quite independently of these. Shortly after his arrival in Zurich the Franciscan Bernardin Samson visited the city on a like mission to that of Tetzel and encountered in Zwingli another Luther. The grossness of the system of indulgences was so ably exposed by Zwingli that he carried nearly all who heard him with him, and Samson was obliged to return to Italy before his mission was fully accomplished. Even Faber, afterwards the opponent of Zwingli, could not but express to the latter his satisfaction at the result. Gradually the voice of the Reformer was heard uplifted against other mediæval superstitions and especially against Mariolatry; his fame as a preacher rapidly spread, and he became known as one of the chief leaders of opinion in Zurich. The state of morality in the city was, however, exceedingly low, and he not only had to encounter considerable opposition but was repeatedly exposed to charges of heresy. Nevertheless the conviction which he produced among the more influential citizens of the truth of the tenets which he advocated was such that in the year 1520 an order was issued by the city council to the effect that all ministers should in future ground their discourses on the New Testament, "and prove their doctrine from the Bible alone, discarding all innovations and human inventions." While meeting with opposition in one direction, he was compelled himself to oppose the zeal of fanaticism in another. As at Wittenberg, an iconoclastic spirit had begun to manifest itself, and the question of the lawfulness of images in churches was warmly debated. In the months of January and October 1523 two conferences of the clergy and laity assembled in Zurich, in the course of which Zwingli put forth sixty-seven propositions, involving conclusions adverse to the teaching and practice of the mediæval church. Among those who took part in the discussions were Faber, Meyer of Bern, Hofmeister, and Conrad Schmidt of Küssnacht, Knight Commander of the Order of St John, a man of eminent character and ability. Schmidt endeavoured, although in a temperate and rational manner, to defend the custom of placing images in the churches, but after a warm discussion Zwingli ultimately decided for their abolition. In the yet more important discussion that followed, with respect to the true nature and significance of the mass, whether it was to be regarded as of the nature of a sacrifice or simply as a commemorative ordinance, he expressed himself in favour of the latter interpretation. The issues raised by the sixty-seven propositions extended considerably in their scope beyond all that Luther had as yet advanced; and, as at Leipsic, it was soon discovered that the two contending parties were divided by an insuperable difference with respect to the authority which they were disposed to accept as final,—the one party grounding their arguments solely on the Scriptures, the other on the councils and the fathers. It may be noted, as an illustration of the extremely low status of the inferior clergy of the country at this period, that, in replying to Zwingli's demand for an intelligent and systematic study of the Scriptures by all pastors, it was urged as an objection that many pastors might be unable to afford to purchase a copy of the Bible for their own use! Another notable theory supported by Zwingli was that known at a later period as Erastianism, according to which the authorities of the church were to be held to be ultimately amenable to the jurisdiction of the civil power. At his instance the church at Zurich next proceeded to repudiate the control both of the bishop of Constance and of the papal nuncio, constituting itself (1524) a separate ecclesiastical body, the supreme authority over which was vested in the magistrates of the city. In the public services the Latin liturgy and the Gregorian chant were set aside for a German prayer-book and German singing. The rite of baptism was made more simple,—the ceremony of exorcism on which the Lutheran Church continued long after to insist being altogether discarded. In the year 1525 Zwingli published a more systematic exposition of his tenets in his best-known work, his *Commentary on True and False Religion*, which he dedicated to Francis I. His conception of the sacraments and of original sin as here unfolded separates him still further from the doctrine of the mediæval church, while in his remarkable catholicity of belief in regard to salvation he much resembles some of the early Greek fathers. Like Clement and Origen, he believed in the final happiness of the good and wise, including the good and wise of pagan antiquity; nor did he hesitate to express his conviction that Socrates was a better and wiser man than any Dominican or Franciscan of his own day. On the other hand, he upheld the doctrine of predestination in its most rigid form, that afterwards known as "supralapsarian" (see PREDESTINATION).

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[1] It should, however, be noted that Cranmer's oath as metropolitan contained the clause "salvo ordine meo," and this clause might probably, in the judgment of canonists, render his subsequent reservation more defensible. See *Sarum Pontifical* in Camb. Univ. Lib. (Mm. iii. 21); Maskell, *Monumenta Ritualia*, ii. 317; Strype, *Memorials of Cranmer*, App. No. VI.

[2] *Records of the Reformation*, ii. 532.

In no country was the Reformation so closely associated with political feeling as in Switzerland; and its upholders, amid surrounding despotisms, were advocates of republican institutions. Zwingli and his followers looked on with shame and sorrow as they saw their countrymen hastening to cross the Alps to become the mercenaries of the pope. With no less sense of humiliation did they regard the venal spirit of their public officials stooping to become the pensioners of the French court. The progress of these new opinions was, as is usually the case, much more rapid in the large towns than in the more rural and mountainous regions. At Bern they were ably upheld by Anshelm, the historiographer of the city, and by Sebastian Meyer, and Haller; in the free city of Basel he had for his followers Œcolampadius and William Farel; and already in 1527 Conrad Pellicanus, afterwards his zealous follower, had conceived that admiration of his character and tenets which was attended by such important results. Wyttenbach, Zwingli's former preceptor, sustained his teaching in Biel, Joachim von Watt in St Gall, Burgli, Blasius, and Dorfmann among the Grisons. In the cantons of Schwyz, Uri, Unterwalden, Lucerne, and Zug, on the other hand, the new doctrines found strenuous opposition; and the simple mountaineers listened with unfeigned sorrow and indignation when they heard that it was proposed to abolish pilgrimages, such as those to the field of Morgarten and the chapel of Tell, and to dispense with those priestly virtues of celibacy and fasting which so greatly enhanced their filial reverence for their village pastor. Another and yet more serious obstacle, which threatened to place the whole movement in peril, was that presented by the differences of belief which now began to rise among the Protestants themselves. Foremost among these points of difference was that respecting the Eucharist,—the theory which Zwingli maintained being assailed with peculiar acrimony and vehemence by Luther. Political feeling added not a little to the animosity of that attack. Difficult as it may seem to associate the efforts of one who did so much for intellectual freedom with tyranny and coercion, it is certain that Luther's influence after the year 1523 was not favourable to the political liberties of his countrymen. In that year both Sickingen and Hutten were removed by death, the victims of a policy to which Luther was always strenuously opposed,—the endeavour to enforce the redress of political and ecclesiastical grievances by recourse to arms. The iconoclastic ardour of Karlstadt and the fanaticism of Münzer alarmed him beyond measure, and he regarded with the most genuine distrust the spread of their influence among the peasantry. The sequel justified his alarm. Ground between the exactions of the agents of the church on the one hand and the oppression of the nobles on the other, the peasants rose at last in fierce rebellion. No such insurrection, so widespread, so sanguinary, and so ruthless in its vengeance, had ever before disquieted Germany as that which marked the close of the year 1524. The part played by Luther in relation to that gloomy episode will always be a matter for dispute among critics of different schools. To some he appears as lending his great influence to crush the efforts of down-trodden classes driven to desperation by intolerable oppression, to others as the champion of law and order against lawless miscreants intent on revolutionizing both church and state. Luther himself considered that loyalty to the emperor and to the civil authority was a primary duty, and that questions of religious reform should never be suffered to affect the citizen's fidelity to his political obligations. He probably held that his views were justified by the sequel; but they were not shared by Ulrich von Hutten nor by Zwingli, who both maintained that the popedom and the empire were too closely associated to make it possible to attack the one without also attacking the other.[1] The sacramental controversy runs parallel with the history of the Peasants' War, and it unfortunately happened that the theory of the Eucharist maintained by Zwingli was the same as that upheld by Karlstadt, whose iconoclastic successes at Wittenberg had made him an object of especial dislike to Luther. It was in vain, therefore, that Œcolampadius and Martin Bucer sought to mediate between the two parties. Luther, to whose view the republican doctrines and the sacramental theory advocated by Zwingli appeared closely associated, believed he saw in the latter only a second Karlstadt; and he was thus led to assail him and his followers with an amount of coarse ridicule altogether unbecoming both the subject and the occasion. Zwingli replied in much more temperate fashion, but he did not hesitate to assert that the doctrine which Luther maintained was identical with that taught by the Church of Rome.[2] To this Luther replied in his tractate entitled *Bekenntniss vom Abendmahl Christi* (1528). This pamphlet warfare only served, however, to embitter the relations of the two parties; and, although the reactionary sentiments evinced by several of the princes at the second diet of Spires (15th March 1529) gave significant warning of the necessity for union and concord among the whole body of the Reformers, it was distinctly foreseen that the conference convened at Marburg a month later was not likely to lead to any healing of the schism (LUTHER). The excellent intentions of the landgrave of Hesse in convening the conference were altogether frustrated. The moral effect was, however, distinctly favourable to Zwingli. His demeanour towards his opponent had throughout been conciliatory and fraternal, while that of Luther had been of a different character. Although fourteen articles, embracing the most important tenets of the Christian faith, had been agreed upon almost without discussion, he could not regard as a brother the man who differed from him on the obscure and doubtful doctrine embodied in the fifteenth article. This intolerance, a sinister omen for the future of the Reformation movement, produced an unfavourable impression on the minds of not a few with respect to Luther's moderation, and caused them subsequently to espouse the side of Zwingli, among their number being the landgrave Philip and Francis Lambert. The former, indeed, did not altogether despair of yet bringing about an alliance between the two parties, and was especially desirous of prevailing upon the Evangelical party (as the Lutherans now began to be called) to admit the congregations at Ulm and Strasburg into their communion. With this design he caused the congress of Schmalkald to be convened on the 29th of November, an earlier date than that originally intended. His friendly purpose was, however, again frustrated; and it soon became evident that the elements of difference between Luther and Zwingli—the reluctance of the former to engage in any line of action which might involve an appeal to arms, and the patriotic spirit of the other, which led him to look upon the assertion of political freedom as itself a Christian duty which it would be moral cowardice to evade—were such as it was hopeless to compose.

League of Schmalkald.

Such were the circumstances under which the emperor, temporarily freed from graver political anxieties by the treaty of Cambray, convened the diet of Augsburg; and on the 25th June 1530 the able and generally temperate exposition of the Protestant faith drawn up by Melanchthon, known as the Confession of Augsburg, was read before the assembly and the people. The Catholic reply, composed by Eck and other theologians, was then presented, and finally the Reformers were called upon to renounce their distinctive tenets and return to their ancient faith. They were at the same time required to arrive at a formal decision within a stated period; and on the 13th of August the Evangelical princes notified to the emperor their inability to comply with his command. On the 29th of the following March, at a third congress, convened at Schmalkald, they formed themselves into the memorable League, whereby each party to the compact pledged himself to the following agreement: "As soon as any one of them should be attacked for the gospel's sake, or on account of any matter resulting from adherence to the gospel, all should at once proceed to the rescue of the party thus assailed, and aid him to the utmost of their ability." It was likewise resolved steadfastly to oppose the assembling of any council which was not summoned independently of the pope or was not in its composition fairly representative of the whole church. In the meantime the efforts made further to define doctrine had been attended with the usual, it might be said the inevitable, results. The tenth article of the Augsburg Confession had been rigorously formulated so as not merely to exclude the Zwinglian theory of the Lord's Supper but also to involve in censure any interpretation that deviated, however slightly, from that laid down by Luther himself. A certain section of the Evangelicals declined, accordingly, to sign the Confession, and the four cities of Strasburg, Constance, Memmingen, and Lindau shortly after drew up and submitted to the diet another confession, known as the *Confessio Tetrapolitana*,—the composition mainly of Bucer and Hedio. In this the influence of the Zwinglian party so far prevailed that the adoration of images, a point on which the Augsburg Confession had been silent, was specifically condemned. The four cities were, however, admitted to the League of Schmalkald in 1531. Other circumstances temporarily strengthened the hands of the Leaguers. The emperor had formed the design of raising his brother Ferdinand, king of Bohemia and Hungary, to the dignity of "king of the Romans"; but the project roused the jealousy of the house of Bavaria, and the reigning duke entered into a treaty with the Protestant League. Treaties were about the same time made with France and Denmark, and it was evident that the new confederation would be able to oppose a resistance which even the resources of the empire might not be able to overcome. At this juncture another circumstance formed an appreciable element in the imperial calculations. All attempts at arriving at an understanding with the Turks had proved without result, and Solyman's invasion of Hungary was imminent. At the advice of his brother, Charles accordingly condescended to treat with the members of the League, and in July 1532 the religious peace of Nuremberg afforded a temporary compromise, which it was provided should remain in force until a general council, of the character demanded by the Lutherans, was convened, or until the assembling of a new diet of the states of the empire. In the meantime the Lutherans were to be free from molestation and to be permitted to preach and publish the doctrines of the Confession of Augsburg. They were also to be left in possession of such church property as they still retained, and the jurisdiction of the courts of the empire in ecclesiastical questions was to be suspended. In return for these concessions the Leaguers pledged themselves to be loyal to the emperor, and to render aid both with money and men in the event of an invasion by the Turks. They likewise undertook not to afford protection either to the Anabaptists or to the followers of Zwingli.

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[1] See Ranke's *Deutsche Geschichte*, iv. 107.

[2] *Deutsche Schriften*, iii. 16.

The great leader of the Reformation in Switzerland was at this time no more. In the year 1531 the feud between the Catholic and Protestant cantons had reached a climax; in the former the more bigoted section, aided by Ferdinand of Austria, had commenced an active persecution, and some of the Protestant preachers had been put to death. In order to repel these aggressions a league was formed between Zurich, Strasburg, and the landgrave of Hesse, and Zwingli strongly advised that a combined attack should forthwith be made on their opponents in Lucerne and Schwyz, and freedom of conscience obtained by an armed demonstration. Divided counsels, however, prevailed; and eventually Zurich was left to bear the brunt of the contest almost entirely alone. At the battle of Cappel (11th October 1531) Zwingli fell, and his followers sustained a defeat which, although they carried on a war of fierce retaliation, they were unable to retrieve, and a decided reaction in favour of Catholicism now set in. The death of Œcolampadius took place soon after the battle of Cappel, and was followed in 1535 by that of Francis Kolb, the Bernese Reformer. The heroic end of Zwingli was a matter of exultation not only to his Catholic antagonists but even to Luther, who was ungenerous enough to class his brother Reformer with lawless fanatics like Münzer,[1] and in a letter written in the following year even went so far as to warn Duke Albert of Prussia not to tolerate the followers of Zwingli within his territories.[2]

In Germany, on the other hand, the Reformation continued to progress. In 1533 Philip of Hesse, who was subsidized by France, inflicted a severe defeat on Ferdinand, and was able shortly after to reinstate Ulrich, duke of Würtemberg, in his dominions. The emperor at the peace of Kadan (29th June 1534) undertook to abstain from further interference in the ecclesiastical affairs of the duchy, and the understanding arrived at on that occasion is regarded by Ranke as marking the second important stage in the history of the Reformation in Germany. The Reformed faith was forthwith established throughout Würtemberg, and soon after was introduced into Holstein, Pomerania, the Mark of Brandenburg, Upper Saxony, Brunswick, and the Palatinate. The League of Schmalkald was thus strengthened by numerous and powerful accessions; among the number was King Francis himself, who, although he was repressing the Reformation movement with severity in his own dominions, saw his advantage in siding with the Protestant princes against his chief enemy, the emperor. Henry VIII. declared himself also a supporter of the League. The city of Basel had already in 1534 put forth, independently, a new confession of faith, and this was followed in 1536 by a second, which received the approval of Luther and became known as the "first Helvetic confession." In order, however, still further to unite the Protestant party, with a view to a general council, Luther, in conjunction with other theologians from Saxony, Swabia, and Hesse, drew up and transmitted to the Lutheran representatives at Schmalkald in February 1537 another confession. In this the doctrines contained in the Confession of Augsburg were reiterated, but in a far more uncompromising form. Luther denounced the pope as Antichrist and the mass as an abomination. Melanchthon declared himself unable to concur in this language, and in an additional article expressed his readiness to yield submission to the bishop of Rome as the highest dignitary in the church so soon as the latter should sanction really scriptural teaching.

As elsewhere, the history of the Reformation in France is that of a twofold struggle,—an endeavour to bring about a reform of discipline, and a contest which pointed in the direction of doctrinal change. The abuses that prevailed in the Gallican Church at this period were scarcely less glaring than those in Germany. The appointments to the higher benefices were dictated solely by the most sordid motives,—political ambition, court favouritism, and family interest. Pluralism largely prevailed; and both bishoprics and abbeys were granted *in commendam* to such an extent that residence was almost unknown. Preferments were often bestowed upon laymen, and even upon females and children. Pierre de l'Estoile, writing of the middle of the 16th century, states that the majority of the benefices in France were then held by persons who were by the canon law disqualified for their office. But in no country was the movement, that aimed at the correction of abuses such as these, more completely dissociated from the religious revolution contemplated by the Protestant leaders. In the first instance, the doctrines of Luther were favourably regarded by many of the nobility and of the episcopal order. The leader of the party which represented those doctrines was Lefèvre d'Étaples, whose translation of the New Testament into French appeared in the year 1522. In the year 1521, having been singled out by the Sorbonne for special attack as a teacher of the tenets which the university had just so emphatically condemned, he deemed it prudent, notwithstanding the encouragement he received from Francis, to retire to Meaux. Here, under the protection of Briçonnet, the eminent bishop of that diocese, he became the guiding genius of a movement which at one time seemed likely to transform Meaux into a second Wittenberg. This activity, however, was very early checked by the terrors of a commission. Lefèvre and his disciple Farel fled to Strasburg, the latter subsequently to Geneva, where his efforts founded the famous school of theology associated with the name of Calvin (see CALVIN); Briçonnet, alarmed at the prospect of a schism which threatened to prove permanent, reverted to Catholicism, and even acquiesced in a policy of persecution in his own diocese. Both Francis I. and his sister Margaret, queen of Navarre, were at this time disposed to support the Reformation. When the Sorbonne condemned the *Colloquies* of Erasmus (May 1526) Francis gave orders that 24,000 copies should be printed and circulated throughout the country; he accepted with expressions of favour the dedication to himself by Zwingli of the latter's treatise *On True and False Religion.* His sister corresponded with Melanchthon and was openly assailed by the Sorbonne as a favourer of heresy, while, as the mother of Jeanne d'Albret, her memory was always cherished with peculiar regard by the great Huguenot party. But the loss of prestige which Francis incurred by his defeat at Pavia and his subsequent captivity inspired the Ultramontane party with greater confidence, and, in spite of his efforts, Louis de Berquin, a leader of the Reformers and one of the most eminent scholars in France, perished at the stake in 1529. The policy of Francis was indeed mainly dictated by one dominant motive—that of personal hostility to the emperor—and the apparent caprice with which he treated the Reformers was the result to no small extent of this feeling. It now became his aim to conciliate Pope Clement as an ally against his great rival, and with this view he took advantage of certain excesses committed by a few fanatics, after the example of Münzer, to light the fires of persecution. At the same time, therefore, that he was supporting the League of Schmalkald he was burning heretics in his own dominions. On the death of Clement (September 1534), when he found the hopes which he had founded on an alliance with the Medici extinguished, since Paul III. proved less amenable to his plans, he again changed his tactics: he invited Melanchthon to come and take up his residence in France, and he set at liberty those who had been imprisoned for holding the Reformed doctrines. At the peace of Crespy (1544), again, he once more changed his policy, and sought to arrive at an agreement with Charles for the suppression of heresy and the restoration of discipline in the church.

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[1] De Wette, *Letters*, iv. Nos. 1429, 1430.

[2] *Ib.*, No. 1445.

At the period at which we have now arrived the main influences which guided the later history of the Reformation may be discerned in full activity. Largely political almost from the commencement of the movement, they continued more and more to partake of that character or became mingled with elements not less secular. Foremost among these latter must be placed the appeal made to baser motives both in Germany and in England, by the manner in which the nobility of both countries were bribed to acquiesce in the suppression of the religious orders, by being allowed to become large sharers in the property and revenues of the monastic and conventual foundations. Among the lower classes, on the other hand, who were often painfully reminded of the loss they had sustained in the withdrawal of that charity which, amid all the degeneracy of the monasteries, had still been one of their recognized functions, a certain genuine sympathy with Catholicism and traditional regard for its institutions long continued to survive. But even among these classes men could not but be conscious that a higher standard of belief and practice had been introduced by the Reformation, while the superior ability shown by those who preached its doctrines, in adapting their discourse to the comprehension and spiritual needs of the poor, invested them with a highly effective influence.

In Germany the policy of the emperor, nearly always ambiguous, became complicated with new difficulties. Charles himself, from political motives, appears at this time to have been really desirous of bringing about a termination of the prevailing religious controversies, but his vice-chancellor, Held, on whom it devolved to carry out his intentions, pursued a singularly infelicitous line of action, which ultimately led to the formation of the League of Nuremberg (10th June 1538), whereby Ferdinand, the duke of Bavaria, Henry of Brunswick, Albert of Brandenburg, and George of Saxony entered into a combination for the purpose of opposing the League of Schmalkald. Dissatisfied with such a result, Charles next endeavoured to bring about an understanding by a series of conferences; and Paul III. was induced to send his legate to attend a diet in Ratisbon (29th July 1541), where a project for reunion, known as the Ratisbon Interim, was brought under formal discussion. "It resulted," says Gieseler, "as before at Augsburg: they quickly came together on merely speculative formulas; but as soon as they touched upon the external constitution and ordinances relating to the authority of the church the division remained." It was the last, perhaps the only occasion, on which an influential section on both sides (the party that followed Paul III. and the party that followed Melanchthon) was animated by a genuine desire for reconciliation. Their design was defeated by the ignoble political aims of Francis on the one hand, and by the theological illiberality of Luther and the elector of Saxony on the other. In the meantime Protestantism continued to advance: Hermann von Wied, elector of Cologne, became a supporter of its doctrines; and Pomerania, Anhalt, Mecklenburg, and the imperial cities were added to the territories in which it became the dominant faith. It was at this juncture, when the Reformation in Germany may be considered to have advanced to its highest point, that Paul III. brought forward a proposal for assembling a general council,—a proposition to which it was decided by the Protestant party at the diet of Worms (March 1545) not to accede, inasmuch as it would be a council convened by the pope. In the following December, however, the council (see TRENT, COUNCIL OF) assembled,—the publication, in the meantime, of Luther's pamphlet *Against the Popedom at Rome, founded by the Devil*, having further contributed to foster theological rancour. The deliberations of this famous assembly resulted, as is well known, in the enactment of a series of canons condemnatory of Protestant doctrine; and in this manner the hopes which down to this time had been cherished of bringing about a compromise with respect to those articles of faith on which agreement had before seemed not unattainable were finally extinguished.

Two months after the first assembling of the council of Trent Luther died. His latter days had been embittered by the defection (as he regarded it) of Melanchthon to a hostile camp, in the espousal by the latter of the tenets maintained by Œcolampadius and Bucer. The doctrine of the church having now been once more defined by the Tridentine decisions, the emperor, in the confident belief that theological divergence might be expected soon to cease, next turned his attention to the removal of those abuses in matters of discipline which he held to be the chief obstacle to the return of Protestants to the church. With this view he brought about the acceptance of the Augsburg Interim (15th May 1548) by the diet, a compromise which, while it roused the susceptibilities of the pope, altogether failed to meet the conscientious scruples of the Protestant party. In its place Melanchthon and Duke Maurice of Saxony put forth the Leipsic Interim, a singular admixture of Lutheran doctrine and Roman ritual, which subsequently gave rise to the controversy with the Adiaphorists. The imperial design, of thus bringing about the extinction of Protestantism either by coercion or by conciliatory measures, may be held to have been finally defeated at the diet of Augsburg (1555), when it was decided not only that every ruler of a separate state should henceforth be at liberty to adopt either the Augsburg Confession (see *supra*) or the Catholic faith as his persona creed, but that his subjects should also be called upon to conform to the profession of their temporal head. The effects of this arrangement cannot be held to have been beneficial. Wherever, as was not seldom the case the ruler of one principality embraced a different doctrine from that professed by a neighbouring potentate, the carrying out of such a law could scarcely fail to generate or intensify feelings of aversion and enmity between their respective subjects, while its complete failure as a means of bringing about unanimity is shown in the rise of those numerous controversies which afterwards enabled the adherents of Romanism to launch so effective a taunt against the principles of Protestantism. Among these controversies were those of the Majorists (1551-1562), whose founder, Georg Major of Wittenberg, maintained the doctrine of the necessity of good works to salvation; of the Synergists (1555-1567), who held that men could not be saved unless the operations of the divine grace were seconded by the spiritual efforts of the individual soul; of the followers of Osiander (1549-1567), who supported a modified theory of the doctrine of justification; of the Crypto-Calvinists (1552-1574), who, led by Peucerus, the son-in-law of Melanchthon, maintained against Flacius Illyricus a theory of predestination differing from the Lutheran doctrine. In this last instance the feelings of enmity engendered by the controversy rose to such a pitch that the elector of Saxony was induced to send the leading Philippists to prison, while Flacius and his party celebrated the victory which they held to be theirs by a solemn service of thanksgiving and a commemorative medal. In the year 1580 an endeavour was made to bring about a reconciliation of the various contending parties by drawing up the celebrated Formula of Concord, but the design was attended with but little success. In the midst of this theological ferment, however, the divines of the university of Helmstädt, in the earlier part of the 17th century, were honourably distinguished by their systematic endeavours to allay the strife; and the career of Georg Calixtus, while affording a remarkable illustration of a gloomy chapter in the history of Protestantism, may be cited as a proof that a faithful adherence to the principles of the Reformation was not incompatible with a regard for the right of private judgment and intellectual freedom.

Reformation in Scandinavia.

In the Scandinavian kingdoms the Reformation was materially assisted by political motives; the introduction of Lutheranism into Denmark by King Christian II. in 1520 was to a great extent the result of his desire to raise the lower classes with a view to the corresponding depression of the nobility and the more powerful ecclesiastics of the realm. He sanctioned the marriage of the clergy and caused the New Testament to be translated into Danish. These measures, however, owing in no slight degree to the motives by which they were held to be inspired, involved him in a struggle with his subjects which eventually led to his deposition and to his passing the rest of his life in exile. But the new doctrines continued to be effectively preached by John Tausen, who had been among Luther's pupils at Wittenberg; and the principles of the Reformation spread rapidly in Schleswig and Holstein. On the accession of Christian's successor, Christian III. (his cousin), the movement acquired fresh strength. The new monarch had been a witness of Luther's heroic conduct at Worms and had conceived the warmest admiration for the character of the great Reformer, and through his efforts the tenets of the Reformation were adopted in 1536, at a diet held at Copenhagen, as the religion of the state. In the following year the movement extended to Norway and shortly after that to Iceland. In Sweden the Reformation was established concurrently with the political revolution which placed Gustavus Vasa on the throne. It was, however, only too apparent that the patriot king was largely influenced by the expectation of replenishing his exhausted exchequer from the revenues of the church, and, as in Germany and in England, the assent of the nobility was gained by their admission to a considerable share in the confiscated property. Among the powerful cities which represented the great Hanseatic confederacy, again, the acceptance of Lutheran doctrine turned largely on the keen commercial rivalry that then existed between that confederacy and Holland, and on the contests between the privileged and the unprivileged classes in the towns. In the prosecution of the former struggle the burghers of Lübeck appealed for assistance to Denmark, and, failing to gain the aid they sought, proceeded to organize an alliance with the object of restoring Christian II. to his throne; at the same time, with the view of outbidding their opponents in popularity, they unwisely proclaimed revolutionary principles scarcely less subversive than those of Münzer. In the civil war that ensued Christian III. ultimately triumphed over his enemies, and Wullenwever, the leader of the fanatical party, suffered death upon the scaffold. The Reformation was now firmly established, but in conjunction with the monarchy reinforced by the power of the nobility, while the ecclesiastical constitution was remodelled; and in the year 1539, at the diet of Odense, the new faith was proclaimed as the religion of the land.

Bohemi

In Bohemia the Hussite movement (see HUSS and HUSSITES) must be held to have become almost absorbed in the broader current of Lutheranism, although the Calixtines (or moderate Utraquists) and the Taborites (or extreme party) long continued to differ on questions of discipline. In the earlier part of the 17th century, however, the trained activity and energy of the Jesuits led to the almost entire expulsion of both parties, and Protestantism as a professed creed nearly ceased to survive.

Poland.

In Poland Protestantism prevailed before the first quarter of the 16th century closed. In Dantzic, Elbing, and Thorn it was established by overwhelming majorities. By the *Pax Dissidentium*, however, with a view to averting contests such as those that disturbed the peace of other lands, the principle of universal toleration was enunciated; and the duke of Anjou (afterwards Henry III. of France), on being elected to the vacant throne of Poland in 1573, notwithstanding his own attachment to Catholicism, found himself compelled to swear that he would strictly protect the adherents of the opposed faith from persecution and aggression. But here again the influence of the Jesuits ultimately proved victorious. The nobles were gained over by their arts, and Catholicism reasserted its ascendency.

The Netherlands

In the Netherlands, where the free spirit of the great mercantile communities was in singular harmony with the movement, the progress was still more rapid. The details of the heroic struggle waged against Charles V. and Philip II. must be regarded as belonging rather to secular than to theological history; but it is to be noted, alike to the honour of the people and of the house of Orange, that the enactment of the principle of religious toleration followed upon the fierce and intolerant persecution to which the country had so long been exposed. Although the majority of the inhabitants professed the tenets of Calvinism, the Arminian party succeeded in bringing about a union of church and state, which, however, left the other communions almost entirely unrestricted in their religious freedom. The followers of Gomarus, indeed, early in the 17th century, seemed at one time likely to place this freedom in danger, not only by their assertion of more rigid Calvinistic doctrine, but also by their demand that the church should be constituted independent of the state. But eventually (see Motley, *Hist. of the United Netherlands*, c. lii.) the party that favoured religious toleration triumphed; and the Dutch republic long continued to be an asylum for those whom the ascendency of the contrary principle in other lands drove into exile. The church organization was modelled on the political organization of the provinces, each province being subdivided into classes, while the mode of government was nearly identical with that known as Presbyterian.

In England the reformation of doctrine made but little progress during the reign of Henry VIII., for although by the Ten Articles (1536) the royal assent was given to the adoption of the doctrine of justification by faith and to the recognition of the Bible and the three ancient creeds as the standard of belief, a marked reaction in favour of Catholic doctrine took place in the enactment of the Six Articles in 1539. For a brief period heresy became a statutable offence and death was inflicted under the new provisions. The anomalous position of the English Church became a scandal to Europe; for, while some men were burnt for denying the doctrine of transubstantiation or for refusing to admit the royal supremacy, others, as Barnes and Gerard, suffered at the stake for their profession of Lutheran opinions, and even Cromwell must be regarded as in some measure a victim of his attachment to German Protestantism. During the reign of Edward VI. Somerset in conjunction with Cranmer pressed on the work of the Reformation apace. Chantries and hospitals were everywhere suppressed and their endowments confiscated. The bishops were compelled to acknowledge their direct subordination to the crown by being required to take out licences for the exercise of their jurisdiction. In 1549 the first book of Common Prayer was published, and the Act of Uniformity prescribed its use while that of all other forms of devotion was forbidden under heavy penalties. The canon law was revised by a body of commissioners specially appointed for the purpose, and the new code was completed for future use, although it never received the young king's signature. By these and other similar reforms, carried out in a great measure under Cranmer's direction, it was sought to make the Reformation in England a complete rejoinder to the proceedings of the council assembled at Trent.

Scotland

In Scotland the Reformation assumed a different character from that of the movement in England. It was inspired directly and solely by Germany, and may be regarded as commencing from the martyrdom of Patrick Hamilton in the year 1528, there being no evidence of any prior spontaneous efforts in the direction of doctrinal reform on the part of the people. Hamilton's designs were looked upon with the greatest disfavour by the clergy at large; and, as James V. was especially anxious to secure the support of that body in his conflict with his insubordinate nobility, he was altogether opposed to the adoption of the Lutheran tenets. He even aspired to succeed to the title, which Henry had forfeited, of "Defender of the Faith," and was encouraged to hope that he might succeed to the English crown. After his death (1542), however, under the regency of the earl of Arran, the Reformed doctrines began to be regarded with greater favour at court, while the merciless policy of Cardinal Beaton and the cruel fate of Wishart gave rise to an outburst of popular indignation against the bishops to which Beaton himself fell a victim (1546). The country was now divided into two parties—the bishops, the clergy at large, and the powerful influence of France (as represented by the Guises) being on the side of Catholicism, while many of the chief nobles and the laity at large were inclined to favor Protestantism. The English influence, which, wisely exerted, might have operated powerfully on the same side, was, however, sacrificed by the injudicious policy of Somerset, who by his endeavour to enforce the marriage of Mary Stuart with the youthful Edward roused the national spirit. The sense of humiliation and resentment which followed upon the battle of Pinkie (1547), where the English were greeted by the Scottish soldiery with the cry of "heretics," produced a reaction in favour of Catholicism which was not arrested until the return of John Knox in 1555 from the Continent (see KNOX).

In Ireland the circumstances which favored the introduction of Protestantism in England were altogether wanting. The Roman ritual was in harmony with the genius of the people, whereas the aversion naturally inspired by a creed imposed at the dictation of the conqueror was in itself a formidable obstacle. The harsh and essentially un-Christian policy pursued by the constituted ecclesiastical authorities presented further difficulties. The Bible was not translated into the vernacular, and that idiom was equally ignored in the church services, where the choice lay between the Latin, hallowed in the minds of the people by immemorial usage, and the language of the oppressor. Notwithstanding, if the native population failed to attend the English Church services they were fined. Other abuses similar to those which had contributed so powerfully to render Germany Protestant,—non-residence on the part of the clergy, the bestowal of benefices on needy aliens, often altogether wanting in religious earnestness, and sometimes indifferent to the observance of ordinary morality,—still further intensified the feeling of alienation. Protestantism became odious in the eyes of the Irish people; and, when, after long years of oppression and neglect, it was sought to inaugurate a juster policy and to render the established church in some degree really national, the obstacle thus created could not be overcome.

Authorities.—The sources already named under POPEDOM, BEZA, CALVIN, ERASMUS, HUSS, JESUITS, KNOX, LUTHER may be consulted. The *Lehrbuch der Kirchengeschichte* of Gieseler (vol. iii. 2 pts) gives a condensed and impartial summary of the main features of the movement throughout Europe, together with a valuable compendium of authorities. A translation has appeared in Clark's Foreign Theological Library, and has been republished in a revised form by Prof. Henry B Smith (New York, 1868), but in its latter form the valuable citations contained in the German work from the original authorities are not given in full. Other standard works are—Baur, *Gesch. d. christlichen Kirche* (1863); Guericke, *Handbuch der Kirchengesch.*, vol. ii. (Leipsic, 1866), which treats the subject from the Lutheran standpoint; Hagenbach, *Hist. of Ref. in Germany and Switzerland* (Clark's For. Theol. Lib., 2 vols., 1879), written in sympathy with the Zwinglian movement; Döllinger, *Die Reformation*, 3 vols. (1851), treating solely of the Lutheran movement; Ranke, *Deutsche Gesch. im Zeitalter d. Ref.*, 5 vols.; Maurenbrecher, *Gesch. d. kath. Ref.*, vol. i. (1517-34), 1880. The *Annales Ecclesiastici* of Raynaldus, the continuator of Baronius, contains original documents. See also Häusser's *Gesch. d. Zeitalters der Ref.* (1547-1648), 2d ed., by Oncken, 1879, in which the political relations of the movement are succinctly brought out (Eng. trans. by Mrs Sturge, 1873); *Monumenta Reformationis Lutheranæ*, a selection from documents at the Vatican by Cardinal Balan (1883-84); and Keller's *Die Reformation und die alteren Reformparteien* (Leipsic, 1885). For the confessions successively adopted by the different Evangelical and Reformed churches consult Schaff's *History of the Creeds* (1878), chaps. v., vi., and vii. The series known as *Leben und ausgewahlte Schriften der Vater und Begründer der Lutherischen Kirchen*, ed. Nitzsch, 8 vols. (1861-75), gives full biographies of the most eminent Evangelical teachers. The corresponding work for the Reformed Church is the *Leben und ausgew. Schriften d. Väter u. Begr. d. ref. Kirchen*, ed. Hagenbach, 10 vols. (1857-62). Other biographies of special interest are—Geiger, *Johann Reuchlin, sein Leben u. seine Werke* (Leipsic, 1871), and that of Ulrich von Hutten, by Strauss (trans. by Mrs Sturge, 1874). Hutten's *Works* (ed. E. Böcking, 7 vols, Leipsic, 1871) and *Das Chronikon des Konrad Pellican* (ed. Riggenbach, Basel, 1877) may also be consulted. For the history of the subject in England, see Foxe's *Acts and Monuments*, ed. Cattley, 8 vols. (1841); Jer. Collier's *Ecclesiastical History of Great Britain*, ed. Barham, 9 vols. (1840-41); Burnet's *History of the Reformation in England*, ed. Pocock, 7 vols. (1865); and the criticisms contained in vol. iii. of S. R. Maitland's *Tracts* (1842), and also his *Essays on Subjects connected with the Reformation in England*. The *Records of the Reformation*, by Pocock, 2 vols. (1870), contains important original documents; to this work may be added Strype's *Annals*, 6 vols. (1822), and *Memorials*, 7 vols. (1824); the works of the Reformers published by the Parker Society (Cambridge, 1841-54), and the *Zurich Letters*, 3 vols. (same society); J. H. Blunt's *Reformation of the Church of England* (1514-47), 2 vols., 1869-80; and Dixon's *History of the Church of England from the Abolition of the Roman Jurisdiction* (1529-48), 2 vols., 1877-80. (J. B. M.)

REFORMATORY AND INDUSTRIAL SCHOOLS.

There exist two classes of schools for the reformation and industrial training of children in Great Britain and Ireland, both under state control when duly certified. Reformatory schools are for the better training of juvenile convicted offenders; industrial schools, in which industrial training is provided, are chiefly for vagrant and neglected children and children not convicted of theft. These schools are of modern but gradual growth, the result in part of humane endeavours to rescue children from evil courses already embarked on or likely to be their lot, in part of the conviction that, as a matter of social economy, the expenditure incurred in early restraint is less costly than the punishment of matured crime.

England and Scotland.—The Acts of Parliament relating to reformatory and industrial schools in Great Britain were consolidated and amended in 1866; and these Acts (29 and 30 Vict. cc. 117, 118), with local legislation and some extension and amendment, govern the two classes of schools at the present time. Both reformatory and industrial schools are certified by the home secretary upon the application of the managers, and upon a satisfactory inspection and report, and subject to a yearly visit by inspectors. In both classes industrial training is an essential feature, so as to engender industrious habits in the inmates and give them the means of earning an honest livelihood. Not only local circumstances but reasonable individual inclinations are taken into consideration. In rural districts the cultivation of the soil and in urban districts local trades are obvious sources of employment; the duties of a sailor are taught in training ships near the coast. Occupations that create a distaste for labour or that do not provide a permanent source of profitable labour for adults are avoided. The managers (often a committee of magistrates) make all necessary rules for the management and discipline of the schools, subject to the provisions of the legislature and the intervention of the secretary of state. They have the appointment of officers. Conformity to the rules and residence in the schools may be enforced by imprisonment, the application and limits of which vary somewhat in reformatory and industrial schools, *e.g.*, such imprisonment for school offences is confined in industrial schools to children above ten, an age almost always exceeded in the inmates of reformatories. Attention is paid in both classes to religious convictions, and as far as possible a selection is made of a school conducted in accordance with the creed professed by the child or its responsible guardians. Children after eighteen months' detention may be placed out on licence with trustworthy persons and with their own consent. The managers of a reformatory or of an industrial school may decline to receive the youthful offender in the one case and in the other the child proposed to be sent; but the reception of a child operates as an undertaking by the managers to educate, clothe, lodge, and feed him (or her) until he (or she) can be legally discharged or is removed. Reformatory and industrial schools are, however, essentially distinct in character and governed by distinct Acts of Parliament: a school cannot at the same time be both a certified industrial school and a certified reformatory school. The Middlesex Industrial School for juvenile offenders, established under local Acts, and in part a certified industrial school, is, however, somewhat exceptional in blending the treatment of both classes.

Any offender under sixteen, convicted of an offence punishable with penal servitude or imprisonment and sentenced to be imprisoned for ten days or a longer term, may be sent to a certified reformatory school for not less than two and not more than five years. A youthful offender under ten cannot be sent to a reformatory school unless he has been previously charged with some crime or offence punishable with penal servitude or imprisonment, or is sentenced in England by a judge of assize or court of general or quarter sessions or in Scotland by a circuit court of justiciary or a sheriff. Youthful offenders receiving a conditional pardon may now be sent to a certified reformatory school. Certified industrial schools receive any child apparently under fourteen who is brought by any person before justices as answering to any of the following descriptions:—if found begging or receiving alms (whether actually or under the pretext of selling or offering for sale anything) or being in any street or public place for these purposes; if found wandering and not having any home or settled place of abode, or proper guardianship, or visible means of subsistence; if found destitute, either being an orphan or having a surviving parent who is undergoing penal servitude or imprisonment; if it frequents the company of reputed thieves; if lodging, living, or residing with common or reputed prostitutes, or in a house resided in or frequented by prostitutes for the purpose of prostitution; if it frequents the company of prostitutes (43 and 44 Vict. c. 15); where a parent or step-parent represents to the magistrates that he is unable to control a child and that he desires that the child be sent to an industrial school; where the guardians of the poor represent that a child maintained in a workhouse or pauper school or poorhouse is refractory or the child of a parent convicted of a crime or offence punishable with penal servitude or imprisonment, and that it is desirable that he be sent to an industrial school. To the above cases have to be added a child apparently under twelve who is charged with an offence punishable by imprisonment or a less punishment but has not been in England convicted of felony or in Scotland for theft; and the children of any woman convicted of a crime after a previous conviction, and under her care and control at the time of conviction for the last of such crimes, who have no visible means of subsistence or who are without proper guardianship (Prevention of Crimes Act, 1871)

A prison authority (a term as regards industrial schools calculated to mislead, as the authority is in general the court of quarter sessions or school boards, and in Scotland commissioners of supply, magistrates of burghs, or county boards) may, with the approval of the secretary of state, establish or contribute towards the establishment, building (including borrowing money), or management (and in England may not only contribute to but undertake these matters) of reformatory or industrial schools, or towards the support of the inmates, and such authority may contract with the managers for the reception and maintenance of offenders or children. The treasury contributes towards the custody and maintenance of offenders in reformatory and of children in industrial schools on the recommendation of the secretary of state, the sum being limited as regards children in industrial schools, on the application of their parents or guardians, to 2s. per head per week. The guardians of the poor or the board of management of district pauper schools or parochial boards of a parish or combination may, with the consent in England of the local government, and in Scotland of the board of management, contribute towards the maintenance of children detained in industrial schools. A prison authority in England may contribute towards the ultimate disposal of an inmate of a certified industrial school. The parent or other person legally liable to maintain a youthful offender or child in a school is required (if able) to contribute not more than 5s. per week, recoverable summarily. The alleged want of diligent enforcement of this liability is a great source of complaint.

The introduction of a system of compulsory elementary education rendered it necessary to extend industrial schools. Under various Acts passed since 1870 school boards have power, with the consent of the secretary of state, to contribute to or wholly to undertake the establishment, building, and maintenance of industrial schools, and a power exists to transfer industrial schools from other authorities to school boards, but such schools are subject to the jurisdiction of the secretary of state in the same manner as other certified industrial schools. The machinery for bringing children, the subjects of certified industrial schools, before the proper tribunal for making orders has been and is a vexed question. Legislative powers given to "any one" are apt to fall into abeyance or into the hands of the police. School boards have a discretionary power to appoint officers to bring children before justices to be sent to industrial schools (33 and 34 Vict. c. 75, s. 36). A school board or school attendance committee (as the local authority) is required, after due warning to the parents, to complain to a court of summary jurisdiction of the non-attendance of a child coming within the elementary education Acts, and must so complain at the instance of any person. The court may then make an attendance order for the child at some certified efficient school, and, in case of non-compliance, may order the child to be sent to a certified day or other industrial school. The expenses of industrial schools, established by or contributed to by school boards, form part of the general expenses of the school fund. As in the case of other industrial schools, parents are liable to contribution, and where a child is ordered upon complaint made by a school attendance committee to be sent to a certified industrial school the council, guardians, or sanitary authority appointing such committee have, on the recommendation of the committee, the same power of contributing towards the maintenance as if they were a school board (42 and 43 Vict. c. 48, s. 4).

In 1876 a fresh class of industrial schools was introduced called "certified day industrial schools," in relation to which prison authorities and school boards have the same powers as in the case of industrial schools; and towards the custody, industrial training, elementary education, and meals of children attending these schools parliament may contribute a sum limited to 1s. per head per week, on conditions recommended by the secretary of state, with a limited power over the contribution of parents. In certain cases of non-compliance with an attendance order the child is sent to a day industrial school rather than to an industrial school of the class described above (39 and 40 Vict. c. 79, s. 16). In large cities day industrial schools are calculated to be of great service in dealing with the class of poor neglected children. The children are found to be managed without much difficulty, and to respond to any efforts made on their behalf; they compare favourably with children kept for years in close confinement, and are often their superiors in spirit and intelligence (27th *Report* of inspector). Another description of certified schools has sprung up in connexion with school boards,—"truant schools." The few which at present are established in London and some large towns are on the whole doing a good work. The necessary adaptation of certified industrial schools to the school-board system must necessitate the placing of all reformatory and industrial schools on a clearer system of classification. Crime must be distinguished from pauperism. However crime may arise from neglect of parents, it is neither desirable nor fair to compel as the price of poverty children unconvicted of crime to associate with juvenile delinquents even after the punishment of crime has ceased. On the other hand, the actual incarceration of boys and girls in a jail should be avoided as far as possible.

The total number of schools under Government inspection at the close of 1883 was 200, viz., 61 reformatory and 139 industrial schools, of which last 7 were specially certified as truant and 12 as day industrial schools. The number of children under detention in 1883 in reformatory schools in Great Britain was 6657, at a total school expenditure of £126,122, of which £85,635 was paid by the treasury, £6140 by parents, £23,183 by rates, and £4943 by subscriptions and legacies. In industrial schools the number was 18,780 and the expenditure £359,821, of which £176,733 was paid by the treasury, £17,596 by parents, £40,052 by rates, £65,542 by school boards, and £42,129 by subscriptions. The total admissions (excluding transfers) to reformatory schools to the end of 1883 amounted to 42,669, viz., 34,640 boys and 8029 girls. The total discharges (excluding transfers) were 36,111, viz., 29,235 boys and 6876 girls. They were disposed of as follows:—

	Boys.	Girls.	Total.
Employment or service	9,962	3814	13,776
Placed out through relatives	9,663	2115	11,778
Emigrated	2,317	148	2,465
Sent to sea	4,291	..	4,291
Enlisted	693	..	693
Discharged from disease	374	181	555
Discharged as incorrigible	213	91	304
Died	781	299	1,080
Absconded, and not recovered	941	228	1,169
	29,235	6876	36,111

The total admissions to industrial schools (excluding transfers) to the end of 1883 were 61,260, viz., 48,959 boys and 12,301 girls. The total discharges (excluding transfers) were 42,412, viz., 33,877 boys and 8535 girls. They were disposed of as follows:—

	Boys.	Girls.	Total
Employment or service	12,513	5248	17,761
To friends	10,212	1995	12,207
Emigrated	737	130	867
Sent to sea	5,325	..	5,325
Enlisted	921	..	921
Discharged as diseased, or on special grounds	859	281	1,140
Committed to reformatories	885	153	1,038
Died	1,405	557	1,962
Absconded, and not recovered	1,020	171	1,191
	33,877	8535	42,412

Ireland.—Reformatory schools were established in Ireland in 1858, and ten years afterwards were placed mainly on their present footing (Irish Reformatory Schools Act, 1868); whilst the establishment and regulation of industrial schools were provided for by the Industrial Schools Act (Ireland), 1868, extending to Ireland, with certain modifications, the English Act of 1866. The differences between the Acts applicable in Ireland and Great Britain relate chiefly to minor matters. The rule requiring a young offender or a child to be sent to a school under the same religious management is much more rigid in Ireland than in Great Britain, and the Irish Act does not limit the power of sending a child under ten to a reformatory school where the child has not been previously charged with an offence punishable with penal servitude or imprisonment. The power to contract with managers for the reception and maintenance of young offenders is in general vested in grand juries and in some town councils. The number of reformatory schools in Ireland at the close of 1883 was 9, viz., 5 for boys and 4 for girls, with 907 boys and 192 girls. Of industrial schools there were 62, viz., 17 for boys, 44 for girls, and 1 for young boys and girls, with a total of 2409 boys and 3759 girls. The disposal on discharge follows the lines given in the tables for Great Britain. Much the larger proportion of girls in industrial schools in Ireland, as might be anticipated, find their subsequent career in employment or service, or are placed out through friends. Emigration also is absolutely far larger (and has been from the establishment of industrial schools) in the case of girls than of boys. The reported results of the training of girls discharged from reformatory schools are very satisfactory, and among the 1526 girls discharged during the three years 1880-82 there was only one conviction for crime during 1883. The total receipts for the maintenance of reformatory schools in 1883 were £28,116, of which £17,555 was contributed by the treasury vote and £7920 from local rates. The average cost per head for maintenance (including rent and disposal) was £23, 9s. for boys and £27, 2s. 2d. for girls. For industrial schools the receipts in 1883 were £126,820, of which the treasury contributed £77,259 and rates £27,960. Parental contributions to reformatory and industrial schools were £1018.

United States.—The institutions in the United States and of other civilized countries, having for their object or effort the reclamation of the young, are too closely connected with the education of poor and destitute children generally to allow of examination here, or of useful comparison with the reformatory and industrial schools of Great Britain under state control.

In 1882 a royal commission was issued to inquire into the management generally of all certified reformatories and industrial schools in the United Kingdom. The commission, in the following year, suggested a simplification of the law and the removal of some anomalies and defects, including the vexed question as to the treatment of boys and girls in relation to imprisonment, and the distinctions already adverted to. The commissioners expressed their opinion that these schools were having a salutary effect in reducing the amount both of juvenile and of adult crime. The memoranda of the earl of Dalhousie and Lord Norton attached to the *Report* are worthy of special attention. (J. E. D.)

REFORMED CHURCHES, the designation of those Protestant bodies who adopted the tenets of Zwingli (and later of Calvin), as distinguished from those of the Lutheran or Evangelical divines. Compare PRESBYTERIANISM, REFORMATION, and GERMANY, vol. x. p. 469.

REFORMED CHURCH IN AMERICA (DUTCH), formerly the Reformed Protestant Dutch Church, a religious denomination which arose in Holland in the 16th century. See PRESBYTERIANISM, vol. xix. p. 698 *sq.*

REFRACTION. See LIGHT and OPTICS.

REFRIGERATION. See ICE and PRESERVED FOOD.

REGALIA, insignia of royalty used at the coronation of the sovereign and other great state ceremonials. The regalia of England were in very early times deposited for security in some religious house dependent on the crown, most generally in the treasury of the Temple. The first mention of their being deposited in the Tower of London is in the reign of Henry III., who on his return from France in 1230 commanded the bishop of Carlisle to replace the jewels in the Tower as they had been before. From his time down to the present the regalia (with the exception of the ancient crown of Edward the Confessor, long retained in Westminster Abbey) have been generally in the Tower under the care of a keeper, but both Henry III. and several of his successors, when in money difficulties, had recourse to the expedient of pawning the crown jewels to raise a loan. Originally the keeper was appointed by letters patent at a stated salary of £50 per annum, which was so largely increased by perquisites that in the time of Henry VIII it amounted to about £1500. The office had attached to it important privileges, and was frequently held by persons of distinction. At the Restoration many of the perquisites were abolished, and since that period the duties have been merged in those of the lord chamberlain, who appoints a person to have charge of the regalia in the Tower. To make up for the decrease in the perquisites of the office, the regalia were first in the reign of Charles II. allowed to be exhibited in public, the profits accruing being given to the person appointed by the lord chamberlain to have charge of the regalia. They were originally kept in a small building in the south side of the White Tower, till the reign of Charles I., when they were transferred to a strong chamber in the Martin Tower, afterwards called the Jewel Tower. During the Civil War they were nearly all carried off by the Puritans and destroyed, and in 1671 an attempt made to steal the new regalia by Colonel Blood (*q.v.*) was nearly successful. During the fire of 1841 they were removed for safety to the house of the governor, and afterwards a new room within the Wakefield Tower was constructed for their reception. The regalia now contained in this room include St Edward's crown, made for the coronation of Charles II. to replace the one broken up and sold during the Civil War; the new state crown made for the coronation of Queen Victoria; the prince of Wales's crown; the queen consort's crown; the queen's diadem or circlet of gold made for the coronation of Marie d'Este, consort of James II.; St Edward's staff of beaten gold; the royal sceptre or sceptre with the cross; the rod of equity or sceptre with the dove; the queen's sceptre with the cross; the queen's ivory sceptre, made for Marie d'Este; an ancient sceptre supposed to have been made for Queen Mary, consort of William III.; the orb; the queen's orb; the Koh-i-Noor diamond; the sword of mercy or curtana; the sword of justice; the armillæ or coronation bracelets; the royal spurs; the ampulla for the holy oil; the gold coronation spoon (supposed to be the only relic of the ancient regalia now remaining); the golden salt cellar; the baptismal font; and the silver wine fountain presented to Charles II. by the corporation of Plymouth.

The regalia of Scotland, of which there is a very complete account in *Papers relative to the Regalia of Scotland* published by the Bannatyne Club (1829), consist of the crown, the sceptre, and the sword of state. The ancient regalia were carried off or destroyed by Edward I. of England in 1296, and Robert Bruce was crowned at Scone with a temporary crownlet, which also shortly afterwards fell into the hands of the English. The present crown, from the character of a portion of its workmanship, is supposed to be that made by the orders of Robert Bruce and first used at the coronation of David II. in 1329. Two concentric circles were added to it in the reign of James V., surmounted at the point of intersection with a mound of gold enamelled and a large cross patée, upon which are the characters J. R. V. The sceptre was made in the reign of James V., and the sword of state was presented to King James IV. in 1507 by Pope Julius II. When Cromwell invaded Scotland the regalia were removed for greater security by the earl marischal from the crown room in Edinburgh Castle to his castle of Dunnottar, one of the strongest fortresses in Scotland. During its siege by Cromwell they were carried from it by a stratagem devised by the wife of the governor and the wife of the minister of Kinneff, and buried under the flagstones in Kinneff church, where they remained till the Restoration. From the Restoration till the Union they were deposited in the crown room of Edinburgh Castle. After the Union they lay locked in a chest until 1818, when they were first publicly exhibited. See also the articles Coronation, Crown, and Sceptre.

REGENSBURG. See Ratisbon.

REGENT. The position of a regent as an administrator of the realm during the minority or incapacity of the king is one unknown to the common law. "In judgment of law the king, as king, cannot be said to be a minor, for when the royal body politic of the king doth meet with the natural capacity in one person the whole body shall have the quality of the royal politic, which is the greater and more worthy and wherein is no minority. For *omne majus continet in se minus*" (Coke upon Littleton, 43a). For reasons of necessity a regency, however anomalous it may be in strict law, has frequently been constituted both in England and Scotland. There are fifteen instances in English history, the earliest of which is the appointment of the earl of Pembroke with the assent of the loyal barons on the accession of Henry III. Whether or not the sanction of parliament is necessary for the appointment is a question which has been much discussed. Lord Coke recommends that the office should depend on the will of parliament (*Inst.*, vol. iv. p. 58), and it is certain that in modern times provision for a regency has always been made by Act of Parliament. In Scotland the appointment of regents was always either by the assent of a council or of parliament. Thus in 1315 the earl of Moray was appointed regent by Robert I. in a council. At a later period appointment by statute was the universal form. Thus by 1542 c. 1 the earl of Arran was declared regent during the minority of Mary. By 1567 c. 1 the appointment by Mary of the earl of Moray as regent was confirmed. As late as 1704 c. 3 provision was made for a regency after the death of Anne. The earliest regency in England resting upon an express statute was that created by 28 Hen. VIII. c. 17, under which the king appointed his executors to exercise the authority of the crown till the successor to the crown should attain the age of eighteen if a male or sixteen if a female. They delegated their rights to the protector Somerset, with the assent of the lords spiritual and temporal. No other example of a statutory provision for a regency occurs till 1751. In that year the Act of 24 Geo. II. c. 24 constituted the princess dowager of Wales regent of the kingdom in case the crown should descend to any of her children before such child attained the age of eighteen. A council called the council of regency was appointed to assist the princess. A prescribed oath was to be taken by the regent and members of the council. Their consent was necessary for the marriage of a successor to the crown during minority. It was declared to be unlawful for the regent to make war or peace, or ratify any treaty with any foreign power, or prorogue, adjourn, or dissolve any parliament without the consent of the majority of the council of regency, or give her assent to any bill for repealing or varying the Act of Settlement, the Act of Uniformity, or the Act of the Scottish parliament for securing the Protestant religion and Presbyterian church government in Scotland (1707 c. 6). The last is an invariable provision, and occurs in all subsequent Regency Acts. The reign of George III. affords examples of provision for a regency during both the infancy and incapacity of a king The Act of 5 Geo. III. c. 27 vested in the king power to appoint a regent under the sign manual, such regent to be one of certain named members of the royal family. The remaining provisions closely followed those of the Act of George II. In 1788 the insanity of the king led to the introduction of a Regency Bill. In the course of the debate in the House of Lords the duke of York disclaimed on behalf of the prince of Wales any right to assume the regency without the consent of parliament. The necessity for the authority of parliament in the particular circumstances was much discussed, as a reference to the parliamentary history of the time will show. Owing to the king's recovery the bill ultimately dropped. On a return of the malady in 1810 the Act of 51 Geo. III. c. 1 was passed, appointing the prince of Wales regent during the king's incapacity. The royal assent was given by commission authorized by resolution of both Houses. By this Act no council of regency was appointed. There was no restriction on the regent's authority over treaties, peace and war, or parliament, as in the previous Acts, but his power of granting peerages, offices, and pensions was limited. At the accession of William IV. the duchess of Kent was, by 1 Will. IV. c. 2, appointed regent, if necessary, until the Princess Victoria should attain the age of eighteen. No council of regency was appointed. By 1 Vict. c. 72 lords justices were nominated as a kind of regency council without a regent in case the successor to the crown should be out of the realm at the queen's death. They were restricted from granting peerages, and from dissolving parliament without directions from the successor. The last Regency Act was passed after the marriage of the queen. By 3 & 4 Vict. c. 52 Prince Albert was appointed regent in case any of the queen's children should succeed to the crown under the age of eighteen. The only restraint on his authority was the usual prohibition to assent to any bill repealing the Act of Settlement, &c. By 10 Geo. IV. c. 7 the office of regent of the United Kingdom cannot be held by a Roman Catholic. A similar disability is imposed in most, if not all, Regency Acts.

REGGIO DI CALABRIA, a city of Italy, in the province of its own name, formerly Calabria Ulteriore Prima, is admirably situated on the Strait of Messina some miles farther south than the city of Messina on the other side. It is the terminus of the railway round the south-east coast from Bari; a scheme for a line along the west coast to Naples received legislative sanction in 1879. The luxuriant gardens and orchards of Reggio have been celebrated for centuries, and the climate is so warm that even the date-palm occasionally ripens its fruit. The old city was in great part destroyed by the earthquake of 1783, and it is now built on a regular plan, with broad streets running north and south and cross streets climbing the hill from the seaside. Besides the cathedral (rebuilt since the earthquake), the principal edifices are the chamber of commerce, the new comizio agrario, the castle on the height, the Renaissance Palazzo Musitano Guerrera, and the Gothic Villa Leo. Local manufactures are essences, scented waters, silks, and byssus gloves, caps, and shoes. Extensive improvements have since 1870 been made on the port of Reggio both by the municipality and the Government; in 1883 787 vessels (209,717 tons) entered and 713 (207,179) cleared. Oil, lemons, and similar fruits, essences, silk, and grain are the staple exports. The population of Reggio was, in 1881, 23,853 in the city, or including the various suburban villages—Sbarre (3622), Santa Catarina (1147), &c.—35,437, and in the commune 39,296.

A colony, mainly of Chalcidians, partly of Messenians from the Peloponnesus, settled at Rhegium (Regium) in the 8th century B.C. About 494 B.C. Anaxilas, a member of the Messenian party, made himself master both of Regium and Zancle (Messina). In 427 it joined the Athenians against Syracuse, but in 415 it remained neutral. An attack which it made on Dionysius of Syracuse in 399 was the beginning of a great struggle which in 387 resulted in its complete destruction and the dispersion of its inhabitants as slaves. Restored by the younger Dionysius under the name of Phœbias, the colony soon recovered its prosperity and resumed its original designation. In 280, when Pyrrhus invaded Italy, the Regines admitted within their walls a Roman garrison of Campanian troops; these mercenaries revolted, massacred the male citizens, and held possession of the city till in 270 they were besieged and destroyed by the Roman consul Genucius. Though one of the cities promised by the triumvirs to the veterans, Regium escaped through the favour of Octavius (hence Regium Julium). Alaric (410 A.D.), Totila (549), and Robert Guiscard (1060) all occupied the city. It was at Reggio that Joseph Bonaparte received the title of king of the Two Sicilies. In 1860 the Bourbon garrison surrendered to the Garibaldians.

REGGIO NELL' EMILIA, a city and episcopal see of Italy, in the province of Reggio nell' Emilia (up till 1859 part of the duchy of Modena), is situated on the line of the old Via Æmilia, 17 miles by rail south-east of Parma. It is a large, well-built, and flourishing place with a population in 1881 of 18,634 (commune 56,031) within the circuit of its walls. Among the points of principal interest are the Piazza Maggiore, with the statue of the river Crostolo; the cathedral, which was founded in 857 A.D. but dates mainly from the 15th century; the co-cathedral basilica of San Prospero, with its six old Lombard lions in front; the public library, which contains the published and unpublished works of Spallanzani; the museum, in which are preserved the same naturalist's collections; the large municipal theatre, famous for its operas throughout Italy; and the municipal "palace," with the statue of Cæcilius Metellus. In the neighbourhood of the city there is an extensive model lunatic asylum as well as a large poorhouse. The house in which Ariosto was born in the Corso della Ghiara is now municipal property. Horse-races are held at Reggio every year.

Regium Lepidi or Regium Lepidium was probably founded by Æmilius Lepidus at the time of the construction of the Æmilian Way. It was during the Roman period a flourishing municipium, but never became a colony; and, though the name is frequently mentioned in the course of the civil war, it is associated with no event more interesting than the assassination of M. Brutus, the father of Cæsar's friend and foe. The bishopric dates from 450 A.D. Under the Lombards the town was the seat of dukes and counts; in the 12th and 13th centuries it formed a flourishing republic, busied in surrounding itself with walls (1209), controlling the Crostolo and constructing navigable canals to the Po, coining money of its own, and establishing prosperous schools. About 1290 it first passed into the hands of Obizzo d'Este, and the authority of the same family was after many vicissitudes more formally recognized in 1409. In the contest for liberty which began in 1796 and closed with annexation to Piedmont in 1859 Reggio took vigorous part. Besides Ariosto, the city has given birth to Secchi the astronomer and Prospero Clementi the sculptor; and the poet Boiardo was governor of Reggio for many years before his death in 1494.

REGIOMONTANUS (1436–1476). The real name of this astronomer was JOHANN MÜLLER, but from his birthplace, Königsberg, a small town in Franconia, he called himself JOH. DE MONTEREGIO. The name Regiomontanus occur for the first time on the title page of his *Scripta*, published in 1544, but he has since become best known by it. He was born in June 1436 and became the pupil of Purbach at the university of Vienna, and jointly with him endeavoured, with such imperfect instruments as they could construct, to test the accuracy of the Alphonsine tables of the motions of the planets. After Purbach's death Regiomontanus finished and published his *Epitome in Ptolemæi Almagestum*, but, having in the meantime become acquainted with Cardinal Bessarion, who was anxious to spread the knowledge of the Greek literature among the Western nations, he proceeded with him to Italy in 1462, and for the following eight years devoted a great deal of time to the study of the Greek language and to collecting

Greek manuscripts. He returned from Italy in 1471 and settled at Nuremberg, at that time one of the chief centres of German industry and literary life. Here he became associated with Bernhard Walther (1430–1504), a wealthy patrician and an enthusiastic astronomer. An observatory was erected, and the finest instruments the skilful artisans of Nuremberg could make were regularly used by the two friends for observing the heavens. Clocks driven by weights were here used for the first time for scientific purposes, the influence of refraction in altering the apparent places of the stars better appreciated, Venus substituted for the moon as a connecting link between observations of the sun and of stars, and other improvements introduced in practical astronomy. Regiomontanus also published a number of calendars and ephemerides, which induced Pope Sixtus IV. to summon him to Rome to assist in reforming the confused calendar. He died very shortly after his arrival in Rome, July 6, 1476.

In 1464 Regiomontanus finished a work on trigonometry, which science had made considerable progress among the Arabians but had to be reinvented in Europe. The work was, however, never printed till 1533 (*De Triangulis libri quinque*), probably because the author, after introducing the use of tangents, had wished to re-write his book, but was prevented from doing so by his early death. In his *Tabulæ Directionum* (Nuremberg, 1475) there is a table of tangents (*tabula fecunda*). His instruments and observations at Nuremberg are described in a posthumous work,—*Scripta clarissimi mathematici Joh. Regiomontani* (Nuremberg, 1544). The ephemerides and calendars were published partly in German (*Magister Johann von Kunsperk's teutscher Kalender*), partly in Latin (*Ephemerides Astronomicæ*, Nuremberg, 1473 or 1475, for the years 1475–1506; *Kalendarium Novum*, Nuremberg 1474, reissued many times and translated into German and Italian). The German geographer Martin Behem made these calendars known among the Spanish and Portuguese navigators, and they became of the greatest importance in guiding Columbus, Diaz, Vasco da Gama, and many others over the trackless ocean. The life of Regiomontanus was written by Gassendi (The Hague, 1654); among modern works see *Regiomontanus, ein geistiger Vorlaufer des Copernicus*, by Zeigler (Dresden, 1874), *Die Vorgeschichte der Gregorianischen Kalenderreform*, by Kaltenbrunner (Vienna, 1876), and Rudolph Wolf's *Geschichte der Astronomie* (Munich, 1877).

REGISTRATION. In all systems of law the registration of certain legal facts has been regarded as necessary, chiefly for the purpose of ensuring publicity and simplifying evidence. Registers, when made in performance of a public duty, are as a general rule admissible in evidence merely on the production from the proper custody of the registers themselves or (in most cases) of examined or certified copies. The extent to which registration is carried varies very much in different countries. For obvious reasons judicial decisions are registered in all countries alike. In other matters no general rule can be laid down, except perhaps that on the whole registration is not as fully enforced in the United Kingdom and the United States as in Continental states. The most important uses of registration occur in the case of judicial proceedings, land, ships, bills of sale, births, marriages, and deaths, companies, friendly and other societies, newspapers, copyrights, patents, designs, trade marks, and professions and occupations. The registration of qualified voters in parliamentary elections in the United Kingdom is treated in a separate section below.

Judicial Proceedings.—In England registrars are attached to the privy council, the Supreme Court, and the county courts. In the Queen's Bench Division (except in its bankruptcy jurisdiction) the duty of registrars is performed by the masters. Besides exercising limited judicial authority, registrars are responsible for the drawing up and recording of various stages of the proceedings from the petition, writ, or plaint to the final decision.[1] With them are filed affidavits, depositions, pleadings, &c., when such filing is necessary. The difference between filing and registration is that the documents filed are filed without alteration, while only an epitome is usually registered. The Judicature Act, 1873, created district registries in the chief towns, the district registrar having an authority similar to that of a registrar of the Supreme Court. In the Admiralty Division cases of account are usually referred to the registrar and merchants. The registration in the central office of the supreme court of judgments affecting lands, writs of execution, recognizances, and *lites pendentes* in England, and the registration in Scotland of abbreviates of adjudications and of inhibitions, are governed by special legislation. All these are among the incumbrances for which search is made on investigating a title. Their satisfaction and discharge is also registered. The Conveyancing Act, 1882, provides for a certificate by the proper officer of the existence or non-existence of entries of judgments, deeds, and other matters or documents made in the central office. The certificate is conclusive in favour of a purchaser. Decisions of criminal courts are said to be recorded, not registered, except in the case of courts of summary jurisdiction, in which, by the Summary Jurisdiction Act, 1879, a register of convictions is kept. Probates of wills and letters of administration, which are really judicial decisions, are registered in the principal or district registries of the Probate Division. In Scotland registration is used for giving a summary remedy on obligations without action by means of the fiction of a judicial decision having been given establishing the obligation. A clause of registration is introduced in deeds importing obligation. The various registers available for this kind of registraton will be found in Watson, *Law Dict.*, *s.v.* "Registration."

Land.—Registration in its relation to land is either of title or of assurances. A register of title bears on the face of it the name and description of a plot of land with more or less particularity, the name of the owner, and the charges and easements to which the land is subject. No one can go behind the entry except in case of fraud. A register of assurances or deeds contains only a copy of documents affecting title, or a memorial or other epitome of such documents, without any authentication of the title as such. Thus a register of title would show that A was owner subject to a mortgage to B, and the purchaser would purchase such a title. A register of assurances would show in the same circumstances that a conveyance had been made to A, and that subsequently A had mortgaged to B, but the purchaser would have to make sure for himself that A and B had the right to convey and mortgage. It will be obvious that the object of registration of deeds is quite different from that of registration of title. The former aims at facilitating the search for incumbrances, the latter at abolishing search by making it unnecessary. The requisites of a registry of title are thus stated by Sir H. Maine (*Early Law and Custom*, 353):—

> "The land registries which have the highest commendation from judicial writers are those of certain small Teutonic communities, *e.g.*, the state of Hesse-Darmstadt and the Swiss canton of Zurich. I can here give but a brief description of the mechanism. The land of the community is divided into a number of circumscriptions of no great area. For each of these a central office is established, with a staff of functionaries who are to some extent experts, and at each office a register is opened in which separate portions or groups of pages are appropriated to separate masses of land . . . When the register has once been opened, the legal history of every parcel of every area is thenceforward recorded in it, and every transfer or mortgage must be registered in it, under pain of invalidity. Whether a person wishing to sell or mortgage has the right to do so, it is the business of the staff of experts to ascertain. It is absolutely essential to the system that the register should be easily accessible, and the formalities of registration simple and cheap."

It will appear on referring to REAL ESTATE that before the Conquest publicity of transfer was secured by a system of record in the shire-book or church-book. After the Conquest this publicity, continued for a time in the Domesday survey, from various causes gradually gave way to that secrecy of transfer which is now one of the peculiar features of English law. Publicity was to a certain extent secured by the court rolls in the case of copyhold lands, by the local statutes mentioned below, and by the Act enforcing the registration of rent charges and annuities charged on land (18 Vict. c. 15). There was a tendency in the same direction in those statutes which made the enrolment of deeds necessary for their validity. Such are the Statute of Enrolments, 27 Henry VIII. c. 16, the Mortmain Act, 9 Geo. II. c. 36, the Fines and Recoveries Act, 3 & 4 Will. IV. c. 74, under which an estate tail may be barred by an enrolled deed, and Acts affecting Queen Anne's Bounty, 1 Geo. I., st. 2, c. 10, and the Charity Commissioners, 18 & 19 Vict. c. 124. No general registry has as yet been established in England, though many attempts have been made in that direction. The question was debated as far back as the Long Parliament. General Ludlow mentions the characteristic incident "that upon the debate of 'registering deeds in each county for want of which, within a certain time fixed after the sale, such sales should be void, and, being so regarded, that lands should not be subject to any incumbrance,' this word incumbrance was so managed that it took up three months' time before it could be ascertained by the committee" (*Memoirs*, i. 436). In the reign of Charles II. a registry of deeds was established for the Bedford Level by 15 Car. II. c. 17. In the reign of Anne registries of deeds and wills were established for the county of Middlesex (7 Anne c. 20), for the West Riding of Yorkshire (2 & 3 Anne c. 4), and for the East Riding and Kingston-upon-Hull (6 Anne c. 35). Similar provisions were not applied to the North Riding until 8 Geo. II. c. 6. The Yorkshire Acts were consolidated and amended by the Yorkshire Registries Act, 1884. "Under these Acts, all deeds are to be adjudged fraudulent and void against any subsequent purchaser or mortgagee for valuable consideration, unless a memorial of such deeds be duly registered before the registering of the memorial of the deed under which such subsequent purchaser or mortgagee shall claim" (Williams. *Real Property*, pt. i. ch. x.). Priority thus depends upon the date of registration. The Acts do not extend to copyholds, to leaseholds for a term not exceeding twenty-one years, or to chambers in an Inn of Court. The full operation of the Registry Acts has been to a certain extent affected by the doctrines of equity that an equitable mortgage by deposit of deeds is valid without registration, and that notice of a prior unregistered deed is within limits equivalent to registration. "It shall only be in cases where the notice is so clearly proved as to make it fraudulent in the purchaser to take and register a conveyance in prejudice to the known title of another that we will suffer the registered deed to be affected" (Sir William Grant in Wyatt *v.* Barwell, 19 Vesey's *Reports*, 438). On this subject the Yorkshire Registries Act, 1884, provides by § 14 that "all priorities given by this Act shall have full effect in all cases except in cases of actual fraud, and all persons claiming thereunder any legal or equitable interests shall be entitled to corresponding priorities, and no such person shall lose any such priority merely in consequence of his having been affected with actual or constructive notice, except in cases of actual fraud." The Act provides for an official search of the same nature as that introduced by the Conveyancing Act, 1882, and for the entry of a caveat against registration by any person interested. Passing to general registration, a general registry of deeds was recommended by the real property commissioners in 1830. The royal commission of 1854 reported in 1857 in favour of general registration of title. In pursuance of this report the Land Registry Act, 1862 ("Lord Westbury's Act"), was passed. It provided for the optional registration of such titles to freeholds and leaseholds in freeholds as a court of equity should hold to be marketable. It was of little importance in practice on account of its making a marketable title (*i.e.*, such a title as the court would compel an unwilling purchaser to accept) and a definition of boundaries necessary, and of its not giving an indefeasible title in effect, though it does so in name, until there had been dealing with the land for valuable consideration subsequent to registration. The Act is still law as to titles registered under it and not re-registered under the Act of 1875. On the same day as the Land Registry Act was passed the Declaration of Title Act, 1862, under which power is given to any person entitled to apply for the registration of an indefeasible title under the Land Registry Act to apply to the Court of Chancery for a declaration of title, and the court, on proof of a marketable title, is to issue a certificate of title under the seal of the court. The Land Registry Act was condemned by the report of a royal commission in 1870. In 1875 some of the recommendations of the commission were adopted in the Land Transfer Act, 1875 ("Lord Cairns's Act"), the latest general enactment on the subject. The Act of 1875 allows the optional registration of a title less than marketable, and the land certificate delivered to the proprietor is to state whether his title be absolute, qualified, or possessory. Two or more persons may be registered as joint proprietors. No notice of any trust is to appear on the register. To be registered land must be either freehold or leasehold for an unexpired term of at least twenty-one years. Land in Middlesex or Yorkshire registered under the Act ceases to be within the jurisdiction of the local registries. A caution against registration may be lodged by any person interested. The Act established an office of land registry under a registrar appointed by the lord chancellor. There was also a power of creating district registries, if necessary. The Act, like its predecessor, has been very little used. A compulsory system of registration of title in England has been so universally recognized as expedient that its adoption can only be a question of time. The chief difficulties in the way of a reform are the objection of the landowners to publicity of transactions in land, the expense, greater than in other countries or in the colonies, arising from the complexity of the English law of real property, and, not least, the conservative instincts of the legal profession. One effect of registration will be to much diminish the importance of the legal doctrines of POSSESSION and LIMITATION (*q.v.*). "It is a grave question whether the establishment of titles by long possession is consistent with a complete and efficient system of registration. In Scotland, where there is such a system, there is nothing answering to our Statute of Limitations as regards land" (Pollock, *Land Laws*, 169).[1] Another effect will be the recurrence to the primitive legal conception of the transfer of land as a matter of public notoriety. In Ireland a registry of assurances was established by 6 Anne c. 2 (Ir.). 28 & 29 Vict. c. 88 constitutes a limited registry of title in the record of title to land which has been the subject of conveyance or declaration by the Landed Estates Court. In Scotland the present system of registration of assurances has existed since the reign of James VI. The Act 1617 c. 16 created a public register for registering within three-score days instruments of sasine as well as reversions and other writs affecting heritable property. The Act established a general register of sasines at Edinburgh and local registers. The latter were abolished by 31 & 32 Vict. c. 64. Modern Acts commencing in 1845 and consolidated in 1868 by 31 & 32 Vict. c. 101 dispense with sasine and the instrument of sasine. The recording of a conveyance with a warrant of registration indorsed now constitutes infeftment. Either the whole or part of a deed may be registered. Probative leases of thirty-one or more years may be registered under 20 & 21 Vict. c. 26. As to entails see ENTAIL. Writs affecting land held in burgage before 1874 must be registered in the burgh register of sasines (37 & 38 Vict. c. 94, § 25). The lord clerk register's duties under the Act of 1617 were transferred to the deputy clerk register by 42 & 43 Vict. c. 44 (see Watson, *Law Dict.*, *s.vv.* "Deeds," "Registration"). In most of the British colonies land registration of some kind exists. The Indian Registration Act, 1866, steers a middle course between compulsory and optional registration. The registration of some assurances is compulsory, of others optional. In Australia a system of compulsory registration of title was introduced by Sir R. R. Torrens, and, after having been first adopted by the legislature of South Australia in 1858, has been generally applied by the other Australian colonies since that time. Under the South Australian Act a certificate of title is cancelled and regranted on transfer. Instruments are not effectual until registration and indorsement according to statutory forms. Mortgages have priority according to the date of registration, irrespective of notice. The registrar may demand the deposit of a map. In the United States registration of assurances is universal, but registration of title is not so generally adopted. At the date of writing, a bill for the compulsory registration of title is before the New York legislature. For the purpose of dealing with public lands of the United States a register of the land office is appointed in each land district. Returns from each land office are made to the general land office.

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[1] The antiquity of registration of this kind is proved by the age of the *Registrum Brevium*, or register of writs, called by Lord Coke "a most ancient book of the Common Law" (Coke upon Littleton, 159a).

Ships.—The registration of ships in the British empire (other than fishing boats, the registration of which is governed by special legislation) now depends upon the Merchant Shipping Acts. The register is open only to British ships, and not more than sixty-four persons can be registered as owners of any ship. One registered owner may, however, represent the beneficial title of any number of persons. No notice of a trust can be entered on the register. Mortgages must be registered in the statutory form in order to be good against registered transferees and mortgagees. The registrar is generally in the United Kingdom the principal officer of customs for any port, abroad such person as may be named by order in council. The Merchant Shipping Act, 1854, established a "general register and record of seamen" under a registrar-general of seamen. The Merchant Shipping Act, 1872, extended both the name and authority of this officer. Since that Act he has been called the registrar-general of shipping and seamen. Returns of shipping and seamen are transmitted to him by the local registrars. In the United States the registration of ships depends upon a series of Acts of Congress beginning in 1792. See *Revised Statutes*, § 4131. A register of seamen is kept by the shipping commissioner (Act of 7th June 1872, c. 322).

Bills of Sale.—By the Bills of Sale Acts, 1878 and 1882, every bill of sale is to be registered within seven clear days after the execution thereof, or, if it is executed in any place out of England, then within seven clear days after the time at which it would in the ordinary course of post arrive in England if posted immediately after execution. A bill must be re-registered every five years, if still existing. An affidavit of the time of its execution, of its due execution and attestation, and containing a description of the residence and occupation of the person making the bill and of every attesting witness, must be filed with the registrar within seven days. A transfer or assignment of a registered bill of sale need not be registered. The duties of registrar are performed by a master of the Supreme Court attached to the Queen's Bench Division of the High Court of Justice. Provision is made for the transmission of bills of sale made by persons or affecting goods outside the London bankruptcy district to the registrars of the proper county courts. The register may be searched by any person on payment of a fee of one shilling. Similar provisions are contained in the Irish Acts of 1879 and 1883. Bills of sale are unknown in Scotland.

Births, Baptisms, Marriages, Deaths, Burials.—The registration of baptisms, marriages, and burials is said to have been first introduced by Thomas Cromwell when vicar-general in 1522, but it is only in comparatively modern times that the registration has been fully carried out. The registration of births, &c., in the United Kingdom depends upon a large body of statutory law. Baptisms, marriages, and burials are usually registered at the time of their occurrence, births and deaths within a certain time afterwards. The English Act 35 & 36 Vict. c. 36 forbids the charging of any fee for registration of baptism. The law of registration of births and deaths is consolidated for England by 37 & 38 Vict. c. 88, for Ireland by 43 & 44 Vict. c. 13. In Scotland it depends upon 17 & 18 Vict. c. 80, as amended by later Acts. The registration of marriages in England depends chiefly upon 4 Geo. IV. c. 76, and 6 & 7 Will. IV. c. 85; in Ireland upon 7 & 8 Vict. c. 81 (as to Protestants), 26 & 27 Vict. c. 90 (as to Roman Catholics); in Scotland upon 17 & 18 Vict. c. 80. The chief official charged with the administration of the Acts is the registrar-general of births, deaths, and marriages; in Scotland the office is held by the deputy clerk-register. In the United States the registration of births, marriages, and deaths is, with a few exceptions such as births and deaths at sea and marriages abroad, the subject of State and not United States legislation. Burials are regulated in England by the Burial Acts, especially the Registration of Burials Act, 1864, in Scotland by 18 & 19 Vict. c. 68. Chapels belonging to nonconformist bodies may be certified to the registrar-general (see NONCONFORMITY). There are few enactments dealing with the subject of this paragraph which extend to the United Kingdom. Those which do so are of a special nature, such as Acts affecting friendly societies and officers and soldiers abroad. A Registration Act embracing the United Kingdom is much needed.

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[1] § 21 of the Act of 1875 in fact provides that "a title to any land adverse to or in derogation of the title of the registered proprietor shall not be acquired by any length of possession," with an exception in favour of an adverse claim where the registered title is possessory only.

Companies.—Under the Companies Act, 1862, and subsequent Companies Acts (most of which apply to the United Kingdom), commercial companies as distinguished from associations of other kinds must be registered. Any company requiring to be registered and not registered is an illegal association, and its members cannot take advantage of the limitation of liability and other benefits conferred by the Acts. The register is under the charge of the registrar-general of joint stock companies or such other registrar as the Board of Trade may appoint. The register must contain (1) the memorandum of association, including the name and objects of the proposed company and the place where its registered office is situate; (2) the articles of association; (3) a list of members and shareholders (or directors where there are no shareholders), and a statement of the amount held by each shareholder, and other particulars; (4) any order of court confirming the reduction of the capital of a company; (5) any contract duly made in writing by which a share is issued otherwise than for cash; (6) proceedings in winding up. No trust is to appear on the register in the case of companies registered in England or Ireland. Every company must keep at its registered office a register of its members, and, if a company not divided into shares, a register of its directors or managers, and, in addition, if a limited company, a register of mortgages and charges affecting the property of the company.

Friendly Societies.—A friendly society consisting of seven members at least may be registered under the Friendly Societies Act, 1875. The name of the society and of its secretary, and of every trustee or other officer authorized to sue or to be sued in the name of the society, and also a copy of its rules, are entered on the register. There is a chief registrar of friendly societies with assistant registrars for Scotland and Ireland. Every registered society is to have a registered office. In the same registry are now registered building societies, industrial and provident societies, and trade unions.

Newspapers.—By the Newspapers Libel and Registration Act, 1881, the registrar of joint stock companies is to keep a register of the titles of newspapers and the names of their proprietors (see NEWSPAPERS, PRESS LAWS).

Copyrights, Patents, Designs, Trade Marks.—See COPYRIGHT, PATENTS, TRADE MARK.

Professions and Occupations.—The effect of recent legislation has been that solicitors, medical men, dentists, veterinary surgeons, chemists and druggists, seamen, lodging-house keepers, cow keepers, milk retailers, and others must be registered in accordance with various statutory provisions. Unless duly registered they cannot as a rule recover for their services. In certain other cases registration is not in name necessary, but it is practically enforced by the law regarding the entry in certain official books and documents as *primâ facie* evidence of qualification. Thus the roll of the House of Lords is evidence that a person appearing upon it is a peer, the army list that a name contained in it is that of an officer.

Among other matters of less importance which are registered are crown debts, acknowledgments by married women, colonial stock under 40 & 41 Vict. c. 59, schemes under the Regulation of Railways Act, 1867, hospitals where lunatics are received, and (in Scotland) lunatics confined in asylums. In this place may be mentioned the peculiar privilege enjoyed by the Channel Islands: orders in council or Acts of Parliament in which they are not named do not become law in those islands until after registration in the royal courts. (J. Wt.)

Parliamentary Registration.

England.—Prior to 1832 the right of parliamentary electors was determined at the moment of the tender of the vote at the election, or, in the event of a petition against the return, by a scrutiny, a committee of the House of Commons striking off those whose qualification was held to be insufficient, and, on the other hand, adding those who, having tendered their votes at the poll, with a good title to do so, were rejected at the time. A conspicuous feature of the Reform Act of that year was the introduction of a new mode of ascertaining the rights of electors by means of an entirely new system of published lists, subject to claims and objections, and after due inquiry and revision forming a register of voters. In forming a register the services of overseers, already existing in every parish, were called into requisition. As regards electors in counties, principally freeholders and long-lease-holders and £50 tenant farmers, under the Chandos clause, overseers have no official knowledge of the persons qualified to vote. Their duty towards providing a register of county electors consisted in giving public notice, receiving claims and objections, and making out lists of them and forwarding them to the clerk of the peace. In boroughs their primary duty was to make out lists, their rate books as overseers giving them the knowledge of persons entitled under the Reform Act to vote as £10 rated occupiers, to which subsequent claims were added or objections made. In old boroughs where freemen were entitled, independently of the then new occupation franchise, the town clerk prepared the lists. Barristers were appointed to revise the lists, which eventually formed the register of voters for the ensuing year for counties and boroughs.

This procedure still forms the basis of registration, but subject to important alterations since made. Although the Act of 1832 was most carefully drawn, its provisions minutely indicating every step to be taken for the formation of a register, accompanied by precise forms, it was found insufficient in practice; and accordingly a Registration Act was passed in 1843 (6 & 7 Vict. c. 15), by which forms of precept were issued by clerks of the peace and town clerks to overseers, telling them in a compendious form what they were to do, and providing them with the necessary forms for all cases. The Representation of the People Act in 1867 introduced very important changes in the franchise,—in counties by introducing an occupation qualification distinct from any previous description of franchise either in county or borough, but having somewhat closer affinity to the £10 occupation in boroughs under the Reform Act of 1832 than to the £50 tenant occupation in counties under that Act. This county franchise was an occupation as owner or tenant of lands or tenements of the rateable value of £12, with the concomitants of rating to the poor rates and payment of rates; but the £12 occupation practically merged within it a large proportion of £50 tenant occupiers. The alterations effected by the Act of 1867 in the borough franchise were much more extensive. In the first place, the franchise was given to every inhabitant occupier as owner or tenant of any dwelling house within the borough; but rating and payment of poor rates were made essential conditions of this franchise: part of a house occupied as a separate dwelling, if separately rated, was a sufficient dwelling house to confer the franchise. Notwithstanding the apparent effect of the general enfranchisement of inhabitant occupiers, a very considerable body still depended on the former £10 franchise in consequence of the distinction between residence and inhabitancy. Secondly, the Act gave the franchise to occupiers of lodgings of a yearly value (irrespective of furniture) of £10. A Registration Act of the following year was in several important respects defective. With respect to two of the three new classes enfranchised in 1867 many doubts were indeed removed by it. The overseers were required to make out a list of £12 occupiers in counties; on the other hand lodgers in boroughs were required under the Act of 1867 to claim to be registered. But with respect to the third class, the most numerous of all—the inhabitant occupiers in boroughs—the Act contained no direction. Notwithstanding attempts to meet these and various other defects, several years elapsed without any alteration being effected. In the meantime important electoral changes occurred. The alterations effected by the Act of 1867, besides those of qualification, the redistribution of seats, and the representation of minorities, followed by the Ballot Act of 1872, were succeeded by the innovation of mixing up regulations for the exercise of parliamentary with the municipal franchise, and led up to the fusion of the registration of the two franchises and the Parliamentary and Municipal Registration Act of 1878, introducing important changes both as regards the definition of the franchise in boroughs and the procedure in relation to registration. As regards the latter the changes recognized the combination of borough registration for the double purpose of parliamentary and municipal registration, and also the more ready preparation of accurate registers irrespective of the combination.

The legislation of 1884 and 1885 in relation to registration next requires notice. The Representation of the People Act, 1884, enacted that a uniform household franchise and a uniform lodger franchise at elections shall be established in all counties and boroughs throughout the United Kingdom, and every man possessed of a household qualification or a lodger qualification shall, if the qualifying premises be situated in a county in England or Scotland, be entitled to be registered as a voter, and, when registered, to vote at an election for such county, and, if the qualifying premises be situated in a county or borough in Ireland, be entitled to be registered as a voter and, when registered, to vote at an election for such county or borough.

A main practical effect of the Act of 1884 was to extend to counties the franchise previously confined to boroughs in respect of inhabitant occupiers of dwelling houses, and in respect of the occupation of lodgings. At the same time the franchise in respect of occupation of lands and tenements (other than a household franchise) was assimilated in boroughs and counties and fixed at £10 a year. Independently of this extension to counties and assimilation of the household and lodger franchise, provision was made for extending the franchise to many cases of the inhabitancy of houses by persons who, in consequence of filling offices or serving others or of the tenure of the house, were deprived of the franchise, not being in law occupiers. This is commonly spoken of as the service franchise. On the other hand restrictions were placed on faggot votes in respect of rent charges. Moreover, a man is not entitled by virtue of the Act to be registered as a county voter in respect of the occupation of any dwelling house, land, or tenement situate in a borough. This Act was shortly followed by the Registration Act, 1885, assimilating the registration law applicable to the borough and county occupation franchises.

The procedure for the formation of the register, as well in counties as in boroughs, is still very complicated. In counties there are two classes of persons entitled to be registered—the one ownership voters, the other occupation voters. General but detailed instructions are sent by the clerk of the peace to overseers, accompanied by forms and copies of the existing register. On or before the 20th June the overseers publish the ownership portion of the then existing register for the parish, at the same time giving notice in a prescribed form that all persons entitled to be registered in counties in respect of the ownership of property within the parish and not upon the register, or whose qualification or address has changed, who are desirous of having their names inserted in the register, must give notice to the overseers in a prescribed published form by the 20th July. A list of such ownership claimants is published by the end of July. The occupation voters now entitled in counties to be on the register comprise a £10 occupation qualification and principally a household qualification, and also a lodger qualification. The occupation list other than that of lodgers is made out and published by the overseers. They are required to get the information, and as this information cannot be gathered in many cases from the rate books, they may require rated persons to supply them with the names of all inhabitant occupiers of their dwelling houses so that such persons (including chiefly the service franchise already mentioned) may be entered in a separate column of the rate book. The lodger list is made out by the overseers from an existing list, if there be one (for in counties there can be no existing list before 1886), and by claims. In cities and boroughs the franchises (where there are no freemen) are chiefly occupation franchises, and the same general system of registration prevails as in counties in relation to the registration or occupation franchises.

With the exception of the provisions relating to the so-called service franchise already noticed, registration procedure has not been much changed by the legislation of 1884 and 1885, and in counties as well as in boroughs it mainly rests still on the Registration Act of 1843. Overseers receive their precepts in boroughs from the town clerk, as they do in counties from the clerks of the peace, and the town clerk deals with the lists of freemen where that description of franchise exists. As the household occupation and lodger franchises were introduced into boroughs in 1867, the preparation and publication of lists as to occupation franchises rests principally on the same procedure in counties and boroughs.

Ample facilities are given for fresh and amended claims and for objections made (by any one on the register) to the overseers by the 20th August and published by them in lists; and, where payment of poor rates is essential, not necessarily by the voter, but by some one (as in some occupation franchises it is), a list of persons disqualified is made out and open to inspection. While the actual exercise of the franchise is governed by the duration of the register (which in the absence of special legislation, as adopted for 1868 and for 1885, is in force for the ordinary year, viz., from 1st January), every period of qualification is computed by reference to the 15th July; the qualification must be complete on that day, whether or not it comprises a possession or occupation for a previous definite fixed period. When payment of poor rates is part of a qualification, payment before the 15th July of rates payable to the 15th January is sufficient. Disqualifications generally refer to their existence at the same date. As regards parochial relief, any relief within twelve months of the 15th July disqualifies. Even with regard to disqualification by office, which may be transitory and disconnected with the qualifying franchise, the existence of the disqualification on the 15th July is a bar to registration. Where a man is registered by virtue of one qualification he cannot be also registered to vote by reason of another in respect of the same property, and a qualification franchise under the Representation of the People Act, 1884, generally overrides another description of qualification; but fine distinctions sometimes exist between inhabitancy and residence in relation to different qualifications affecting the right to be on the register in respect of one description of occupation franchise rather than another. In a borough divided under the Redistribution of Seats Act, 1885, a person cannot be registered in more than one division. The duties of overseers in reference to registration extend from spring to autumn. By the 25th of August the lists are delivered by them to the clerk of the peace in counties, and in boroughs to the town clerk. Barristers are appointed to revise the lists and hold courts for that purpose (and also for revising the municipal franchise) between the 15th September and 31st October, giving notice to the clerks of the peace in counties and town clerks of boroughs, who publish notice of the sittings appointed and attend and deliver the lists, the overseers also attending. They hold open courts (the localities including all polling places in counties) on appointed days, with evening sittings in populous places, with general powers of adjournment. A right of appeal exists from a revising barrister's decision on the points of law, by a claimant or objector, to judges of the High Court of Justice. Whether the right of appeal is exercised or not, the lists, as settled and signed by the barrister, are transmitted by him to the clerk of the peace or town clerk as the case may be. The lists are copied and printed in such manner and form that the list of voters for every parish appears separately and with reference to polling places. By the end of December the printed lists signed by the clerk of the peace are delivered to the sheriff of the county, and signed borough lists are delivered by the town clerk to the returning officer. The register is thus completed, and the book constitutes the register of persons entitled to vote for the county or borough to which it relates at any election which takes place during the year commencing on the 1st January next after such register is made.

For some years after the passing of the Reform Act, 1832, an elector was allowed, previous to voting, to be interrogated as to the possession of the qualification for which his name was inserted on the register; but since 1843 no inquiry is permitted at the time of polling as to the right of any person to vote, except as to his identity with the name appearing on the register and as to his having already voted; he may be required to give his answers on oath, but without an oath a false answer wilfully made is an indictable misdemeanour. With this exception it is unlawful to require any voter to take an oath in proof of his qualification or right to vote, or to reject any vote tendered by any person whose name is upon the register; and no scrutiny is allowed by or before any returning officer with regard to any vote given or tendered at an election. A great effort, partially successful, was made in 1885 to transfer the cost of forming the register from local to imperial funds. A part of the cost is now borne by the state. The remuneration of revising barristers is paid by the treasury.

Scotland.—In Scotland as in England a system of registration was established in 1832 (2 & 3 Will. IV. c. 65), and, passing over amendments on the extension and assimilation of county and burgh franchises by the Representation of the People Act, 1884, establishing a general household qualification in the United Kingdom, the principles of registration adopted in England by the Registration Act, 1885, were applied with some modifications to Scotland by the Registration Amendment (Scotland) Act, 1885. An annual revision of the register (founded on the valuation roll) is made by appointed officers, with the publication of lists and of names of parties interested making claims and objections. Instead, however, of the duties of publication and primary correction being in the hands of the parish officers, as in England, those duties devolve as before on assessors (aided in burghs by the town clerks), who make up the register. The duties of final revision devolve on the sheriff, who authenticates the register, and it is delivered to the sheriff clerk with the names duly arranged. The principal expenses of registration are provided from local or county sources, with a contribution from imperial funds.

Ireland.—In Ireland also the registration of voters was a feature of the reform in parliament effected in 1832, and the same general features as to the formation and amendment of the register prevail as in England. The extension and assimilation of the franchise by the Representation of the People Act, 1884, is carried out by the Parliamentary Registration (Ireland) Act, 1885, on the same lines as before, only adapted to peculiar exigencies. Clerks of poor-law unions have still many of the duties of parochial officers in England. Prominent among recent divergencies is the proviso that temporary eviction for non-payment of rent followed by reinstalment does not disqualify a claim to occupation franchise.

Revision is made at special sessions before assistant barristers, or, in counties, before the chairman. The register, when completed, is placed in the hands of the sheriff in counties and of the returning officer in boroughs. The expenses of registration are defrayed from local sources, with a contribution from imperial funds.

Universities.—The Reform Act of 1832 made no change in the university representation. Special provisions affect the electoral roll of universities returning members of parliament.

London Freemen.—There are also special provisions as to the registration of freemen in the City of London. (J. E. D.)

REGNARD, Jean François (1656-1709), who in general estimation ranks next to Molière among French comic dramatists, was born at Paris in 1656, and during at least the earlier part of his life had a singularly adventurous career considering his time, station, and country. His father was a rich shopkeeper, who educated his son carefully, and died when he was about twenty, leaving Regnard master of what was for the time a considerable fortune. Regnard, who was apparently beyond his day in affection for travelling, set off at once for Italy and there gambled perseveringly. A young tradesman's son in such circumstances ought, according to precedent and poetical justice, to have been fleeced to his last penny; but Regnard, according to the story, increased his fortune by ten thousand crowns. In Italy (on his second visit according to some authorities) he met and fell in love with a young married lady of Provençal birth. With her and her husband (it is difficult not to believe that biographers have taken the facts of a short autobiographical romance which Regnard wrote, under the title of *La Provençale*, rather literally) he set out for France on board an English frigate. This was attacked by two Algerian rovers; the captain and the crew were cut to pieces, and the passengers taken to Algiers and sold. Regnard, who, being skilful in cookery, was a valuable slave, is said to have been taken by his master to Constantinople, but after about two years' captivity he was ransomed with his lady love for twelve thousand livres. The husband was supposed to be dead, and Regnard was preparing to marry the widow when a proper time of mourning had elapsed, but the husband reappeared and the lover was disappointed. The disappointment set him once more on a roving life, and he journeyed by Holland, Denmark, and Sweden to Lapland, and thence by Poland, Turkey, Hungary, and Germany back to France, having commemorated what was then the somewhat extraordinary feat of visiting the head of the Gulf of Bothnia by a Latin inscription on the rocks, which was visible thirty years later. He returned to Paris at the end of 1683. He now appears to have entirely exhausted his roving inclinations, and for the second half of his life (for this date of December 1683 nearly bisects it) his existence, if not exactly sedentary, was divided between luxury and letters. He bought the place of treasurer of France in the Paris district; he had a house at Paris in the Rue Richelieu; and he acquired the small estate of Grillon near Dourdan (about equidistant between Rambouillet and Fontainebleau), where he hunted, feasted, and wrote comedies. This latter amusement he began in 1688 with a piece called *Le Divorce*, which was performed at the Théatre Italien, and followed it up with many other small pieces, which are not, however, his titles to fame. He gained access to the Théâtre Français in 1694 with a slight piece called *Attendez-moi sous l'Orme*, and two years later produced there the masterly comedy of *Le Joueur*, in reference to which his ally Dufresny attempted to make out a charge of plagiarism. *Le Distrait* (1697), *Le Retour Imprévu* (1700), *Les Folies Amoureuses* (1704), *Les Menèchmes* (1705), a clever following of Plautus, and, lastly, his masterpiece, *Le Legataire Universel* (1708), with one or two less meritorious pieces, were also produced at the Français.

Regnard's death, after a quarter of a century of quiet living, renews the doubtful and romantic circumstances of his earlier life. Some hint at poison; there is a wild and wonderful story of his having deliberately made up a prescription of horse medicine for himself and taken it with fatal consequences; while other more prosaic accounts give as the cause of death his having gone out hunting while under an ordinary course of treatment, and on his return, when much heated, having swallowed a large quantity of iced water. At any rate he died on the 4th September 1709.

Besides the plays noticed above and others, Regnard wrote a certain number of miscellaneous poems, the above-mentioned novel of *La Provençale*, and several short accounts in prose of his travels. He quarrelled with Boileau and was reconciled with him, owing to which fact the expressions of that critic concerning Regnard's literary merit were not wholly consistent. The saying, however, which is attributed to him when some one, thinking to curry favour, remarked that Regnard was only a mediocre poet, "Il n'est pas médiocrement gai," is both true and very appropriate. Regnard's verse is not particularly good (in his non-dramatic work it is sometimes positively bad), and his French style, especially in his purely prose works, is not considered faultless. He is often unoriginal in his plots, and, whether Dufresny was or was not justified in his complaint about *Le Joueur*, it seems likely that Regnard owed not a little to him and to others; but he had a thorough grasp of comic situation and incident and a most amusing faculty of dialogue. He is often not far from the verge of farce, but he certainly might plead Molière's example in this respect. There is no trace in him of Molière's ethical value, and he is seldom a serious critic of society and life, while in point of refinement of incident and language his drama is a distinct relapse from his master's. But there are few things in artificial comedy more amusing and more dexterously managed than the series of devices whereby the miserly uncle of *Le Légataire Universel* is brought to make his nephew rich and happy.

The first edition of Regnard's complete works was published in 1731 (5 vols., Paris), one of the last in 1854 (2 vols.). There is a good selection of almost everything important in the Collection Didot.

REGNAULT, Henri (1843-1871), French painter, born at Paris on the 31st October 1843, was the son of Henri Victor Regnault (noticed below). On leaving school he successively entered the studios of Montfort, Lamothe, and Cabanel, was beaten for the Great Prize (1863) by Layraud and Montchablon, and in 1864 exhibited two portraits in no wise remarkable at the Salon. Nothing, in short, produced by Regnault up to 1866 led men to suspect the brilliancy of his endowments, but in that year he made a mark, carrying off the Great Prize with a work of unusual force and distinction—Thetis bringing the Arms forged by Vulcan to Achilles (School of the Fine Arts). The past and the works of the past in Italy did not touch him, but his illustrations to Wey's *Rome* show how observant he was of actual life and manners; even his Automedon (School of Fine Arts), executed in obedience to Academical regulations, was but a lively recollection of a carnival horse race. At Rome, moreover, Regnault came into contact with the modern Hispano-Italian school, a school highly materialistic in its aims and tendencies, and inclined to regard even the human subject only as one amongst many sources whence to obtain amusement for the eye. The vital, if narrow, energy of this school told on Regnault with ever-increasing force during the few remaining years of his life. In 1868 he had sent to the Salon a life-size portrait of a lady in which he had made one of the first attempts to render the actual character of fashionable modern life, and, on his return from a visit to the exhibition, he seized the opportunity of making a tour in Spain. There he saw Prim pass at the head of his troops, and received that lively image of a military demagogue which he afterwards put on canvas somewhat to the displeasure of his subject. But this work made an appeal to the imagination of the public, whilst all the later productions of Regnault were addressed exclusively to the eye. After a further flight to Africa, abridged by the necessities of his position as a pensioner of the school of Rome, he painted Judith, then (1870) Salome, and, as a work due from the Roman school, despatched from Tangiers the large canvas Execution without Hearing under the Moorish Kings, in which the painter had played with the blood of the victim as were he a jeweller toying with rubies. The war arose, and found Regnault foremost in the devoted ranks of Buzenval. where he fell on January 19, 1871.

See *Correspondance de H. Regnault*; Duparc, *H. Regnault, sa vie et son œuvre*; Cazalis. *H. Regnault. 1843–1871*; Baillière, *Les artistes de mon temps*; C. Blanc. *H. Regnault*; P. Mantz, *Gazette du Beaux Arts*, 1872.

REGNAULT, Henri Victor (1811–1878), was born on July 21, 1811, at Aix-la-Chapelle. His early life was a struggle with poverty. When a boy he went to Paris, and after a time succeeded in obtaining a situation in a large drapery establishment, where he remained, occupying every spare hour in study, until he was in his twentieth year. Then he entered the École Polytechnique, and, after making the best use of his increased opportunities, passed in 1832 to the École des Mines, where he developed an aptitude for experimental chemistry.

A few years later he was appointed to a professorship of chemistry at Lyons, and devoted himself to research amongst organic compounds. He paid little attention to theories and cared only for facts; but, by his unequivocal proof of the substitution of chlorine for hydrogen in hydrocarbons, he greatly assisted his countrymen Laurent and Dumas in establishing the type-theory of organic compounds. Regnault's most important chemical work was a series of researches, commenced in 1835, on the haloid and other derivatives of unsaturated hydrocarbons. This made him the discoverer of the vinyl group of compounds, carbon tetrachloride (CCl_4), and of perchlorether ($C_4Cl_{10}O$). He studied many of the natural alkaloids and organic acids, introduced a classification of the metals according to the facility with which they or their sulphides are oxidized by steam at high temperatures, and effected a comparison of the chemical composition of atmospheric air from all parts of the world.

In 1840 Regnault was recalled to Paris by his appointment to the chair of chemistry in the École Polytechnique; at the same time he was elected a member of the Académie des Sciences, in the chemical section, in room of M. Robiquet; and in the following year he became professor of physics in the Collége de France, there succeeding Dulong, his old master, and in many respects his model. From this time Regnault devoted almost all his attention to practical physics; but in 1847 he published a four-volume treatise on *Chemistry* which was highly esteemed and has been translated into many languages.

Regnault is perhaps best known by his careful redetermination of the specific heats of all the elements obtainable, and of many compounds—solids, liquids, and gases—by which he was enabled to correct the values obtained by Dulong and Petit, and to reduce the number of exceptions to their law that *the specific heat of an element varies inversely as its atomic weight, and of a compound as its molecular weight.* He investigated the expansibility of gases by heat, determined the coefficient for air as 0·03663, and showed that, contrary to previous opinion, no two gases had precisely the same rate of expansion. By numerous delicate experiments he proved Boyle's law that *the volume of a gas is inversely as the pressure it supports* to be only approximately true, and that those gases which are most readily liquefied diverge most widely from obedience to the law. Regnault studied the whole subject of thermometry critically; he introduced the use of an accurate air-thermometer, and compared its indications with those of a mercurial thermometer, determining the absolute dilatation of mercury by heat as a step in the process. He also paid attention to hygrometry and devised a hygrometer in which a cooled metal surface is used for the deposition of moisture.

In 1854 he was appointed to succeed Ebelman as director of the celebrated porcelain manufactory at Sevres. He carried on the great research on the expansion of gases in the laboratory at Sèvres, but all the results of his latest work were destroyed during the Franco-German War, in which also his son Henri (noticed above) was killed. Regnault never recovered the double blow, and, although he lived until January 19, 1878, his scientific labours ended in 1872. He wrote more than eighty papers on scientific subjects, and he made fine researches, many of them of importance, in conjunction with other workers. His greatest work, bearing on the practical treatment of steam-engines, forms vol. xxi. of the *Mémoires de l'Académie des Sciences.*

Regnault was great as a laborious worker; in all his researches he overcame every difficulty by his determined perseverance, his unusual natural ingenuity in devising apparatus, and his rare power of manipulation. Although few discoveries are associated with his name, the mass of physical constants which he determined with the utmost accuracy constitutes a powerful instrument of further advance, and the thorough training which he gave his students has provided many painstaking and exact workers in the field of physics.

REGNAULT, Jean Baptiste, French painter, was born at Paris on 9th October 1754, and died in the same city on November 12, 1829. He began life at sea in a merchant vessel, but at the age of fifteen his talent attracted attention and he was sent to Italy by M. de Monval under the care of Bardin. After his return to Paris, Regnault, in 1776, obtained the Great Prize, and in 1783 he was elected Academician. His diploma picture, the Education of Achilles by Chiron, is now in the Louvre, as also the Christ taken down from the Cross, originally executed for the royal chapel at Fontainebleau, and two minor works—the Origin of Painting and Pygmalion praying Venus to give Life to his Statue. Besides various small pictures and allegorical subjects, Regnault was also the author of many large historical paintings; and his school, which reckoned amongst its chief attendants Guérin, Crepin, Lafitte, Blondel, Robert Lefevre, and Menjaud, was for a long while the rival in influence of that of David.

REGNIER, Mathurin (1573–1613), the greatest satirist of France, was born at Chartres on the 21st December 1573. His father, Jacques Regnier, was a bourgeois of good means and position; his mother, Simonne Desportes, was the sister of the poetical Abbé Desportes, one of the most distinguished of the disciples of Ronsard. Desportes, who was richly beneficed and in great favour at court, seems to have been regarded at once as Mathurin Regnier's natural protector and patron, and the boy himself, with a view to his following in his uncle's steps, was tonsured at nine years old. It appears that Jacques Regnier, at any rate for a time, encouraged his son to imitate his uncle in poetry also, though he afterwards changed his views. The boy was somewhat early introduced to general society of the jovial kind, for his father built a tennis court at the end of his garden which became semi-public and was much frequented. The poet's enemies said that his father had been a common gaming-house keeper, and that the court was built with the ruins of some church property; but this seems to be mere scandal. Little is known of his youth, and it is chiefly conjecture which fixes the date of his visit to Italy in the suite of the Cardinal de Joyeuse in 1586. Others give 1583 and 1593, but the former date is certainly too early, and the latter probably too late. Indeed the greatest uncertainty exists as to the dates and incidents of Regnier's short life, and his biographers hitherto have chiefly busied themselves in upsetting each others' facts without supplying fresh details of an authentic character. It is commonly said that the poet, finding Joyeuse an inactive or unwilling patron, transferred his services to Philippe de Bethune, Sully's brother, who went as ambassador to Rome in 1601; but this seems doubtful, for one of the very few positive documents concerning Regnier speaks of him as still in Joyeuse's service a year later. What is generally certain is that during the greater part of his youth he lived partly in Paris and partly in Italy, after a somewhat idle and very dissipated fashion. He early began the practice of satirical writing, and the enmity which existed between his uncle Desportes and the poet Malherbe gave him occasion to attack the latter in some of his very best verses. It has been generally said that Regnier obtained full possession of a canonry at Chartres, to the reversion of which he had been appointed when a child, in 1604, and a singular legend is told of the immediate circumstances; but the formal registry of admission signed by himself is extant, and is dated 1609, a further instance of the uncertainty which prevails respecting him. In 1606 Desportes died, leaving nothing to Regnier, though they seem to have been on excellent terms to the last. The poet was even disappointed of the succession to Desportes's abbacies, but he obtained a pension (the amount as usual variously stated at 2000 and 6000 livres) chargeable upon one of them, by the influence of the Marquis de Cœuvres, afterwards Maréchal d'Estrées, the brother of Henry IV.'s Gabrielle. He also became a great favourite with his bishop, Philippe Hurault, at whose abbacy of Royaumont Regnier spent much time in the later years of his life. On the other hand the death of Henry IV. deprived him of his last hope of great preferments, and appears to have considerably soured his temper. He did not long survive the king. His life had always been one of dissipation, or, to speak frankly, debauchery, and in the autumn of 1613 he went to Rouen to put himself under the care of a quack doctor. An apparent cure was followed by a feast at which the patient drank his physician's health too freely in strong Spanish wine, and died of pleurisy or fever at his hotel, the Écu d'Orléans, on the 13th October. His body was disembowelled and the entrails deposited in the parish church, that of St Marie Mineure, the other remains being carried to Royaumont and buried there.

Such is the meagre amount of positive knowledge respecting one of the greatest poets of France. Nor can it be said that Regnier's literary history is quite accurately ascertained, though it is less dubious than his personal. The period immediately preceding and following his death was a period of numerous collections of licentious and satirical poems, some published, some still remaining in manuscript. Gathered from these there has been a floating mass of epigrams, &c., attributed to Regnier, few of which are certainly authentic, and most of which do no particular credit to his memory. On these editors of his works have exercised freely the right of acceptance or rejection, so that it is very rare to find two editions of Regnier which exactly agree in contents. His acknowledged or undoubted work, however, is that on which his fame rests, and it falls into three classes:—regular satires in alexandrine couplets, serious poems in various metres, and satirical or jocular epigrams and light pieces, which often, if not always, exhibit considerable licence of language. This latter class is, however, much the least important in every way. The real greatness of Regnier consists in the vigour and polish of his satires, contrasted and heightened as that vigour is with the exquisite feeling and melancholy music of some of his minor poems. In the latter Regnier is a disciple of Ronsard (whom he defended brilliantly against Malherbe), without the occasional pedantry, the affectation, or the undue fluency of the Pléiade, but in the satires he had hardly any master (Vauquelin de la Fresnaye and Agrippa d'Aubigné, who preceded him in point of composition, did not publish their satires until later) except the ancients. He has sometimes followed Horace closely, but always in an entirely original spirit. His vocabulary is varied and picturesque, but is not marred by the maladroit classicism of some of the Ronsardists. His verse is extraordinarily forcible and nervous, but what distinguishes him especially from most satirists is the way in which he gets the better of what may be called the commonplaces of satire, and to a great extent at any rate avoids the tendency of all French poetry to run into types. His keen and accurate knowledge of human nature and even his purely literary qualities extorted the admiration of Boileau—usually the severest of critics in regard to all poets of the preceding age except Malherbe. Regnier, moreover, in respect of Malherbe has himself displayed remarkable independence and acuteness of literary criticism, and the famous passage in which he satirizes the poet of Caen contains the best denunciation of the merely "correct" theory of poetry that has ever been written. Lastly, Regnier had a most unusual descriptive faculty, and the vividness of what may be called his narrative satires was not approached in France for at least two centuries after his death. All his merits are displayed in the masterpiece entitled *Macette ou l'Hypocrisie déconcertée*, but hardly any one of the sixteen satires which he has left falls below even a very high standard. In general it may be said that Regnier is the last poet who shows the poetic faculties of the French tongue before the classical reforms of the 17th century had cramped and curtailed them, and that he shows these faculties in something like perfection.

The first edition of Regnier's satires appeared in 1608 published by Gabriel Buon. There was another in 1609, and another in 1612. The author had also contributed to two collections—*Les Muses Gaillardes* in 1609 and *Le Temple d'Apollon* in 1611. In the year of his death (1613) a completer collection appeared, and another in 1616. The chief editions of the 18th century are that of Brossette (1729), which supplies the standard commentary on Regnier, and that of Lenglet Dufresnoy (1733). Recently the poet has been frequently and carefully reprinted. The editions of Prosper Poitevin in 1800, of M. de Barthélemy in 1862, and of M. Courbet in 1875 may be specially mentioned. The last, printed after the originals in italic type, and well edited, is perhaps the best, as M. de Barthélemy's is the fullest, of recent copies.

REGULUS, MARCUS ATILIUS, was consul for the second time in the ninth year of the First Punic War (256 B.C.), and so was one of the commanders in the great naval expedition which shattered the Carthaginian fleet and successfully landed an army on Carthaginian territory at Clupea. At first the invaders had such success that half the army and the other consul Manlius could be recalled to Rome, and yet leave good hope that Regulus with the insurgent Numidian subjects of the Phœnicians would finish the war in the second campaign. But Carthage, which had found an able general in the Spartan Xanthippus, used the winter to such good account that in the spring of 255 Regulus was decidedly inferior in strength, and, hazarding a pitched battle on ground favourable to the enemy, had his army cut to pieces and was himself taken captive. Regulus perished in captivity, and was supposed at Rome to have been done to death: according to the common story he was sent to Rome on parole to negotiate a peace or exchange of prisoners, but on his arrival strongly urged the senate to refuse both proposals, and returning to Carthage was slain with horrid tortures. This is the story so eloquently told by Horace (*Carm.* iii. 5), and which made Regulus to the later Romans the type of heroic endurance in misfortune; but most critical historians regard it as insufficiently attested, Polybius being silent.

REICHA, ANTON JOSEPH (1770–1836), musical theorist and teacher of composition, was born at Prague, February 27, 1770, and educated chiefly by his uncle, Joseph Reicha (1746–1795), a clever violoncellist, who first received him into his house at Wallerstein in Bohemia, and afterwards carried him to Bonn. He studied hard, and began to compose at a very early age,—producing, during the course of a long and active life, a vast quantity of church music, five operas, a number of symphonies, oratorios, and many miscellaneous works. Though clever and ingenious, his compositions are more remarkable for their novelty than for the beauty of the ideas upon which they are based, and display but little of the divine fire which alone can render works of art immortal. His fame is, indeed, more securely based upon his didactic works than upon the results of his theories as exemplified in his own productions. His *Traité de Mélodie* (Paris, 1814), *Cours de Composition Musicale* (Paris, 1818), *Traité de Haute Composition Musicale* (Paris, 1824–1826), and *Art du Compositeur Dramatique* (Paris, 1833) are valuable and instructive essays, containing much that is new and interesting; and, though many of the theories they set forth are now condemned as erroneous, they can scarcely be read without profit to the student.

Reicha first visited Paris in 1799. In 1802 he removed to Vienna, where he spent some happy years in close intercourse with Beethoven, and the veteran Haydn. His permanent settlement at Paris took place in 1808. In 1817 he succeeded Méhul as professor of counterpoint at the Conservatoire. In 1831 he was made a knight of the Legion of Honour; and in 1835 he was admitted as a member of the Institute in the place of Boieldieu. He died at Paris, May 28, 1836.

REICHENAU, a picturesque island in the Untersee or western arm of the lake of Constance, is 3 miles in length by 1 in breadth, and is connected with the east bank by a causeway three quarters of a mile long. It belongs to the duchy of Baden, and comprises the three parishes of Oberzell, Mittelzell, and Unterzell, with a joint population of 1463 in 1880. The soil is very fertile, and excellent wine is produced in sufficient quantity for exportation. The Benedictine abbey of Reichenau, founded in 724, was long celebrated for its wealth and for the services rendered by its monks to the cause of learning. In 1538 the abbey, which had previously been independent, was subordinated to the see of Constance, and in 1799 it was secularized. The abbey church, dating in part from the 9th century, contains the tomb of Charles the Fat, who retired to this island in 887, after losing the empire of Charlemagne. It now serves as the parish church of Mittelzell, and the churches of Oberzell and Unterzell are also interesting buildings of the Carlovingian era.

REICHENBACH, a manufacturing town of Saxony, in the province of Zwickau, lies in the hilly district known as the Voigtland, 50 miles to the south of Leipsic. The chief industrial products are woollen cloth, merino, cashmere, flannel, and shawls. Its importance is of recent origin, and the population, amounting to 16,509 in 1880, has trebled itself within the last fifty years. The earliest notice of the town occurs in a document of 1212 and it acquired municipal rights in 1367.

REICHENBACH, a cotton-manufacturing town of Prussian Silesia, with 7225 inhabitants (1880) and an old castle, lies 30 miles to the south-south-west of Breslau, and demands mention chiefly from its connexion with several important historical events. In 1762 Frederick the Great gained a victory here over the Austrians; by the Reichenbach convention of 1790 England and the other powers guaranteed the subsistence of the Turkish empire; and in 1813 a treaty, afterwards ratified at Prague, was concluded here between Austria and the allies.

REICHENBACH, Georg von (1772–1826), astronomical instrument maker, was born at Durlach in Baden on August 24, 1772. He first served as an officer of artillery, and afterwards held several civil appointments in Bavaria. Already from 1796 he was occupied with the construction of a dividing engine; in 1804 he founded, with Liebherr and Utzschneider, an instrument-making business in Munich; and in 1809 he established, with Fraunhofer and Utzschneider, equally important optical works at Benedictbeuern, which were moved to Munich in 1823. He withdrew from both enterprises in 1814, and founded with Ertel a new optical business, from which also he retired in 1820. He died at Munich on May 21, 1826.

Reichenbach's principal merit is his having introduced into observatories the meridian or transit circle, combining the transit instrument and the mural circle into one instrument. This had already been done by Roemer about 1704, but the idea had not been adopted by any one else, the only exception being the transit circle constructed by Troughton for Groombridge in 1806. The transit circle in the form given it by Reichenbach had one finely-divided circle attached to one end of the horizontal axis and read by four verniers on an "Alhidade Circle," the unaltered position of which was tested by a spirit level. The instrument came almost at once into universal use on the Continent (the first one was made for Bessel in 1819), but in England the mural circle and transit instrument were not superseded for many years.

REICHENBERG (Bohem. *Liberec*), a town of Bohemia, with an independent jurisdiction, lies on the Neisse, about 50 miles to the north-east of Prague and not far from the Saxon and Prussian frontiers. It is the centre of the important cloth manufacture of northern Bohemia, and is the third town of Bohemia in size and the second in industrial importance. Its cloth factories employ about 7000 workpeople and produce goods to the annual value of upwards of a million sterling, while weaving is also extensively prosecuted as a domestic industry. Other important manufactures are cotton, yarn, machinery, and liqueur. Trade is carried on in the raw materials and finished products of the various industries. The most prominent buildings are the town-house, of 1601; the chateau of Count Clam Gallas; the Dekanalkirche, of the 16th century; the Protestant church, a handsome modern Romanesque edifice; the hall of the cloth-workers; the new law courts; the new theatre; and the weaving school. The population in 1880 was 28,090.

Reichenberg is first mentioned in a document of 1348, and from 1622 to 1634 was among the possessions of the great Wallenstein, since whose death it has belonged to the Gallas and Clam Gallas families. The woollen industry was introduced about the middle of the 16th century. In 1866 Reichenberg was the headquarters of Prince Charles Frederick of Prussia.

REICHENHALL, a small town and watering-place of Upper Bavaria, is finely situated in an amphitheatre of lofty mountains, on the river Saale or Saalach, 1570 feet above the level of the sea and 9 miles to the south-west of Salzburg. As indicated by its name, in which the syllable *hall* corresponds, according to a well-known linguistic law, to the Latin *sal*, Reichenhall possesses several copious saline springs, producing upwards of 11,500 tons of salt per annum. The water of some of the springs, the sources of which are 50 feet below the surface of the soil, is so strongly saturated with salt (up to 24 per cent.) that it is at once conducted to the boiling houses, while that of the others is first submitted to a process of evaporation. Reichenhall is the centre of the four chief Bavarian salt-works, which are connected with each other by brine conduits having an aggregate length of 60 miles. The surplus brine of Berchtesgaden is conducted to Reichenhall, and thence, in increased volume, to Traunstein and Rosenheim, which possess larger supplies of timber for use as fuel in the process of boiling. Since 1846 Reichenhall has become one of the most fashionable spas in Germany, and it is now visited annually by about five thousand patients, besides many thousand passing tourists. The resident population in 1880 was 3271, almost all Roman Catholics. The saline springs are used both for drinking and bathing, and are said to be efficacious in scrofula and incipient tuberculosis. In addition to numerous large hotels, the most prominent edifices are the Romanesque church, recently restored, and the handsome and extensive buildings of the salt-works.

The brine springs of Reichenhall are mentioned in a document of the 8th century, and were perhaps known to the Romans; but almost all trace of the antiquity of the town was destroyed by a conflagration in 1834. The brine conduit to Traunstein dates from 1618. The environs abound in numerous charming Alpine excursions.

REICHSTADT, Duke of. See Napoleon II. (vol. xvii. p. 226). The title is derived from the little town of Reichstadt in northern Bohemia.

REID, Mayne (1818–1883), captain in the United States army, was in his generation one of the most popular of writers of stories of adventure. His own early life was as adventurous as any boy reader of his novels could desire. He was a native of Ulster, born in 1818, and was educated for the church, but, disliking the prospect of a regular profession, went to America at the age of twenty in search of excitement and fortune. Among other experiences he made trading excursions on the Red River, and studied the ways of the retiring red man and the white pioneer on the spot. He made acquaintance with the Missouri in the same practical manner, and roved about through all the States of the Union. When the war with Mexico broke out in 1845 he obtained a commission, was present at the siege and capture of Vera Cruz, and led a forlorn hope at Chapultepec. In one of his novels he says that he believed theoretically in the military value of untrained troops, and that he had found his theories confirmed in actual warfare. But, though he saw a good deal of service in America, he was disappointed in his plans for taking part in a conflict with the regular troops of a European country. An enthusiastic republican, he offered his services to the Hungarian insurgents in 1849, raised a body of volunteers, and sailed for Europe, but arrived too late. Thereafter he settled in England, and began his career of a novelist in 1849 with the *Rifle Rangers*. This was followed next year by the *Scalp Hunters*. He never surpassed his first productions, except perhaps in *The White Chief* (1855) and *The Quadroon* (1856); but he continued to produce tales of self-reliant enterprise and exciting adventure with great fertility. Simplicity of plot and easy variety of exciting incident are among the merits that contribute to his popularity with boys. His reflexions are not profound, but are frequently more sensible than might be presumed at first sight from his aggressive manner of expressing them. He died in London, October 22, 1883.

REID, THOMAS (1710–1796), the chief founder of what is generally designated the Scottish school of philosophy, was born at Strachan in Kincardineshire, about 20 miles from Aberdeen, on the 26th April 1710. His father was minister of the place for fifty years, and traced his descent from a long line of Presbyterian ministers on Deeside. His mother belonged to the brilliant family of the Gregorys, which gave so many representatives to literature and science in Scotland last century. After two years at the parish school of Kincardine, Thomas Reid entered Marischal College, Aberdeen, in 1722. He was instructed in philosophy by Dr George Turnbull, in his day a voluminous and versatile writer, but now almost entirely forgotten. Turnbull's teaching would appear, from the account given of it by M'Cosh, to have anticipated and suggested certain characteristics of Reid's subsequent theory. Reid graduated in 1726 at the early age of sixteen, but remained in Aberdeen as librarian to the university for ten years longer. This may be looked upon as his real student-time, and it seems to have been largely devoted to mathematical reading. In 1737 he was presented to the living of Newmachar near Aberdeen. The parishioners, being violently excited at the time about the law of patronage, received Reid with open hostility; and tradition asserts that, during the preaching of his first sermon, an uncle who lived near defended him on the pulpit stair with a drawn sword. But before he left the parish he was completely successful in winning the affections of his people. He was, however, nowise distinguished as a preacher, being accustomed "from a distrust in his own powers," as Stewart puts it, "to preach the sermons of Dr Tillotson and of Dr Evans." The greater part of his time was given to study; and, instigated by the publication of Hume's treatise, he now turned his chief attention to philosophy, and in particular to the theory of external perception. His first publication, however, which dealt with a question of philosophical method suggested by the reading of Hutcheson, was more nearly allied to his mathematical studies. The "Essay on Quantity, occasioned by reading a Treatise in which Simple and Compound Ratios are applied to Virtue and Merit," denies that a mathematical treatment of moral subjects is possible. The essay appeared in the *Transactions* of the Royal Society for the year 1748. Before this, in 1740, Reid had married a cousin of his own, the daughter of a London physician. In 1752 the professors of King's College, Aberdeen, elected him to the chair of philosophy, which he held for the next twelve years. The foundation of the Aberdeen Philosophical Society, which numbered among its members Campbell, Beattie, Gerard, and Dr John Gregory, was mainly owing to the exertions of Reid, who was secretary for the first year (1758). Many of the subjects of discussion were drawn from Hume's speculations; and during the last years of his stay in Aberdeen Reid propounded his new point of view in several papers read before the society. Thus we find from the minutes that on the 13th and 26th of July 1758 Mr Reid "handled" the following questions:—"Are the objects of the human mind properly divided into impressions and ideas? And must every idea be a copy of a preceding impression?". The reply to Hume which these titles foreshadow was embodied by Reid in his *Enquiry into the Human Mind on the Principles of Common Sense*, published in 1764. The *Enquiry* does not go beyond an analysis of sense perception, and is therefore more limited in its scope than the later *Essays*; but if the latter are sometimes more mature, there is more freshness about the earlier work. The same year saw Reid's removal from Aberdeen to the professorship of moral philosophy in the university of Glasgow, where he succeeded Adam Smith. This position he continued to hold till 1781, when he resigned his chair in order to give his undivided energies to completing a systematic exposition of his philosophy. As a public teacher, Reid did not possess the eloquence and charm of manner which afterwards characterized both Stewart and Brown. Stewart's account of his lecturing, which may be presumed to be favourable, mentions only the "silent and respectful attention" which was accorded to "the simplicity and perspicuity of his style" and "the gravity and authority of his character." Reid's philosophical influence was mainly exerted through his writings, and, at second hand, through the eloquent treatment which his doctrines received at the hands of Dugald Stewart, and the learning which Hamilton subsequently devoted to their elucidation. The *Essays on the Intellectual Powers of Man* appeared in 1785, and their ethical complement, the *Essays on the Active Powers of the Human Mind*, in 1788. These, with an account of Aristotle's *Logic* appended to Lord Kames's *Sketches of the History of Man* (1774), conclude the list of works published in Reid's lifetime. Hamilton's edition of Reid also contains an account of the university of Glasgow and a selection of Reid's letters, chiefly addressed to his Aberdeen friends the Skenes, to Lord Kames, and to Dr James Gregory. With the two last-named he discusses the materialism of Priestley and the theory of necessitarianism. He reverted in his old age to the mathematical pursuits of his earlier years, and his ardour for knowledge of every kind remained fresh to the last. But in 1792 the serenity which marked the concluding years of his life was clouded by the death of his wife. All the children of their marriage except one daughter had died many years before. In other respects Reid's life pursued its equable and uneventful course till within a few weeks of his death, which took place on the 7th October 1796.

The key to Reid's whole philosophy is to be found in his revulsion from the sceptical conclusions of Hume. In several passages of his writings he expressly dates his philosophical awakening from the appearance of the *Treatise of Human Nature.* "I acknowledge," he says in the dedication of the *Enquiry*, "that I never thought of calling in question the principles commonly received with regard to the human understanding until the *Treatise of Human Nature* was published in the year 1739. The ingenious author of that treatise upon the principles of Locke—who was no sceptic—hath built a system of scepticism which leaves no ground to believe any one thing rather than its contrary. His reasoning appeared to me to be just; there was, therefore, a necessity to call in question the principles upon which it was founded, or to admit the conclusion." Reid thus takes Hume's scepticism as, on its own showing, a *reductio ad impossibile* of accepted philosophical principles, and refuses, accordingly, to separate Hume from his intellectual progenitors. From its origin in Descartes and onwards through Locke and Berkeley, modern philosophy carried with it, Reid contends, the germ of scepticism. That scepticism, "inlaid in it and reared along with it," Hume did but bring to light. Embracing the whole philosophic movement under the name of "the Cartesian system," Reid detects its πρῶτον ψεῦδος in the unproved assumption shared by these thinkers "that all the objects of my knowledge are ideas in my own mind." This doctrine or hypothesis he usually speaks of as "the ideal system" or "the theory of ideas"; and to it he opposes his own analysis of the act of perception. In view of the results of this analysis, Reid's theory (and the theory of Scottish philosophy generally) has been dubbed natural realism or natural dualism in contrast to theories like subjective idealism and materialism or to the cosmothetic idealism or hypothetical dualism of the majority of philosophers. But this is unduly to narrow the scope of Scottish philosophy, which does not exhaust itself, as it is sometimes supposed to do, in uncritically reasserting the independent existence of matter and its immediate presence to mind. The real significance of Reid's doctrine lies in its attack upon the principles which Hume explicitly lays down as the alpha and the omega of his system, viz., the principles that all our perceptions are distinct existences, and that the mind never perceives any real connexion among distinct existences (*cf.* Appendix to the third volume of the *Treatise*, 1740). It is here that the danger of "the ideal system" really lies—in its reduction of reality to "particular perceptions," momentary or "perishing" existences essentially unconnected with each other. If the ultimate elements of experience are unrelated units or sense-atoms, called impressions, then it only remains to be shown, as Hume attempts to show, how the *illusion* of supposed necessary connexion arises. But Reid meets this scepticism by combating the principle on which it is based. In logical language, he denies the actuality of the abstract particular: unrelated impressions and ideas nowhere exist. The unit of knowledge is not an isolated impression but a judgment; and in such a judgment is contained, even initially, the reference both to a permanent subject and to a permanent world of thought, and, implied in these, such judgments, for example, as those of existence, substance, cause and effect. Such principles are not derived from sensation, but are "suggested" on occasion of sensation, in such a way as to constitute the necessary conditions of our having perceptive experience at all. Thus we do not start with "ideas," and afterwards refer them to objects; we are never restricted to our own minds, but are from the first immediately related to a permanent world. Reid has a variety of names for the principles which, by their presence, lift us out of subjectivity into perception. He calls them "natural judgments," "natural suggestions," "judgments of nature," "judgments immediately inspired by our constitution," "principles of our nature," "first principles," "principles of common sense." The last designation, which became the current one, was undoubtedly unfortunate, and has conveyed to many a false impression of Scottish philosophy. It has been understood as if Reid had merely appealed from the reasoned conclusions of philosophers to the unreasoned beliefs of common life. The tirades of men like Beattie and Oswald, and many unguarded utterances of Reid himself, lent countenance to this notion. But Reid's actions are better than his words; his real mode of procedure is to redargue Hume's conclusions by a refutation of the premises inherited by him from his predecessors. For the rest, as regards the question of nomenclature, Reid everywhere unites common sense and reason, making the former "only another name for one branch or degree of reason." Reason, as judging of things self-evident, is called common-sense to distinguish it from ratiocination or reasoning. And in regard to Reid's favourite proof of the principles in question by reference to "the consent of ages and nations, of the learned and unlearned," it is only fair to observe that this argument assumes a much more scientific form in the *Essays*, where it is almost identified with an appeal to "the structure and grammar of all languages." "The structure of all languages," he says, "is grounded upon common sense." To take but one example, "the distinction between sensible qualities and the substance to which they belong, and between thought and the mind that thinks, is not the invention of philosophers; it is found in the structure of all languages, and therefore must be common to all men who speak with understanding" (Hamilton's *Reid*, pp. 229 and 454).

The principles which Reid insists upon as everywhere present in experience evidently correspond pretty closely to the Kantian categories and the unity of apperception. Similarly, Reid's assertion of the essential distinction between space or extension and feeling or any succession of feelings may be compared with Kant's doctrine in the *Æsthetic*. "Space," he says, "whether tangible or visible, is not so properly an object [Kant's "matter"] as a necessary concomitant of the objects both of sight and touch." Like Kant, too, Reid finds in space the source of a necessity which sense, as sense, cannot give (Hamilton's *Reid*, 323). In the substance of their answer to Hume, the two philosophers have therefore much in common. But Reid lacked the art to give due impressiveness to the important advance which his positions really contain. Although at times he states his principles with a wonderful degree of breadth and insight, he mars the total effect by frequent looseness of statement, and by the amount of irrelevant psychological matter with which they are overlaid. And, if Kant was overridden by a love of formal completeness and symmetry, Reid's extreme indifference to form and system is an even more dangerous defect in a philosopher. It has also to be admitted that the principles frequently appear in Reid more as matter of assertion than as demonstrated necessities for the constitution of experience. The transcendental deduction, or proof from the possibility of experience in general, which forms the vital centre of the Kantian scheme, is wanting in Reid; or, at all events, if the spirit of the proof is occasionally present, it is nowhere adequately stated and emphasized. But, when these defects are acknowledged, Reid's insistence on judgment as the unit of knowledge and his sharp distinction between sensation and perception must still be recognized as philosophical results of the highest importance. They embody the only possible answer to

Hume's sceptical dissolution of knowledge. Reid's theory of sensation, indeed, deserves more attention than has been generally bestowed upon it. According to this theory, sensations are not the objects of our perception, not even, as Kant maintained, the "matter" of our perceptions on which the "form" is superinduced; they are merely the "signs" which introduce us to the knowledge of real objects. The latter "are presented to the mind" by means of, or on occasion of, certain corresponding sensations; but the sensation and the perception "appear upon accurate reflexion not only to be different things, but as unlike as pain is to the point of a sword" (Hamilton's *Reid*, 122). Sensation, it might be expressed, is the condition of perception, but there is no sort of community between the two. They are distinct in kind, and therefore the possibility of deriving the one from the other—of melting down the real world into subjective sensations—is once for all shut out. Reid's position here enables him to escape also from the phenomenalism of the Kantian theory. Inasmuch as the permanent objects presented to us in perception are not in any sense a manipulation of subjective sensations, there is not even an apparent warrant for branding them as "merely" phenomenal. They are real in the full sense of the word; we know the world as it really exists.

The relativism or phenomenalism which Hamilton afterwards adopted from Kant and sought to engraft upon Scottish philosophy is thus wholly absent from the original Scottish doctrine. One or two passages may certainly be quoted from Reid in which he asserts that we know only properties of things and are ignorant of their essence. But the exact meaning which he attaches to such expressions is not quite clear; and they occur, moreover, only incidentally and with the air of current phrases mechanically repeated. In Dugald Stewart, however, the merely qualitative nature of our knowledge is consciously emphasized, and made the foundation of philosophical arguments; so that Stewart in this respect paves the way for the more thoroughgoing philosophy of nescience elaborated by Hamilton. But since Hamilton's time the most typical Scottish thinkers have repudiated his relativistic doctrine, and returned to the original tradition of the school.

Authorities.—For the life, the *Memoir* by Dugald Stewart, prefixed to Hamilton's edition of Reid's works, may be consulted, along with the account given by Dr M'Cosh in his *Scottish Philosophy* (1875). The complete edition of the works by Sir William Hamilton, published in two volumes with notes and supplementary dissertations by the editor (6th ed. 1863), has superseded all others. (A. SE.)

REID, Sir William (1797–1858), administrator and man of science, was born in 1797 at the manse of Kinglassie, Fifeshire, Scotland, and entered the army in 1809 as a lieutenant of royal engineers. He saw active service in the Peninsula under Wellington, and afterwards took part in the bombardment of Algiers in 1816. It was while governor of Bermuda that in 1838 he published the work by which he is now known, *The Law of Storms*, which obtained a wide popularity and did good service in furthering the progress of this department of meteorology. In 1851 he was chairman of the executive committee of the Great Exhibition; on the completion of the work he was made a K.C.B. and appointed governor of Malta. He died in October 1858, shortly after his return to England.

REIGATE, a market town and municipal borough of Surrey, is situated at the head of the long valley of Holmsdale Hollow, on three railway lines, 23 miles south of London. It consists principally of one long street, with surrounding houses and villas inhabited chiefly by persons having their occupations in London. Of the old castle, supposed to have been built before the Conquest, to command the pass through the valley, there only remains the entrance to a cave beneath, 150 feet long and from 10 to 12 feet high, excavated in the sand, which the barons used as a guardroom. The grounds have been laid out as a public garden. Near the market house is the site of an ancient chapel dedicated to Thomas à Becket. In the chancel of the parish church of St Mary, a building ranging from Transition Norman to Perpendicular, which dates from the beginning of the reign of Henry VII., were buried Archbishop Ussher and Lord Howard, the commander of the English navy against the Spanish Armada. Above the vestry there is a library containing some choice manuscripts and rare books. The grammar school was founded in 1675. Among the other public buildings are the town-hall, the public hall, the market-hall, and the working men's institute. The town has some agricultural trade, and in the neighbourhood are quarries for freestone, hearthstone, and white sand. The area of the municipal borough is 6015 acres, with a population in 1871 of 15,916, and in 1881 of 18,662.

In Domesday the town was called "Churchfelle," or "the church in the field," and afterwards it was called Churchfield in Reigate, the earlier reading of the latter name being "Ridgegate." The castle was taken by Louis the Dauphin in the reign of John. In the time of the Confessor the manor belonged to his queen Edith. A market was granted by Edward III. The town returned two members to parliament from the reign of Edward I. to the reign of William IV., and one from 1832 to 1867, when it was disfranchised for corrupt practices.

REIMARUS, Hermann Samuel (1694–1768), known to history chiefly as the author of the *Wolfenbüttel Fragments*, was born at Hamburg, December 22, 1694. His father, the son of a clergyman and married into a patrician family of that city, was one of the masters in the Johanneum college, a good scholar and excellent teacher. Until his twelfth year the son received his education almost entirely from his father. He passed from his father's tuition into the class of the famous scholar Johann Albrecht Fabricius, whose son-in-law he subsequently became. In his twentieth year he entered the university of Jena, where he studied theology, ancient languages, and philosophy. After making a tour in Holland and England (1720), he became privat-docent in the university of Wittenberg; and in 1723 he accepted the post of rector of the high school at Wismar in Mecklenburg, which he exchanged four years afterwards for that of professor of Hebrew and Oriental languages in the high school of his native city. This post he held till his death, though offers of more lucrative and distinguished positions were at various times made to him. His professional duties were but light, and he employed his ample leisure in the study of philology, mathematics, philosophy, history, political economy, natural science, and natural history, for which he made expensive collections. Philosophy and theology, however, became with his advancing years the chief subjects of pursuit. From 1744 to 1768 he had in hand the theological work from which Lessing published the notorious *Fragments* in 1774–78. Reimarus was held by his contemporaries in the highest esteem as a scholar, a thinker, an author, and a man. His house was the centre of the highest culture of Hamburg, and a monument of his influence in that city still remains in the *Haus der patriotischen Gesellschaft*, where the learned and artistic societies partly founded by him still meet. His wife bore him seven children, three only of whom lived to grow up, namely his only surviving son—the distinguished physician Johann Albrecht Heinrich—and two daughters, one of them being Elise, Lessing's friend and correspondent. Ten days before his death he invited a select number of friends to dine with him, and, with his wonted cheerfulness and amiability, declared to them solemnly that this was his farewell meal with them. Three days after he was taken seriously ill, and died March 1, 1768.

Reimarus's reputation as a classical and historical scholar rests on the valuable edition of Dio Cassius (1750–52) which he prepared from the materials collected by his father-in-law, J. A. Fabricius. In the department of philosophy he published a work on logic (*Vernunftlehre als Anweisung zum richtigen Gebrauche der Vernunft*, 1756, fifth edition 1790), and two very popular books bearing on the great religious questions of the day. The first of these works was a collection of essays on the principal truths of natural religion (*Abhandlungen von den vornehmsten Wahrheiten der natürlichen Religion*, 1754, 6th ed. 1791); the second (*Betrachtungen über die Kunsttriebe der Thiere*, 1762, 4th ed. 1798) dealt with one particular branch of the same subject. In these works he appears as a powerful opponent of French materialism and Spinoza's pantheism, a zealous teleologist and able wielder of the argument from design. His philosophical position is essentially that of Christian Wolff. But it is the work (carefully kept back during his lifetime, strangely enough) from which Lessing published certain chapters after the author's death with which his name is most widely associated. Lessing's relation to this work has been stated in the article LESSING. Its title in the MS. is *Apologie oder Schutzschrift für die vernünftigen Verehrer Gottes*. The original MS. is in the Hamburg town library; a copy was made for the university library of Göttingen, 1814, and other copies are known to exist. In addition to the seven fragments published by Lessing, a second portion of the work was issued in 1787 by C. A. E. Schmidt (a pseudonym), under the title *Uebrige noch ungedruckte Werke des Wolfenbüttelschen Fragmentisten*, and a further portion by D. W. Klose in *Niedner's Zeitschrift für historische Theologie*, 1850–52. Two of the five books of the first part and the whole of the second part, as well as appendices on the canon, remain still, and will probably always remain, unprinted. But D. F. Strauss has given an exhaustive analysis of the whole work in his book on Reimarus.

The standpoint of Reimarus in his *Apologie* is that of pure naturalistic deism. Miracles and mysteries are denied, and natural religion is put forward as the absolute contradiction of revealed. The essential truths of the former are the existence of a wise and good Creator and the doctrine of the immortality of the soul. These truths are discoverable by reason, and are such as can constitute the basis of a universal and rational religion. A revealed religion could never obtain universality, as it could never be made intelligible and credible to all men. Even supposing its possibility, the Bible does not present such a revelation. It abounds in error as to matters of fact, contradicts human experience, reason, and morals, and is one tissue of folly, deceit, enthusiasm, selfishness, and crime. Moreover, it is not a doctrinal compendium, or catechism, which a revelation would have to be. What the Old Testament says of the worship of God is little, and that little worthless, while its writers are unacquainted with the second fundamental truth of religion, the immortality of the soul. The design of the writers of the New Testament, as well as that of Jesus, was not to teach true rational religion, but to serve their own selfish ambitions, in promoting which Reimarus makes them exhibit an inconceivable combination of conscious fraud and enthusiasm. With all his acuteness as a rationalistic critic, and the destructive force of his attack upon the old orthodox conception of the nature of the Bible and revelation, Reimarus must be regarded simply as the classical representative of rationalism in its absolute inability to form any remotely just conception of God, religion, revelation, the Bible, and Christianity. His *Apologie* is the historical monument to the incapacity of rationalism with regard to philosophy, religion, and true historical and literary criticism. By the higher and profounder ideas and historical insight of Lessing, Herder, Semler, Kant, and Schleiermacher, his entire position was rendered antiquated, and the permanently valid portions of his criticism of the Bible are of value only as destructive of a theory, now outlived, of it and religion. But as a learned, acute, and logical assailant of that theory he must be honoured with a place amongst the pioneers of truer views of both.

See the "Fragments" as published by Lessing, reprinted in vol. xv. of *Lessing's Werke*, Hempel's edition; D. F. Strauss, *Hermann Samuel Reimarus und seine Schutzschrift für die vernünftigen Verehrer Gottes*, 1861, 2d. ed. 1877; Rev. Charles Voysey, *Fragments from Reimarus*, London, 1879 (a translation of the life of Reimarus by Strauss, with the second part of the seventh fragment, on the "Object of Jesus and his Disciples"), the *Lives* of Lessing by Danzel and G. E. Guhrauer, Sime, and Zimmern; Kuno Fischer, *Geschichte der neuern Philosophie*, vol. ii. pp. 759–772, 2d ed. 1867; Zeller, *Geschichte der deutschen Philosophie*, 2d ed. 1875, pp. 243-6.

REIMS. See RHEIMS.

REINAUD, JOSEPH TOUSSAINT (1795–1867), a distinguished French Orientalist, was born in 1795 at Lambesc, Bouches du Rhône, and began to study for the church, but, being drawn towards Eastern learning, he came to Paris in 1815 and became a pupil of Silvestre de Sacy. In 1818 and the following year he was at Rome as an attaché to the French minister, and studied under the Maronites of the Propaganda, but gave special attention to Mohammedan coins. In 1824 he entered the department of Oriental MSS. in the Royal Library at Paris, and in 1838, on the death of De Sacy, he succeeded to his chair in the school of living Oriental languages. In 1847 he became president of the Société Asiatique, and in 1858 conservator of Oriental MSS. in the Imperial Library. In all these functions Reinaud maintained the great reputation of the French Oriental school, and he also did good service with his pen. His first important work was his classical description of the collections of the Duc de Blacas (1828). To history he contributed an essay on the Arab invasions of France, Savoy, Piedmont, and Switzerland (1836), and various collections for the period of the crusades; he edited (1840) and in part translated (1848) the geography of Abulfeda; to him too is due a useful edition of the very curious records of early Arabic intercourse with China of which Renaudot had given but an imperfect translation (*Relation des Voyages*, &c., 1845) and various other essays illustrating the ancient and mediæval geography of the East. His chief quality was indefatigable industry.

REINDEER. See DEER.

REINEKE VOS. See GERMAN LITERATURE, vol. x. pp. 522, 527, and ROMANCE.

REINHOLD, KARL LEONHARD (1758–1823), who played a considerable part in the early spread and development of the Kantian philosophy, was born at Vienna in 1758. At the age of fourteen he entered the Jesuit College of St Anna with the intention of becoming a priest of the order. The order was dissolved by the pope in the following year; but young Reinhold, being full of Catholic and monastic zeal, joined a similar college of the order of St Barnabas in 1774. There he remained nine years, before the end of which his scientific and philosophic studies had completely estranged him from the life and aims of the cloister. In 1783 he fled to North Germany, and settled in Weimar, where he became Wieland's *collaborateur* on the *German Mercury*, and eventually his son-in-law. In the *German Mercury* he published, in the years 1786–87, his *Briefe über die Kantische Philosophie*, which, by their clear and eloquent exposition were most important in making Kant known to a wider circle of readers. Reinhold himself had read the *Critique* five times without a single ray of light; in the end it was the ethical side of the system by which he found himself attracted and convinced. As a result of the *Letters*, Reinhold at once received a call to the neighbouring university of Jena, where he taught from 1787 to 1794, and largely contributed to make Jena, after Königsberg, the second home of the Kantian philosophy. In 1789 he published his chief work, the *Versuch einer neuen Theorie des menschlichen Vorstellungsvermögens*, in which he attempted to simplify the Kantian theory and make it more of a unity. In 1794 he accepted a call to Kiel, but his departure from Jena marks the zenith of his reputation. He taught at Kiel till his death in 1823, but his independent activity was at an end. His essentially receptive and impressible nature yielded first to the powerful impulse of Fichte, and then gravitated, on grounds of religious feeling, towards Jacobi, whom he in turn deserted for the so-called "rational idealism" of Bardili.

Reinhold's historical importance belongs entirely to his earlier activity. The development of the Kantian standpoint contained in the *New Theory of the Human Faculty of Ideas* (1789), and in the *Fundament des philosophischen Wissens* (1791), was called by its author "Elementarphilosophie." Endeavouring to build up the system out of simpler elements, Reinhold starts from the mere fact of consciousness of the existence of mental states ("Vorstellungen" or ideas). Every idea carries with it the reference to a subject, whose idea it is, and to an object, of which it is the idea. This double reference explains why every idea consists, as Kant maintained, of "form" and "matter." In its "form" lies the reference to the subject, in its "matter" the reference to an object. Hence, too, we see why the thing-in-itself, though necessarily existent, is at the same time necessarily unknowable, seeing that all knowledge implies a subject-derived element. The rest of Reinhold's emendations to Kant are little more than suggested improvements in terminology.

REISKE, JOHANN JACOB (1716–1774), scholar and physician, was born 25th December 1716, in the little town of Zörbig in Electoral Saxony. From the Waisenhaus at Halle he passed in 1733 to the university of Leipsic, and there spent five years. He lived alone without teacher or friend, heard no lectures, but studied continually without order or aim. He tried to find his own way in Greek literature, to which German schools then gave little attention; but, as he had not mastered the grammar, he soon found this a sore task and took up Arabic. He was very poor, having almost nothing beyond his allowance, which for the five years was only two hundred thalers. But everything of which he could cheat his appetite was spent on Arabic books, and when he had read all that was then printed he thirsted for manuscripts, and in March 1738 started on foot for Hamburg, joyous though totally unprovided, on his way to Leyden and the treasures of the Warnerianum. At Hamburg he got some money and letters of recommendation from the Hebraist Wolf, and took ship to Amsterdam. Here D'Orville, to whom he had an introduction, proposed to retain him as his amanuensis at a salary of six hundred guilders. Reiske refused, though he thought the offer very generous; he did not want money, he wanted manuscripts. But when he reached Leyden (6th June 1738) he found that the lectures were over for the term and that the MSS. were not open to him. His money too was gone, and he passed a miserable summer. By and by things mended: D'Orville and A. Schultens helped him to private teaching and reading for the press, by which he was able to live, and his great power of work enabled him still to find time enough for his own studies. He heard the lectures of A. Schultens, and practised himself in Arabic with his son J. J. Schultens. Through Schultens too he got at Arabic MSS., and was even allowed *sub rosa* to take them home with him. Ultimately he seems to have got free access to the collection, which he recatalogued—the work of almost a whole summer, for which the curators rewarded him with nine guilders.

In spite of his hardships Reiske's first years in Leyden were not unhappy, till he got into serious trouble by introducing divers emendations of his own into the second edition of Burmann's *Petronius*, which he had to see through the press. His patrons withdrew from him, and his chance of perhaps becoming professor was gone. D'Orville indeed soon came round, for he could not do without Reiske, who did work of which his patron, after dressing it up in his own style, took the credit. But A. Schultens was never the same as before to him; Reiske indeed was too independent, and hurt him by his open criticisms of his master's way of making Arabic mainly a handmaid of Hebrew. Reiske, however, himself admits that Schultens, though he had reason to complain of his scholar's want of respect towards him, always behaved honourably to him. In 1742 by Schultens's advice Reiske took up medicine as a study by which he might hope to live if he could not do so by philology, and at medicine he worked hard for four years, still continuing the tasks that brought him bread as well as his Greek and Arabic studies. In 1746 he graduated as M.D., the fees being remitted at Schultens's intercession. It was Schultens too who conquered the difficulties opposed to his graduation at the last moment by the faculty of theology on the ground that some of his theses had a materialistic ring. On June 10, 1746, he left Holland and settled in Leipsic, where he hoped to get medical practice.

But his shy proud nature was not fitted to gain patients, and the Leipsic doctors would not recommend one who was not a Leipsic graduate. In 1747 an Arabic dedication to the electoral prince of Saxony got him the title of professor, but did not better his circumstances. Neither the faculty of arts nor that of medicine was willing to admit him among them, and he never delivered a course of lectures. He had still to go on doing literary task-work, but his labour was much worse paid in Leipsic than in Leyden. Still he could have lived and sent his old mother, as his custom was, a yearly present of a piece of leather to be sold in retail if he had been a better manager. But, careless for the morrow, he was always printing at his own cost great books which found no buyers. And so for many years he lived in such misery that he often did not know where to find bread to still his hunger. His academical colleagues were hostile; and Ernesti, under a show of friendship, secretly hindered his promotion. His slashing and unsparing reviews made bad blood with the pillars of the university.

At length in 1758 the magistrates of Leipsic rescued him from his misery by giving him the rectorate of St Nicolai, and, though he still made no way with the leading men of the university and suffered from the hostility of men like Ruhnken and J. D. Michaelis, he was compensated for this by the esteem of Frederick the Great, of Lessing, Karsten Niebuhr, and many foreign scholars. The last decade of his life was made cheerful by his marriage with Ernestine Müller, who shared all his interests and learned Greek to help him with collations. In proof of his gratitude her portrait stands beside his in the first volume of the *Oratores Græci*. Reiske died August 14, 1774, and his MS. remains passed, through Lessing's mediation, to the Danish minister Suhm, and are now in the Copenhagen library

Reiske certainly surpassed all his predecessors in the range and quality of his knowledge of Arabic literature. It was the history, the *realia* of the literature, that always interested him; he did not care for Arabic poetry as such, and the then much praised Ḥaríri seemed to him a grammatical pedant. He read the poets for their bearing on history, and cared less for their verses than for such scholia as supplied historical notices. Thus for example the scholia on Jarír furnished him with a remarkable notice of the prevalence of Buddhist doctrine and asceticism in 'Irák under the Omayyads. In the *Adnotationes Historicæ* to his Abulfeda (*Abulf. Annales Moslemici*, 5 vols., Copenhagen, 1789-91) he collected a veritable treasure of sound and original research; he knew the Byzantine writers as thoroughly as the Arabic authors, and was alike at home in modern works of travel in all languages and in ancient and mediæval authorities. He was interested too in numismatics, and his letters on Arabic coinage (in Eichhorn's *Repertorium*, vols. ix.–xi.) form, according to De Sacy, the basis of that branch of study. To comprehensive knowledge and very wide reading he added a sound historical judgment. He was not, like Schultens, deceived by the pretended antiquity of the Yemenite Ḳasídas.[1] Errors no doubt he made, as in the attempt to ascertain the date of the breach of the dam of Marib.

Though Abulfeda as a late epitomator did not afford a starting-point for methodical study of the sources, Reiske's edition with his version and notes certainly laid the foundation for research in Arabic history. The foundation of Arabic philology, however, was laid not by him but by De Sacy. Reiske's linguistic knowledge was great, but he used it only to understand his authors; he had no feeling for form, for language as language, or for metre. He was diligent in lexicographic collections, but cared nothing for etymology or for any speculations that transcended the historical data before him. This narrowness of interest was the counterpart of his hatred for pedantry and strong love of reality. His greed for historical facts made his studies a sort of vast foray in Arabic literature, but with this he is not to be reproached.

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[1] "Animadvers. criticæ in Hamzæ hist. regni Joctanidarum," in Eichhorn's *Mon. Ant. Hist. Ar.*, 1775

In Leipsic Reiske worked mainly at Greek, though he continued to draw on his Arabic stores accumulated in Leyden. Yet his merit as an Arabist was sooner recognized than the value of his Greek work, partly perhaps because his talents were really at their best in dealing with a literature which suffers little injustice through lack of interest in its form, but mainly because his contemporaries in Greek learning were narrow and had not the judgment to appreciate him. Reiske the Greek scholar has been rightly valued only in recent years, and it is now recognized that he was the first German since Sylburg who had a living knowledge of the Greek tongue. His reputation does not rest on his numerous editions, often hasty or even made to booksellers' orders. The text was never his main concern, and he often let received readings stand against his own judgment. The valuable matter lies in his remarks, especially his conjectures. He himself designates the *Animadversationes in Scriptores Græcos* as *flos ingenii sui*, and in truth these thin booklets outweigh his big editions. Closely following the author's thought he removes obstacles whenever he meets them, but he is so steeped in the language and thinks so truly like a Greek that the difficulties he feels often seem to us to lie in mere points of style. His criticism is empirical and unmethodic, based on immense and careful reading, and applied only when he feels a difficulty; and he is most successful when he has a large mass of tolerably homogeneous literature to lean on, whilst on isolated points he is often at a loss. Phonetics, dialects, orthography were indifferent to him; metre he did not understand. His corrections are often hasty and false, but a surprisingly large proportion of them have since received confirmation from MSS. And, though his merits as a Grecian lie mainly in his conjectures, his realism is felt in this sphere also; his German translations especially show more freedom and practical insight, more feeling for actual life, than is common with the scholars of that age.[1]

Reiske was essentially a pioneer, who neither left any complete performance behind him nor marked out for others a sharply defined method of research. This was partly due to his unhappy circumstances, but mainly to his passionate interest in all history and all letters, which never allowed him to linger in any one field. The son of the Zörbig tanner, driven by a natural instinct to Arabic lore, devoured by eager desire to view the unknown treasures of distant ages and lands, is an attractive figure amidst the pedants of learned Germany as it then was. Reiske was not amiable, but he was a real character—a character, too, sustained by genuine piety when the deep waters threatened to close over his head.

For a list of Reiske's writings see Meusel, xi. 192 *sq.* His chief Arabic works (all posthumous) have been mentioned above. In Greek letters his chief works are *Constantini Porphyrogeniti libri II de ceremoniis aulæ Byzant.*, vols. i. ii., Leipsic, 1751-66, vol. iii., Bonn, 1829; *Animadv. ad Græcos auctores*, 5 vols., Leipsic, 1751-66 (the rest lies unprinted at Copenhagen); *Oratorum Græc. quæ supersunt*, 8 vols., Leipsic, 1770-73; *App. crit. ad Demosthenem*, 3 vols., *ib.*, 1774-75; *Maximus Tyr.*, *ib.*, 1774; *Plutarchus*, 11 vols., *ib.*, 1774-79; *Dionys. Halic.*, 6 vols., *ib.*, 1774-77; *Libanius*, 4 vols., Altenburg, 1784-97. Various reviews in the *Acta Eruditorum* and *Zuverl. Nachrichten* are characteristic and worth reading. Compare *D. Johann Jacob Reiskens von ihm selbst aufgesetzte Lebensbeschreibung*, Leipsic, 1783. (J. WE.)

RELAND, ADRIAN, a meritorious Dutch Orientalist, was born at Ryp, July 17, 1676, studied at Utrecht and Leyden and successively professed Oriental languages with great success at Harderwijk (1699) and Utrecht (1701). In the latter chair, from which he also lectured on sacred antiquities, he remained till he died of small-pox February 5, 1718.

Reland's most important work is *Palæstina ex veteribus monumentis illustrata*, Utrecht, 1714, an admirable collection which is still the most valuable book on the historical geography of the Holy Land. His *Antiquitates sacræ veterum Hebræorum*, learned, clear, and compact, is also a most useful book; and his other writings and collections—for he reprinted many curious and useful tracts of other scholars on Biblical and Rabbinical topics—all show judgment as well as knowledge. His works are enumerated by Burman, *Traj. Erud.*, p. 296 *sq.*

RELICS. Relics, in what may be called their merely human and historic aspect, appeal to many of the most obvious and most deeply seated principles of human nature—to that power of connexion with the past which has been justly called one of the divinest elements of our being, to the law of association, and to that love of something like ocular testimony which so notoriously affects the mind more forcibly than "the hearing of the ear." The Russian general Suwaroff, "albeit unused to the melting mood," is reported to have been deeply touched by the relics of departed greatness laid bare by the discovery of a palace in the Crimea which had been built by Mithradates. Many of those who were present at the opening of the tomb of Robert the Bruce at Dunfermline were quite unmanned at the sight of the skull that had toiled for Scotland's weal, and the arm that had struck down Sir Henry de Bohun on the eve of the battle of Bannockburn; and at the funeral of the duke of Wellington, in 1852, the pathetic part of the processional ceremonial was found to lie in the riderless charger, bearing relics of the deceased warrior. In 1802 Napoleon Bonaparte, while making his preparations at Boulogne for the invasion of England, professed to have found a coin of Julius Cæsar and a weapon which had belonged to one of the soldiers of William the Conqueror. Napoleon had a profound belief in the power of the imagination. It is needless to dwell upon his object in ostentatiously announcing these discoveries.

It is obvious, however, that, apart from designs such as that of Napoleon, pretended relics, sometimes associated with real sometimes with legendary events, would be sure to spring from human credulity, from love of the marvellous, and from hopes of gain. Perhaps all settled Governments exhibit relics, such as regalia and the like, of which many are perfectly authentic, while some would not bear close examination. The same may be said of family treasures. We read of ancient Romans exhibiting curiosities, such as fragments of the ship "Argo." Again, relics are apt to gather round a great name. The town of Lutterworth possessed an ancient chair and a piece of a cope. Each became, despite of want of evidence, and indeed against evidence, associated with the name of Wickliffe.

It would be strange indeed if religion (which, alike in its good features and in its abuses, penetrates more deeply than anything else into the human heart) were found to be dissociated from relics. Probably all the more widely spread creeds claim some such material links with the past. Let it suffice to mention here the Ka'ba at Mecca, and the tooth of Buddha exhibited in Ceylon.

We turn to the pre-Christian and Christian dispensations. The Old Testament contains allusions to relics too numerous to mention. We may refer to the language of the epistle to the Hebrews, which speaks of the holy of holies as containing the golden censer, and the ark of the covenant, wherein were the golden pot that had manna and Aaron's rod that budded and the tables of the covenant (Heb. ix. 4, 9; Exod. xxv. 10, 16; Num. xvii. 10). These were believed to have been lost at the destruction of the temple by Nebuchadnezzar. We also read of the sword of Goliath being preserved as something sacred (1 Sam. xxi. 9).

Certainly, however, in one respect, perhaps in two (though of seemingly opposite tendencies), Judaism stands in this matter distinguished from contemporary religions. Nowhere else should we read of a valued and most interesting relic being destroyed by a devout ruler because it was found to have been abused and to have led to idolatry, as was done to the brazen serpent by Hezekiah (2 Kings xviii. 4). But it may also be questioned whether the records of any other people contain an account of a miracle wrought by the relics of a deceased prophet. We may indeed read of a miracle wrought in heathendom for the defence of innocence unjustly accused, and we also find the possession of the bones of a departed hero made the condition of a successful war.[1] But the second book of Kings relates the revival of a dead man by the bones of Elisha,—a narrative rendered the more remarkable by the fact that, as a rule, the contact with a corpse, a bone, or a grave made a man unclean for seven days (Num. xix. 11–22).

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[1] For this estimate of Reiske as a Greek scholar the writer is indebted to Prof. U. v. Wilamowitz-Moellendorff.

The New Testament does not relate any case precisely similar to that of Elisha. The remains of the protomartyr Stephen are simply committed to the tomb, with much lamentation by devout men (Acts viii. 2); and of the funeral of the first martyred apostle, James, we have no record. It is not, however, to be denied that the book of Acts tells of miracles of healing resembling that of her who was cured by the touch of our Lord's garment (Matt. ix. 20–22). Even the shadow of Peter, it is implied, may have healed the sick; and handkerchiefs or aprons which had been worn by Paul relieved not only the diseased but the possessed (Acts v. 15; xix. 12).

To a great extent the homage paid to the tombs and the remains of patriot, sage, or bard was transferred, at an early period in the history of the Christian church, to those of its own heroes, more especially to those of martyrs. Such a result was natural, and almost inevitable. The intercession of the departed on behalf of the living was everywhere recognized, and that of martyrs naturally believed to be especially powerful. But it was further inferred from the instance of Elisha and from the passages of the book of Acts already cited that it might please the Almighty to repeat similar manifestations of miraculous power. Whether the fathers who maintain this view would have written so freely if they could have foreseen the abuses which were to arise may perhaps be doubted.[2] But three or four features in the history of early Christendom conspired to spread the cultus of relics. These were the heathen persecutions, the rise of Gnosticism, the strong and exaggerated feeling about possession and witchcraft, —to which may probably be added the sense of a sort of education connected with visible and tangible links of connexion with the past.

The way in which these elements of the case would operate is tolerably obvious. If, as at Lyons and Vienne, pagan persecutors burnt the ashes of the martyrs, and threw them into the Rhone, exulting in the idea that they were disproving one of the most important articles of the Christian creed, the resurrection of the body, with still more fervid zeal would the faithful seize every opportunity of honouring those remains which their opponents sought to vilify. Then, again, the other great foe of early Christendom, the heresy of Gnosticism (often denounced as a more subtle and dangerous evil than the open hostility of heathendom), amidst all its varied forms was consistent in representing matter as something essentially evil. The counter teaching, implied in the central doctrine of the Christian faith, the mystery of the incarnation, and in the sacraments, might seem to gain some aid from the veneration shown to what was regarded as another form of hallowed matter, the bodies of the saints or the material instruments of Christ's passion. And, thirdly, the dread of possession found some alleviation in the check to satanic malice which relics were believed to effect.

It is also conceivable that the interest created by such memorials might have its share in that education of the earlier Middle Ages which was so powerfully assisted by pilgrimages and by biographies. Guizot, in a well-known chapter of his *Civilisation en France* has dwelt largely on the value of even the legends of this period. He maintains that, in a world full of violence, disorder, and oppression, the legends of the saints found food for some of the most powerful instincts and invincible needs of the human mind—that exaggeration of details, or even failure in material truth, did not prevent them from being a moral relief and a protest on behalf of many of the rights of man. Material memorials, or even supposed memorials, would certainly help to impress such stories upon the mind, as is the case with the facts and the legends of secular history. Leibnitz, among the large concessions in his *Systema Theologicum* to the Roman Catholic view of these questions, in some degree anticipates the language of Guizot concerning pious legends.

In any case, alike for good and for evil,—and it will be necessary to speak presently of the sadder aspects of the question,—relics from the 4th to the 16th century occupied a large space in the mind of Christendom. The word relics (*reliquiæ*, *λείψανα*) became almost restricted, in theological language, to the bodies (or parts of the bodies) of saints, or, as has been intimated, to memorials of Christ's passion, or instruments which had been used in the torture and execution of martyrs. Inquiries connected with their genuineness are, as is well known to students of ecclesiastical history, conspicuous in the life of the mother of Constantine, St Helena, who claimed to have discovered the true cross on which our Lord suffered, and in the career of St Ambrose at Milan. Once at least a really glorious series of campaigns, those of the emperor Heraclius against the barbarian Avars and the Persians (622–628), is connected with a successful endeavour to regain the cross (see PERSIA, vol. xviii. pp. 614–615). It is remarkable that the Persians are reported to have kept the cross in its case with the seals unbroken.

Thus far relics have been regarded as evidencing two marks of a very powerful element of life, namely, the capacity of evoking enthusiasm and of influencing even bystanders or opponents. But it is time to turn to the more painful features of their history in connexion with Christian thought and practice. It must not be supposed that the recognition of such phases is by any means a purely Protestant sentiment, although it is no doubt a prominent feature in the Reformation of the 16th century. Thus, for example, one of the most credulous biographies of a saint of the 4th century, that of St Martin by Sulpicius Severus, mentions (chap. viii.) an instance where the supernatural insight of Martin was exerted in the way of repression of such homage. The country people were exhibiting veneration at the tomb of a supposed saint, but it was revealed to the bishop of Tours that it was that of a robber executed for his crimes. St Augustine, in his severe and satiric tractate against certain unworthy monks who made their profession a mere cloak for idleness, clearly insinuates the sale of questionable relics as one of their faults. "Alii membra martyrum, si tamen martyrum, venditant." The traffic in relics became part of the recognized commerce of Christendom and was countenanced by sovereigns of undoubted excellence. Thus Athelstan was a great donor of relics to the monastery at Exeter. A list occupying more than three columns is given in the Leofric missal. It includes fragments of the candle which the angel of the Lord lit in the tomb of Christ, of the burning bush whence Jehovah spoke to Moses, and of one of the stones which slew the protomartyr Stephen. Edward the Confessor and Louis IX. of France may be named among the saintly patrons of a commerce which they at least considered meritorious.

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[1] We allude to the miracle claimed by two poets, Ovid (*Fast.*, iv. 310) and Propertius (*Eleg.*, iv. 14, 51), as also by Livy, Cicero, and Pliny, to have been wrought by Cybele on behalf of the Vestal Claudia, and to the oracular injunction from Delphi to the Spartans to find and carry with them the bones of Orestes as a condition of success against the men of Tegea (Herodotus, i. 67–68).

[2] A set of passages is given by Petavius (*De Dogmatibus Theologicis*, "De Incarnatione," xiv. 11). It certainly includes most of the leading post-Nicene patristic names,—such as Eusebius and many fathers commonly honoured with the prefix of saint, as Gregory of Nazianzus, Gregory of Nyssa, Chrysostom, both the Cyrils, Ambrose, Jerome, and others. Of these St Jerome is the most extreme and vehement; but this is accounted for, not only by the author's temperament, but by the fact of his writing against an opponent whom he specially disliked on personal as well as theological grounds (*Contra Vigilantium liber unus*). Later writers on the same side with Vigilantius are Claudius of Turin and Agobard of Lyons, but our limits forbid us to discuss their views. Some sectaries (*e.g.*, the Novatianists) appear to have been as anxious as their opponents to collect relics.

The mention of this last name involves a reference to an event which, above all others of the Middle Ages, spread, fostered, and ultimately injured the veneration of relics. The crusades created a profound excitement in this matter. Pilgrims had already thought it a default to return from Palestine without some such evidence that they had actually visited the Holy Land. Relics, at first probably bought and sold in good faith, became multiplied; and rival possessions of most sacred memorials (as, for instance, the crown of thorns, exhibited both by the abbey of St Denys and by St Louis) were by no means uncommon. Even the crime of theft seems to have been condoned when a relic was in question, and mutilation of a saint's body to have been hardly thought irreverent. To swear by these relics became the most binding of oaths, as will be remembered by those who have read the life of King Robert II. of France, and the ruse practised on Harold by William, duke of Normandy. Marauding campaigns between monastery and monastery were by no means uncommon; but these sink into insignificance compared with the spoliation exercised by the crusaders from the West who captured and sacked Constantinople in 1203-4. The shameful behaviour of the conquering army is admitted by the Latins themselves; but the condemnation freely uttered against licence, brutality, and profane irreverence seems generally (though not quite universally) hushed when the spoliation concerns treasure in the way of relics. The fact of their abundance shows an agreement on this point, amidst their differences, between the Latin and Greek Churches; but Constantinople must have been greatly impoverished by the immense supply of relics "that were scattered by this revolution over the churches of Europe."[1]

The next two centuries saw no diminution of such zeal, and there grew up, it can hardly be doubted, an increase of lower motives and of fraud. By the time of the Reformation the condition of matters was such as in many respects to offer a mark for all assailants of the existing state of things, and a practical admission on the part of those in authority that it was to a large extent simply indefensible. Erasmus, on this as on so many other kindred subjects, is found leading the van of satirists. One of his *Colloquia*, entitled *Peregrinatio Religionis Ergo*, contains within some thirty pages a mass of sarcasm against the abuses of the age. The discharge of vows through an agent, the localism of particular favours, the earthly (and sometimes evil) character of the petitions offered to saints and specially to the Virgin Mother, the strange character of the relics, one of the most common and abundant being the "cæleste lac beatæ Virginis," the enormous amount of wealth lying idle at the shrine of St Thomas à Becket—these and similar topics are treated in this author's caustic and elegant Latinity. The *Colloquia* were published in 1522, and from this date a mass of similar literature in the vernacular tongue of various countries, of a coarser kind and more adapted to the popular taste, seems to have been circulated freely throughout Europe.

The reaction against the homage paid to relics was immense. A practice which has not only been extensively abused, but which appears from its very nature to involve a fatal facility of abuse, can never stand quite where it did after such an exposure as that to which reference has been made. Yet it seems doubtful whether the Reformers in all cases intended to do more than check the prominent abuses connected with relics. Those who claimed Holy Scripture as the sole authority could not deny that it might please the Almighty to convey blessings through the instrumentality of such material things, as in the cases already referred to in the second book of Kings and the Acts of the Apostles. Even Luther seems rather to denounce mistakes concerning particular relics than the respect paid to recognized ones. In like manner the English Church, while using severe and contemptuous language in the *Homilies* with reference to such practices as those satirized by Erasmus, has preserved in its calendar, among minor festivals, the days respectively chosen by the earlier mediæval church for the discovery of the cross by St Helena (May 3rd) and its recovery by Heraclius (September 14th). Mosheim and other learned foreign Protestants also speak gently on such themes. Thus the devout Lutheran Neander, while mentioning in his *Church History* some cases of deliberate fraud, and holding that the superstition concerning saints and relics bordered nearly on paganism, is yet unable to approve of the extreme reaction which in some quarters arose out of it.

As regards the Church of Rome, although in theory the events of the 16th century may have left its teaching untouched, yet it can hardly be questioned but that this is one of the many departments of religious life in which that great commotion, as De Maistre calls it, has in his words, even among Roman Catholics, *opéré une révolution très sensible.* The council of Trent, which must be regarded as, from its own point of view, a reforming council, treated the subject of relics in its twenty-fifth session, held in December 1563. It expressed its earnest desire for the removal of abuses, for the abolition of unworthy gain in the veneration of relics, and of revelry on occasion of their visitation. It forbade the acceptance by any church of new relics, without the approbation of the bishop, given after consultation with theologians and other devout men, and referred grave and difficult questions concerning the extirpation of abuses to the judgment of local councils, of metropolitans, and ultimately to the Roman see itself.

By these steps a great change has been effected. We hear nothing more of the sale of relics (which had indeed been forbidden by the fourth Lateran council in 1215), of theft or of war in connexion with them. Some of those most strange memorials to which a passing allusion has been made above have seemingly disappeared from history. And, although leading writers of the Roman obedience in France and Italy do not often make concessions, the Freiburg *Encyclopædia* admits the non-authenticity of numbers of relics brought home from the crusades and from the conquest of Constantinople; and Addis and Arnold (*Roman Catholic Dictionary*, 1884) say that "abuses no doubt have occurred in all ages with regard to relics." No shock less great than that caused by the Reformation would probably have effected so much as has been done.

Still, however, the Church of Rome stands alone, we believe, in considering the possession of relics an indispensable condition of the performance of the highest acts of public Christian worship. Every altar used for the celebration of mass must, according to Roman Catholic rule, contain some authorized relics. These are inserted into a cavity prepared for their reception, called "the tomb," by the bishop of the diocese, and sealed up with the episcopal seal. A collect in the *Ordo Missæ* assumes their presence, and makes reference to the saints whose relics are thus preserved.

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[1] Gibbon, *Decline and Fall*, chap. lx. *sub fin.*; comp. Milman, *Latin Christianity*, bk. ix. chap. vii. Milman quotes from Gunther's words concerning the abbot Martin, one of the spoilers: "Indignum ducens sacrilegium, *nisi in re sacra*, committere."

Authorities.—Many of the leading authorities have already been named. To these may be added on the Roman Catholic side Perrone, *Prælectiones Theologicæ*, vol. ii. "De Cultu Sanctorum," cap. iv. (ed. Paris, 1863), and Martigny. *Dictionnaire des Antiquités Chrétiennes* (*s. v.* "Reliques"). On the other side the followers of Calvin (on this as on so many other topics) are usually more fiercely anti-Roman than those of Luther. Among Anglican divines those who have published treatises on the Thirty-nine Articles are necessarily brought across the subject. The work of the bishop of Winchester (Dr Harold Browne) will here be found the fullest and most able as well as the most candid and temperate. Compare also Bp. Pearson, *Minor Works*, vol. ii. (J. G. C.)

RELIEF. See SCULPTURE.

RELIGIONS. Religions, by which are meant the modes of divine worship proper to different tribes, nations, or communities, and based on the belief held in common by the members of them severally, were not before the present century the subject of original scientific research and comparative study. With the exception of a few good books containing useful information on some ancient religions and on the religious customs of uncivilized nations, nothing written on this subject in former centuries can be said to possess any scientific value. It is not that the old books are antiquated, as all works of learning must become with the lapse of time: they were worth nothing even when published. There were huge collections, containing descriptions of all the religions in the world, so far as they were known, laboriously compiled, but without any critical acumen, and without the least suspicion that unbiblical religions are not mere curiosities. There was a philosophy of religion, but it was all but purely speculative, and it could not be otherwise, as then it had but scanty means to work with, and was obliged to draw the facts it required from very troubled and insufficient sources. Attempts were made to explain the mythologies of the Greeks and the Romans, and even of some Oriental nations, but for the same reason they could not but fail. Then there was the theological bias, which caused all religions except one to be regarded as utterly false; the philosophical bias, which caused all religions, except the arbitrary abstraction then called natural religion, to be decried as mere superstitions, invented by shrewd priests and tyrants for selfish ends; and, finally, the total lack of a sound method in historical investigation, which was one of the prominent characteristics of the 18th century. It was only after the brilliant discoveries which marked the end of that century and the first half of this, and after the not less brilliant researches to which they gave rise; after the sacred writings of the Chinese, the Indians, the Persians, and some other ancient nations could be studied in the original; after the finding of the key to the Egyptian hieroglyphics and the Assyrian and Babylonian cuneiform writing had lifted the veil which for many centuries had covered the history of these most ancient civilizations—it was then only that a history of religion could be thought of and that something like a science of religion could be aimed at, if not yet founded.

The comparative historical study of religions is one of the means indispensable to the solution of the difficult problem What is religion?—the other being a psychological study of man. It is one of the pillars on which not a merely speculative and fantastic, and therefore worthless, but a sound scientific philosophy of religion should rest. Still, like every department of study, it has its aim in itself. This aim is not to satisfy a vain curiosity, but to understand and explain one of the mightiest motors in the history of mankind, which formed as well as tore asunder nations, united as well as divided empires, which sanctioned the most atrocious and barbarous deeds, the most cruel and libidinous customs, and inspired the most admirable acts of heroism, self-renunciation, and devotion, which occasioned the most sanguinary wars, rebellions, and persecutions, as well as brought about the freedom, happiness, and peace of nations—at one time a partisan of tyranny, at another breaking its chains, now calling into existence and fostering a new and brilliant civilization, then the deadly foe to progress, science, and art.

Religions, like living organisms, have a history, and therefore this is to be studied first, so far as it can be known,—how they rise and spread, grow and fade away; how far they are the creations of individual genius, and how far of the genius of nations and communities; by what laws, if it is possible to discover them, their development is ruled; what are their relations to philosophy, science, and art, to the state, to society, and above all to ethics; what is their mutual historical relation, that is, if one of them sprang from another, or if a whole group are to be derived from a common parent, or if they only borrowed from one another and were subject to one another's influence; lastly, what place is to be assigned to each of those groups or single religions in the universal history of religion. The first result of this historical inquiry must be an attempt at a genealogical classification of religions, in which they are grouped after their proved or probable descent and affinity.

However, like every genuine scientific study, historical investigations, if they are to bear fruit, must be comparative. Not only has every religion as a whole, and every religious group, to be compared with others, that we may know in what particular qualities it agrees with or differs from them, and that we may determine its special characteristics, but, before this can be done, comparative study on a much larger scale must precede. Every religion has two prominent constituent elements, the one theoretical, the other practical—religious ideas and religious acts. The ideas may be vague conceptions, concrete myths, precise dogmas, either handed over by tradition or recorded in sacred books, combined or not into systems of mythology and dogmatics, summarized or not in a creed or symbol, but there is no living religion without something like a doctrine. On the other hand, a doctrine, however elaborate, does not constitute a religion. Scarcely less than by its leading ideas a religion is characterized by its rites and institutions, including in the higher phases of development moral precepts, in the highest phases ethical principles. It happens but very seldom, if ever, that those two elements balance each other. In different religions they are commonly found in very different proportions, some faiths being pre-eminently doctrinal or dogmatic, others pre-eminently ritualistic or ethical; but where one of them is wanting entirely religion no longer exists. Not that dogma and ritual are religion; they are only its necessary manifestations, the embodiment of what must be considered as its very life and essence, of that which as an inner conviction must be distinguished from a doctrine or creed—a belief. But we cannot get a knowledge of the belief which lies at the base of a particular doctrine and which prompts peculiar rites and acts, without studying the mythical and dogmatical conceptions and the ritual or ethical institutions in which it takes its shape, and without comparing these with others. This then is the task of what is called comparative theology in its widest sense, of which comparative mythology is only a branch, and in which more space and attention should be given to the hitherto much neglected comparative study of religious worship and of ethics in their relation to religion. It is then only that we can proceed to characterize and mutually compare religions themselves, regarded as a whole, and that we may come to what must be the final result of this historical as well as comparative study, a morphological classification of religions. Here the study of religions reaches its goal, and the task of the philosophy of religion, the other main branch of the so-called science of religion or general theology, begins.

It need scarcely be said that the basis of the comparative historical study of religions must be a patient and critical examination of the sources from which the knowledge of the various religions of the world is to be drawn, viz., written documents and traditions, monuments and works of art, sacred writings and heretical books, and, when we wish to inquire into the religions of the uncivilized tribes that have no history at all, an impartial weighing of the evidence brought by travellers and settlers from different parts of the globe,—in short, an unbiassed ascertaining of facts.

Genealogical Classification.—There is no difficulty in determining the descent and relationship of religions which have taken rise in historical times, such as Confucianism, Buddhism, Judaism, Christianity, Mohammedanism, and some others of minor importance. But the great majority of ancient religions had their origin in prehistoric times, of which neither documents nor trustworthy traditions are extant. In that case their mutual relation has to be established by reasoning from the myths, ideas, rites, and characteristics common to them. Professor Max Müller (*Lectures on the Science of Religion*, pp. 154 *sq.*) suggests that, whatever classification has been found most useful in the science of language ought to prove equally useful in the science of religion. Now it may be true in general, at least for the most ancient times, that where the languages of a group of nations are proved to belong to one family their religions too most probably "hold together by the same relationship." But this hypothesis requires proof, and that proof is not to be obtained otherwise than by the comparative study of the religions themselves. Only when the religions of two independent nations agree in doctrine and mode of worship, above all in the notion of the relation between God and man, between the divine and the human, to such a degree and in such a manner that this agreement cannot be accounted for by the universal aspirations and wants of human nature, then only may we feel sure that the one of these religions is the parent of the other, or that both have come from a common stock. If not only two but several religions agree in like manner, or nearly so, we get a family of religions. At present we can go no farther. The mutual relations of the different families cannot be determined yet; the problem is too difficult and too complicated to be solved in the present state of science. That religions belonging to different families have borrowed myths and customs from one another and have been subjected to one another's influence may easily be proved. But whether the families themselves are branches of one and the same old tree is an open question to which a satisfactory answer cannot be given now.

It would be equally premature to venture on drawing up a complete genealogical table of religions. For some families of religions such a classification may be sketched with tolerable certainty; the genealogy of by far the greater number of them can be given in mere outlines only, leaving the fixing of details for further inquiry. We start from what may be held the most certain.

Aryan or Indo-Germanic Family.—Comparative mythology and the history of religion leave no doubt that all the religions of the Aryan or Indo-Germanic nations, viz., Eastern Aryans (or Indians, Persians, and Phrygians) and Western Aryans (or Greeks, Romans, Germans, Norsemen, Letto-Slavs, and Celts), are the common offspring of one primitive *OLD-ARYAN*[1] religion. That the same name of the highest heaven-god, Dyaus, Zeus, Jupiter), Zio (Tyr), is met with among Indians, Greeks, Italiotes, Germans, and Norsemen, however great the difference of the attributes and dignity ascribed by each of them to the god thus named may be, is a fact now generally known. Where this name has been lost, as is the case with the Persians, the Slavs, and the Celts, there are other divine names which they have in common with their kindred nations. Still more important is the fact that most Aryans show a tendency to call their supreme god "father," as is proved by the very common forms Dyaus pitar, *Ζεὺς πατήρ*, Jupiter, Diespiter, Marspiter, Alföðr. The supreme god in the Avesta, Ahuramazda, is often called father. Moreover many divine names used by different Aryan nations, though varying in form, are derived from the same root,—which proves the original unity of their conception. Take as examples the root *di* (*div*), "to shine," and its derivatives Dyaus, Deva, and their family, Diti, Aditi, Dione, Pandion, Dionysos, Diovis, Dianus (Janus), Diana, Juno; or the root *man*, "to think" (perhaps equally signifying originally "to shine"), and its derivatives Manu, Minos, Minerva, (Juno) Moneta; or the roots *sur* (*svar*), *sar*, *mar*, *vas*. Especially startling is the use of the same general word for "god" among several Aryan nations, viz., Skr. *deva*, Iran. *daeva*, Lat *deus*, Litth. *dēwas* (deiwys), Old Norse *tivar* (plur.), to which belong perhaps also Greek *θεός*, Irish *dia*, Cymr. *dew*. Daeva and deiwys are used in a bad sense, but this cannot be original. So too the word *asura* (*ahura*), which, though it too was used by the Indians in relatively modern times in a bad sense, was the name which the East-Aryans gave to their highest gods, and the Norse *asa*, pl. *æsir* (orig. *ans*), are both to be derived from the root *as*, *anh*. If we add to this the remarkable conformity of the myths and customs in all Aryan religions,—if, above all, by comparing them with those of other races, especially of the Semites, we find that the leading idea embodied in these Aryan myths and rites is everywhere the same, however different the peculiar character of each religion may be, namely, the close relation between God and man, the real unity between the divine and the human economy,[2] so that we may call them the "theanthropic" religions,—if we remember this, there can be no doubt that all of them have sprung from one primitive *OLD-ARYAN* religion.

However, the degree in which the Aryan religions are mutually related is not always the same. None of them came directly from the *OLD-ARYAN* religion. They consist of five pairs, each of which must have been first a unity:—the Indo-Persian, the Græco-Roman, the Letto-Slavic, the Norse-Teutonic, and the Gaelo-Cymric. The fact that the members of those pairs are more closely allied with one another than with the other members of the family obliges us to assume five prehistoric Aryan religions:—the *OLD EAST-ARYAN*, the *OLD PELASGIC*,[3] the *OLD WINDIC*, the *OLD GERMAN*, and the *OLD CELTIC* religions, forming so many links between those historical religions and the common parent of all,—the primeval *ARYAN* worship.

Space forbids us to give the complete proof of this conclusion. We only mention that the Indian and Iranian religions have many gods in common, unknown to the Western Aryans, and therefore probably such as arose after the eastern and western branch of the family had separated, *e.g.*, Mitra—Mithra, Aryaman—Airyaman, Bhaga—Bagha—Baga (comp. also Áramati—Ármaiti, Sarasvati—Hara-

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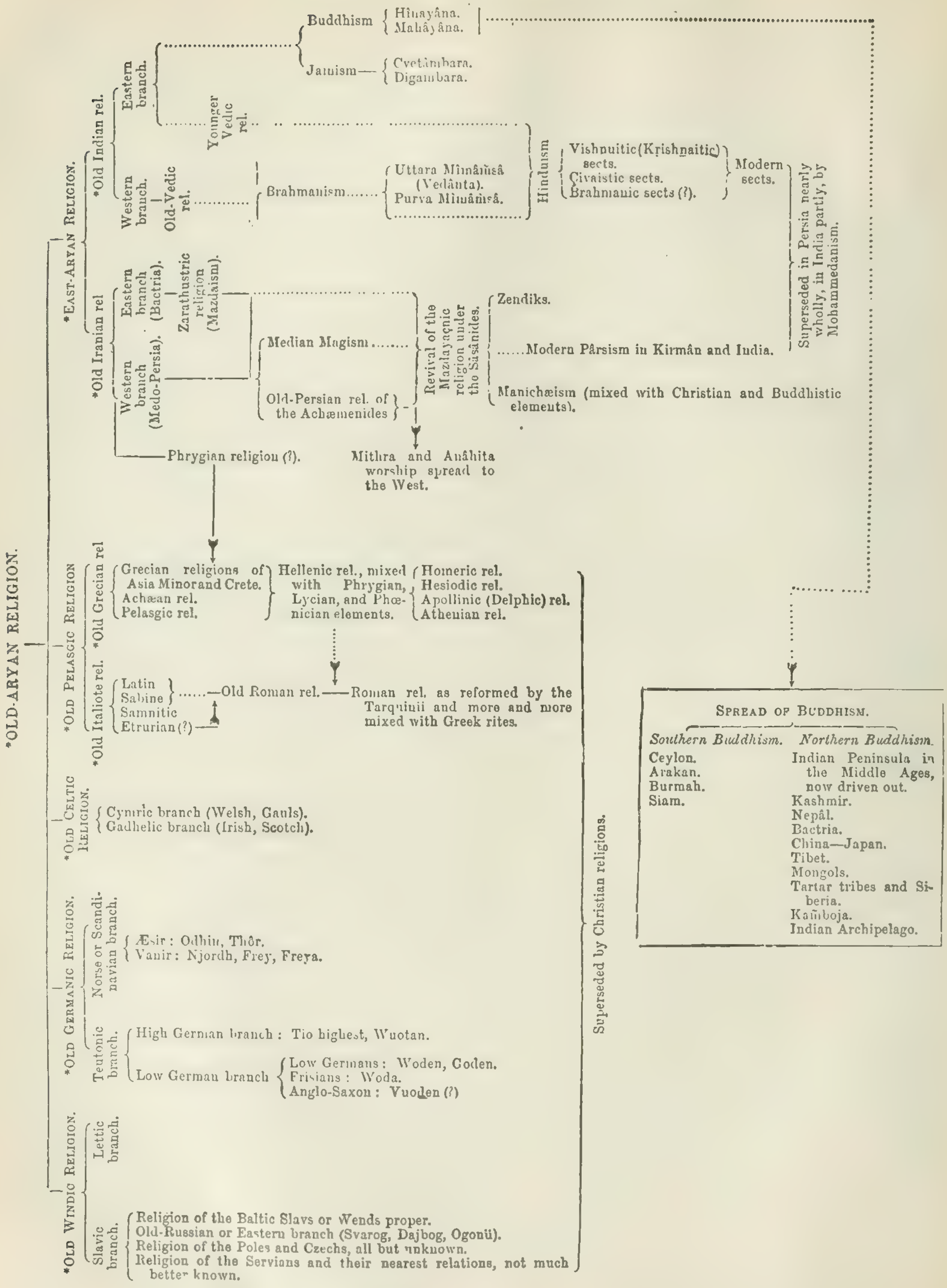
[1] This special type indicates prehistoric religions.

[2] This is why they call the Godhead "father," or even "brother, friend, companion." Compare the names Mitra—Mithra, "friend," Aryaman—Airyaman, "companion," &c.

[3] The name is not exact. It is only chosen as the most convenient.

Genealogical Table of the Aryan Religions.[1]


*OLD-ARYAN RELIGION.
*East-Aryan Religion.
*Old Indian rel.
Eastern branch.
Western branch.
Old-Vedic rel.
Younger Vedic rel.
Buddhism
Hînayâna.
Mahâyâna.
Jainism
Cvetâmbara.
Digambara.
Brahmanism
Uttara Mîmâṁsâ (Vedânta).
Purva Mîmâṁsâ.
Hinduism
Vishnuitic (Krishnaitic) sects.
Çivaistic sects.
Brahmanic sects (?).
Modern sects.
Superseded in Persia nearly wholly, in India partly, by Mohammedanism.
*Old Iranian rel
Eastern branch (Bactria).
Zarathustric religion (Mazdaism).
Western branch (Medo-Persia).
Median Magism
Old-Persian rel. of the Achæmenides
Revival of the Mazdayaçnic religion under the Sâsânides.
Zendiks.
Modern Pârsism in Kirmân and India.
Manichæism (mixed with Christian and Buddhistic elements).
Phrygian religion (?).
Mithra and Anâhita worship spread to the West.
*Old Pelasgic Religion
*Old Grecian rel
Grecian religions of Asia Minor and Crete.
Achæan rel.
Pelasgic rel.
Hellenic rel., mixed with Phrygian, Lycian, and Phœnician elements.
Homeric rel.
Hesiodic rel.
Apollinic (Delphic) rel.
Athenian rel.
*Old Italiote rel.
Latin
Sabine
Samnitic
Etrurian (?)
Old Roman rel.
Roman rel. as reformed by the Tarquinii and more and more mixed with Greek rites.
*Old Celtic Religion.
Cymric branch (Welsh, Gauls).
Gadhelic branch (Irish, Scotch).
*Old Germanic Religion.
Norse or Scandinavian branch.
Æsir: Odhin, Thôr.
Vanir: Njordh, Frey, Freya.
Teutonic branch.
High German branch: Tio highest, Wuotan.
Low German branch
Low Germans: Woden, Coden.
Frisians: Woda.
Anglo-Saxon: Vuoden (?)
*Old Windic Religion.
Lettic branch.
Slavic branch.
Religion of the Baltic Slavs or Wends proper.
Old-Russian or Eastern branch (Svarog, Dajbog, Ogonü).
Religion of the Poles and Czechs, all but unknown.
Religion of the Servians and their nearest relations, not much better known.
Superseded by Christian religions.
Spread of Buddhism.
Southern Buddhism.
Ceylon.
Arakan.
Burmah.
Siam.
Northern Buddhism.
Indian Peninsula in the Middle Ages, now driven out.
Kashmir.
Nepâl.
Bactria.
China—Japan.
Tibet.
Mongols.
Tartar tribes and Siberia.
Kamboja.
Indian Archipelago.

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[1] Prehistoric religions are marked with an asterisk (*).

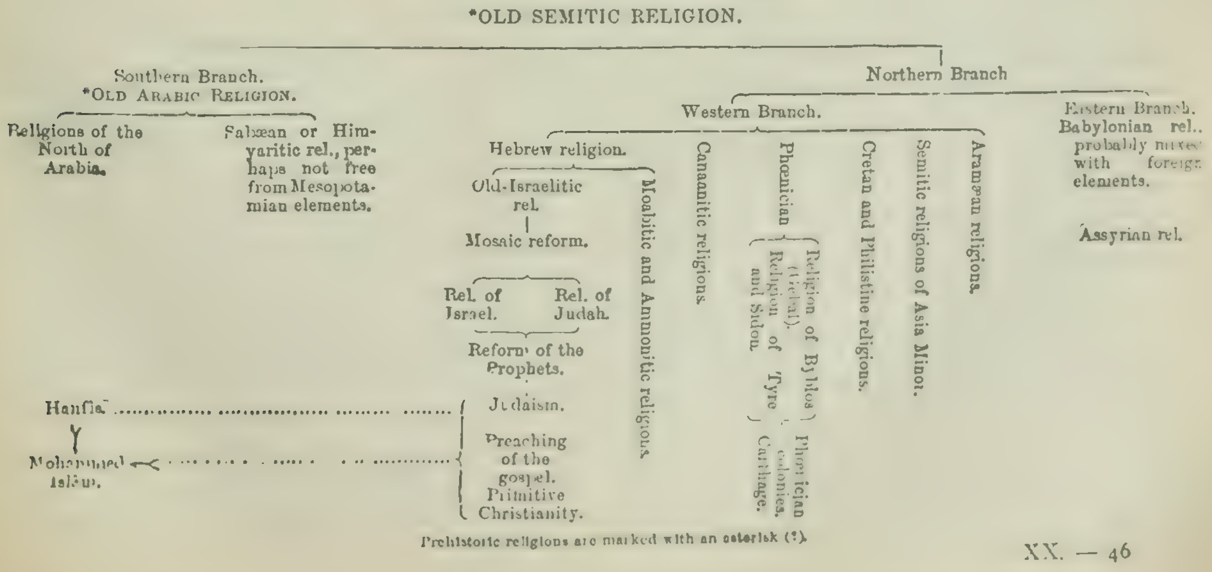
qaiti, &c.), and that the Soma—Haoma sacrifice, equally unknown in Europe, at least in that form, was the principal sacrifice as well in India as in Irân. The close relation of the Teutonic and Norse religions, and of the mythology and rites of the Greeks and Romans, even if we carefully except all that the latter took from the former in historical times, is sufficiently proved. It is not so evident, but still highly probable, that the religions of the north-western and the south-eastern Celts, though differing from one another in historical times, are daughters of one ancient *CELTIC* religion. When we presuppose such a common parent, an ancient *WINDIC* religion, for the Letto-Slavic religions, we do so by way of an hypothesis, based on the analogy with the other branches of the family. What we know about these and about the Celtic forms of worship is so defective that we cannot speak more positively. As for the Phrygian religion, it seems to belong to the Iranian stock, and to form the transition from the Persian to the Greek or Pelasgic worship.

There may have been some other intermediate stages, besides those which we have been compelled by the facts to assume, between the historical Aryan religions and the prehistoric *OLD-ARYAN*. Thus, *e.g.*, the Vedic religion as well as the Zarathustric cannot be considered as having sprung directly from the *EAST-ARYAN*. The Rig-Veda appears to be far less primitive than has been generally thought until now. It contains ancient elements, but it is itself the product of relatively modern speculations, and belongs to a period in which a complicated and mystical sacrificial theory was upheld by priests of various functions and ranks. On the other hand it cannot be denied that the Zarathustric dogmas are pure old Aryan myths in a new shape—this is what M. Jas. Darmesteter has proved —but it was doubtless a reformer, or, if Zarathustra was no historical person, a body of reformers, who called the Zarathustric religion into existence. Therefore, between the Vedic and Zarathustric religions and their common ancestor the *EAST-ARYAN*, there must have existed an *OLD INDIAN* and an *OLD-IRANIAN* religion.

This may suffice to justify the genealogical table of the Aryan religions given on last page.

Semitic. *Semitic Religions.*—Though there is so much wanting in our knowledge of the Semitic religions, especially as regards those of the pre-Christian Aramæans, of the pre-Islamic Arabs, and of the old Hebrews, all we know about them tends to prove that they too must have descended from a common source. When we find that the same divinities were worshipped by several North-Semitic nations it might be contended that they were borrowed from one of them, as trade and conquest had brought them from ancient times into close contact with one another. But no such relation existed till the very last centuries of the Assyrian empire between the Northern Semites and the various tribes of the Arabian desert. Therefore gods and religious ideas and customs prevailing alike among the northern and the southern or Arabic branch of the race may be safely regarded as the primeval property of the whole family. Such are the general name for the godhead, Ilu, Êl, Ilâh (in Allah), and the gods Serakh or Sherag (Σέραχος, Assyr., Arab., Cypr.), Keivan (Kaivanu, Babyl., Assyr., Arab., *cf.* Amos v. 26), Al-Lât, the moon-goddess (Babyl., Assyr., Arab.), as one of three different forms, of which another, the Al-'Uzza of the Arabs, is met with as 'Uza or 'Aza in Phœnician inscriptions, while the corresponding male god Azîz is found among the Aramæans, and the third, Manât, corresponds to Meni, the "minor Fortune," the planet Venus of the Hebrews, perhaps also with the Babylonian Manu. The myth of the dying and reviving Thammuz, Dumuzi, common to all Northern Semites, seems not to have been current among the ancient Arabs, though some scholars (Krehl, Lenormant) think there are traces of it left in their traditions and rites. Tree worship and stone worship have been pretty general in prehistoric times, and not a few remains of both have survived in all ancient faiths and modern superstitions; but the latter was particularly developed among both Northern and Southern Semites, which is proved by the use of Betyles (בֵּית־אֵל), by the black stone in the Ka'ba, the stone at Bethel, that in the temple of the great goddess of Cyprus at Paphos, at Edessa, and elsewhere, by the seven black stones representing the planet-gods at Erech (Uruk) in Chaldæa, &c. Holy mountains too are very frequent among the Semites, alike in Arabia (Ḳaçi, Dhu-l-shera, Horeb, Sinai—the two last-named still worshipped by the Saracens in the 6th century of our era) and in Canaan (Hermon, Tabor, comp. the Tabyrios and Zeus Atabyrios in Cyprus, Karmêl, Penîêl, Sion, Moriah, *i.e.*, Gerîzim), in Syria (Lebanon, Anti-Libanus, Amanus; comp. the *istirât*, the heights of modern Syria), and in Mesopotamia, where the zigurrats or terrace towers represent the holy mountains as the abodes of the gods. Finally, all Semitic religions without a single

Genealogical Table of the Semitic Religions,[1]



Prehistoric religions are marked with an asterisk (*).

exception understand the relation between God and man as one between the supreme lord and king (Él the mighty, Ba'al, Bel, Adon, Malik, Sar) and his subject or slave ('Abd, 'Obed, Bod), his client or protected one (Jār, Gēr). They are eminently theocratic, and show a marked tendency to monotheism, which, both in Israel and in Arabia, is the last word of their religious development.

It is not so easy to determine the grade of relationship between the different Semitic religions as it is to show that they all descend from a common parent. Moreover the question is complicated by another problem—Whether the Babylonians and Assyrians borrowed the greater part of their religious conceptions and institutions from a foreign, non-Semitic people, the primitive inhabitants of their country, and if this be the case what they then have of their own and what is due to the influence of that ancient civilization. Whatever may be the final solution of this question, we shall not go far wrong if we distinguish the Semitic religions into two principal groups—the one comprising the southern or Arabic, with perhaps the most ancient Hebrew, the other all the Northern Semitic religions from the Tigris to the Mediterranean,—leaving it undecided whether the undeniable relationship between the north-eastern and the north-western Semitic religions be that of parent and children or that of sisters—in other words, whether it be due to the influence of the superior culture of the former or to the fact that they all have radiated from a common centre. This only is beyond doubt, that the Assyrian religion is a daughter of the Babylonian, and that the Canaanitic and Phœnician modes of worship are closely allied.

What we give on last page is no more than a rough genealogical table of the Semitic religions.

A detailed and accurate genealogical classification of the religions which do not belong to either of those two principal families is out of the question. Their mutual relation can be fixed only in a general way.

African Religions.—The first problem to be solved is the classification of the Egyptian religion. It is neither Semitic and theocratic nor Aryan and theanthropic. But it has many elements that belong to the former, and also a few elements that belong to the latter category, which might lead to the supposition that it represents a stage in the development of the great Mediterranean, commonly called the Caucasian, race, anterior to the separation of the Aryan family from the Semitic. But this is no more than a supposition, as the existence of such a Mediterranean race, embracing the so-called Hamites, Semites, and Japhetites or Aryans, is itself a pure hypothesis. All we know is that the Egyptians themselves mention a people called Punt (the Phut of the Bible), with whom they had commercial relations and whose religion was akin to their own, so much so that they called the country of Punt, on the western Arabian and on the opposite African coast, the Holy Land (*ta neter*). The same may be said of the Cushites, the southern neighbours of Egypt, the ancient pre-Semitic Ethiopians; and a pre-Semitic population also may have lived in Canaan, allied to the Egyptians and ethnologically or genealogically combined with them, with Cush, and with Phut in the tenth chapter of Genesis. But, as we know next to nothing about their religions, a Hamitic family of religions, including these four, is still purely hypothetical.

That the primitive religion of southern Mesopotamia, commonly called Accadian or Sumerian, was related to the Egyptian, is also a mere conjecture, which does not seem to be favoured by the newly discovered facts. Finally, the scanty remains of the pre-Islamic religion of the Imoshagh or Berbers, the ancestors of the Libyans (in Egyptian Ribu), the Gætulians, the Mauretanians, and the Numidians resemble in some degree Egyptian customs and notions; but, whether they point to genealogical relationship or are due to early Egyptian influence, it is hard to say.

This, however, cannot be denied, that there are to be found in the Egyptian religion a great many magical rites and animistic customs, closely resembling those which prevail throughout the whole African continent. If then, as is generally supposed,[1] the dominant race sprang from Asiatic settlers and conquerors, who long before the dawn of history invaded the country, subjugated the dark-coloured inhabitants, and mixed with them, and if it is to these foreigners that the more elevated elements in the Egyptian religion are due, the basis of this religion is of a purely Nigritian character.

All we can say about the other original religions of the dark continent is that they resemble one another in many respects. We may distinguish four principal groups:—(1) the Cushite, inhabiting the north-eastern coast region south of Egypt; (2) the Nigritian proper, including all the Negro tribes of inner Africa and the west coast; (3) the Bantu or Kaffrarian (Kafir); and (4) the Khoi-Khoin or Hottentot, including the Bushmen, in South Africa. Before we can come to decision with regard to the first-named group, we must receive better and more certain information than we now possess. The prominent characteristic of the second group of religions, those of the Negroes proper, is their unlimited fetichism, combined as usual with tree worship, animal worship, especially that of serpents, with a strong belief in sorcery and with the most abject superstitions, which even Islâm and Christianity are not able to overcome. They have next to no mythology, at all events a very poor one, which may be one of the causes of what is called euphemistically their tendency to monotheism. A theistic tendency, as Dr Tylor calls it, cannot be denied to them. Almost all tribes believe in some supreme god, without always worshipping him, generally a heaven- and rain-god, sometimes, as among the Cameroons and in Dahomey, a sun-god. But the most widely spread worship among Negroes and Negroids, from west to north-east and south to Loango, is that of the moon, combined with a great veneration for the cow.

Among the Abantu or Kaffrarians (Ama-Kħosa, Ama-Zulu, Be-Chuana, Ova-Herero), which form the third group, fetichism is not so exuberant. Their religion is rather a religion of spirits. The spirits they worship, not sharply distinguished from the souls of the departed ancestors (Imi-shologu, Barimi), are conjured up by a caste of sorcerers and magicians, Isintonga (Isinyanga, Nyaka), and are all subordinate to a ruling spirit, regarded as the ancestor of the race, the highest lawgiver who taught them their religious rites, but who seems to have been originally a moon-god as the lord of heaven. The four tribes give him different names—the Ghost (Mukuro), the very High (Mo-limo), the Great-great (Unkulunkulu) or grandfather; but that the Bantu religions are four branches of one and the same faith cannot be doubted. They agree in many respects with those of the Negroes, but differ from them in others, especially in the cardinal characteristic of the latter, their fetichism. Possibly the difference is for the greater part due to the influence of the Hottentots, to whom the country now inhabited by the Abantu formerly belonged, and who seem to have been at the time of the invasion more civilized than the latter.

The Khoi-Khoin or Hottentots, who are not black but brown, and who now live in and near the Cape Colony also have a supreme deity, called Tsui- or Tsuni-Koab (the wounded knee) by the colonial Hottentots, Heitsi-eibib (wooden face) by the Namaqua. He, too, like the highest god of the Bantu, is the ancestor of the race and the chief of souls and spirits. But the primitive myth current about him shows that he was originally a moon-god, contending with the spirit of darkness. The altars intended for sacrifices to this god are now called his graves, and the Bantu, who do not use them, call them chiefs' graves. The great difference between the religions of the Khoi-Khoin and the other Nigritians is the total absence of animal worship and of fetichism by which it is characterized. Even sorcery and magic are still very primitive among them. Therefore they must be considered as a distinct family among the African tribes, only allied to the so-called Bushmen (Ba-tua, Ba-roa, or Soaqua, Sonqua), who seem to be a degraded race, sunk to the lowest degree of savagery, but who likewise worship a highest god and by whom likewise fetichism is not practised.

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[1] Even Rob. Hartmann, *Die Nigritier*, Berlin, 1876, pp 192 sq. who denies the existence of a Hamitic race, and considers the Egyptians as Nubian Cushites, separated from the others in early times, ascribes their higher civilization to their intercourse with Semitic settlers.

The Chinese Religions, and their Relation to the Mongolic and Ural-Altaic.—This is perhaps the most knotty point in the genealogical classification of religions. There are ethnologists (as Oscar Peschel) who bring not only the Chinese, with their nearest relatives the Japanese and Coreans,—all Ural-Altaic or Turanian nations,—but also the whole Malay race, including the Polynesians and Micronesians, and even the aboriginal Americans, from the Eskimo to the Patagonians and Fuegians, under one and the same vast Mongoloid family. There is indeed some similarity in the religious customs of the Americans and of the so-called Turanians; and even in the Polynesian religions some points of contact with those of the former might be discovered. Still, such conformities are but few and not very important, and do not justify our going so far.[1] Other ethnologists, like Friedrich Müller, do not admit the Americans, including the Hyperboreans of North America and the north-west of Asia, nor the Malayans and the Polynesians as members of the Mongolian race. This, according to them, only comprises the Chinese and their relatives in Tibet and the Transgangetic peninsula, the Japanese and Coreans, and the Ural-Altaic or Turanian nations. Now Prof. Max Müller[2] tries to show that the religions of all those groups of nations—let us say, of this Mongolian race—are also bound together by a close relationship, because not only their character is fundamentally the same, but even the same name of the highest god, Tien, Tengre, Tangara, &c., is met with among most of them. Putting aside the argument taken from the common name of the supreme deity, which is all but general among the members of this ethnical family and seems to have come from the Chinese to some of the Mongolians,[3] we cannot deny the fact that not only in the Ural-Altaic and Japanese but also in the highly-developed Chinese religions the relation between the divine powers and man is purely patriarchal. Just as the chief of the horde—nay, even the son of heaven, the Chinese emperor—is regarded as the father of all his subjects, whom they are bound to obey and to venerate, so are the gods to their worshippers. The only difference is that the Chinese heaven-god Tien is an emperor like his earthly representative, ruling over the other spirits of heaven and earth as does the latter over the dukes of the empire and their subjects, while the Ural-Altaic heaven-god is indeed the most powerful being, invoked in the greatest difficulties, when he only is able to save, but no supreme ruler,—not anything more than a *primus inter pares*, every other god being absolute lord and master in his own domain. Now this difference is not one of character but of progress, and answers fully to the difference of the political institutions of which it is the reflex.

The high veneration for the spirits of the deceased fathers, which are devoutly worshipped among all the members of this religious family, is a necessary consequence of its patriarchal type. But this feature is not less predominant among nations belonging to wholly different races. Another striking characteristic of the Mongolic religions is their extensive magic and sorcery (Shamanism). One might say that even the gods and the heroes of epic poetry are sorcerers, and that what their worshippers value above all are the magical powers they possess. Shamans are most highly honoured. One of the Chinese religions, and in fact that which contains the most ancient elements, we mean Taoism, involves the most implicit belief in sorcery, and even Buddhism, as it was adopted by the Mongols and the Chinese, has degenerated to all but pure Shamanism.

We are thus fully justified in assuming a Mongolian or patriarchal family of religions, of which the following are the principal subdivisions:—

1. *Chinese Religions*, being (*a*) the *ANCIENT NATIONAL* religion, now superseded partly by (*b*) Confucianism and (*c*) Taoism, partly, though only several centuries later, by Chinese Buddhism. What the ancient national religion was can only be gathered from its survivals in the still existing faiths. Confucianism claims to be a restoration of the old and pure institutions of the fathers, though it may just as well be said to be a thorough reform, and Taoism is, according to some European scholars, the original Chinese religion in its latest development—we should say, in its most miserable degradation. At all events, in some form or another, it is much older than Lao-tsze (6th century B.C., see LAO-TSZE), though it has availed itself of his mystical treatise *Tao-tĕ-King* as a sacred book. There may be some truth in both these conflicting assertions. Without venturing to speculate on the origin of the Chinese nationality, which according to some is a mixture of autochthons with more civilized foreign invaders (the Hundred Families), nor on the possibility that this ethnic dualism may be the source of the two streams of religious development in China, we have some ground to hold Confucius's reform as the renewal of a much older reform (Chowkung's or even earlier), limited to the learned and the greater part of the upper classes,—Taoism on the contrary being a revival of the ancient popular Chinese religion, to which the *Tao-tĕ-King* had to give the appearance of a philosophical basis. Chinese Buddhism does not differ much from the latter, and is now equally despised.

2. *Japanese Religions*, where we have again the same triad, nearly parallel to the Chinese: (*a*) the old national religion Kami-no-madsu (the way, *i.e.*, the worship, of the gods), called frequently Sin-to (Chinese Shin-tao, the way or worship of the spirits), with the mikado as its spiritual head, just as Chinese Taoism had its popes; (*b*) Confucianism, imported from China in the 7th century; and (*c*) Buddhism, imported from Corea and nearly exterminated in the 6th century, but reviving, and at last, in the beginning of the 7th century, triumphant.

3. The *Finnic* branch of the Ural-Altaic religions, all recognizing the same heaven-god Num, Yum, Yummal, Yubmel, Yumala, as supreme. The primitive unity of this subdivision has been demonstrated by Castrén, the highest authority upon it. By far the best known of this family are its North-European members, the religions of the Lapps, the Esthonians, and the Finns, but the two last named are not pure specimens of Ural-Altaic worship, as

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[1] They are enumerated by Waitz, *Anthropologie der Naturvölker*, iii., 56 *sq.*

[2] *Lectures on the Science of Religion*, 190 *sq.*

[3] The resemblance of the Mongolian Tengre, Tangara, to the Sumerian or Accadian Dingira appears to be equally fortuitous as that of the Polynesian Tangaroa (Taaroa) to the Melanesian Ndengei.

they borrowed much from the Germanic, especially from the Scandinavian, mythology.

It is highly probable that the other branches of the same ethnic family, the Mongolian and the Turkish, and the other members of the same branch, *e.g.*, the Magyars, originally did not differ much from the Finnic in religious ideas and customs. Unfortunately we are here able to judge only by analogy, partly because we are but imperfectly informed, partly because most of these nations have long been converted to Buddhism, Mohammedanism, and Christianity. Nor do we know in how far the Tibetans, Burmese, Siamese, and other peoples nearly related to the Chinese had originally a similar worship, as all of them are now faithful Buddhists.

The question whether the religion of the primitive inhabitants of Mesopotamia (Sumêr-Akkad) has any genealogical relation to that of the Chinese and the Ural-Altaic family, as some scholars now try to prove, is not yet ripe for solution.

The Aboriginal Religions of America.—The religions of the Eskimo (Esquimantsic, Ashkimeg, as their Redskin neighbours call them) or Innuyt (*i.e.*, "men," as they call themselves) should be clearly distinguished from those of the other American nations. Though some of their customs and notions resemble those of the latter, there are others, and it would seem the most important, which are of the same character as those prevailing among the Ural-Altaians and Mongols. Now, as they belong ethnically to the Hyperboræan or Arctic nations, who inhabit not only the extreme north of America from east to west, but also the islands between the two continents and besides a part of the east of Siberia, and as these Hyperboræans are physically akin to the Mongolian race, we might suppose that the American elements in the Eskimo religion have been borrowed, and that it must be considered to have been originally a member of the Ural-Altaic family. Their division of the world of spirits into those of the sea, the fire, the mountains, and the winds, with Torngarsuk (chief of spirits), the heaven-god, as the highest, and their belief in the magical power of their sorcerers, the Angekoks, do not differ from those which characterize the Ural-Altaic religions. At any rate the religion of the Eskimo is the connecting link between the latter and those of the American aborigines.

That all the other religions of North and South America are most closely allied is generally admitted, and is indeed beyond doubt. Several myths, like those of the sun-hero, of the moon-goddess, of the four brothers (the winds),[1] are found in their characteristic American form among the most distant tribes of both continents. Some religious customs, scarcely less characteristic, such as the sweating bath, intended to cause a state of ecstasy, the ball-play, a kind of ordeal, the sorcery by means of the rattle, are all but generally practised. Fetichism and idolatry are much less developed among the Americans than among other uncivilized and semi-civilized races, but a marked tendency to gloomy rites and bloody self-torture is common to all.

The American family of religions may be divided into the following principal groups. (1) Those of the Redskins of North America, from Canada to the Gulf of Mexico, all of whom have in common the worship of the great spirit (Kitche Manitoo, Michabo, Wahcon[da], Anduagni, Oki) who is the ghost of heaven, the highest wind-god, to whom all other spirits, even those of the sun and the moon, are subordinate; also the hero myth which has sprung from that belief, and the so-called totemism, *i.e.*, the adoption of a special tutelar genius, usually in animal form, for every individual family. (2) Those of the Aztec race, comprising the Aztecs, Toltecs, and Nahuas, who are spread from Vancouver's Island to Nicaragua. To this branch belongs that strange mixture of more elevated religious ideas and barbarous rites which was the state worship of the Mexican empire, but which for its purer elements was indebted to the conquered race, the Mayas (see MEXICO) (3) Those of the original inhabitants of the Antilles, to whom the Mayas in Yucatan and the Natchez between the Red River and the Mississippi seem to be nearly related They are one of the most gifted nations of the American race, with an interesting mythology and highly-developed religious ideas, but perhaps weakened by civilization and therefore unable to withstand the more warlike barbarous tribes, by whom they were finally subjugated. (4) That of the Muyscas (Chibchas) in South America. Originally they seem to have had the same worship as the Nicaraguans. At least the Nicaraguan god Fomagazdad, the creator of mankind and the consort of the moon goddess, acts a part in the principal myth of the Muyscas, under the name of Fomagata But after the latter had reached a higher stage of civilization they adored the god Bochika as its principal founder, and Fomagata became a dethroned tyrant, while the moon goddess, now an evil deity, tried to spoil the beneficent works of Bochika. There is some likeness between their hierarchical political institutions and those of Peru, but they were never subjected to the power of the Incas, and it is not proved that they borrowed their culture from them. (5) Those of the Quichua, Aymara, and their relatives, which culminated in the sun worship of the Incas in Peru, spread by them throughout all the countries they conquered, and even reformed by some of them to a tolerably pure and elevated theism (not monotheism, as Dr Brinton contends). This most interesting religion ranks highest among all the faiths of the two American continents, those of Central America not excepted. This remarkable progress is not to be derived from the influence of foreign settlers, come from Asia or Europe, but is here, as well as in Central America, the product of natural growth favoured by happy circumstances. (6) Those of the warlike Caribs and Arowaks, extending along the whole of the north coast of South America, who subjugated the peaceful inhabitants of the Antilles to their rule.

The Brazilian aborigines (Tupi guaranos, Indios mansos), who form a distinct group, and the south-eastern and southern tribes (Abipones, Pampas Indians, Puelches, Patagonians or Tehuelches, Fuegians) have religious notions and customs quite in accordance with the low degree of their civilization. Only the Araucanians, though ethnically the nearest relations of the Fuegians and perhaps of the Pampas Indians, have a somewhat advanced sun worship, but seem to have been influenced by the ascendency of Peruvian culture.

Lastly we come to the *Malayo-Polynesian* family of religions. The primitive ethnic unity of this widely scattered race, which, including the Micronesians and Melanesians, inhabits the islands in the Great Pacific from Easter Island to the Pelew Archipelago, the East Indian Archipelago, and the Malay Peninsula, and to which belong the Hovas of Madagascar, has been established on sufficient evidence. As to their primitive religious unity we cannot be equally positive. The original religions of the Malay archipelago have given place first to Brahmanism and Buddhism, afterwards to Mohammedanism, lastly, though only sporadically, to Christianity. But, so far as we can judge from what has still survived of the aboriginal worship and from what is known of the religious customs of the Malagasy, especially the Hovas, the ancient Malay religions did not differ more from the Polynesian and the Melanesian than do the languages. There is one institution especially which, though in principle and to a certain degree common to all ancient religions, has nowhere acquired that importance and that peculiar development which it has grown to in the Polynesian and the Melanesian religions, the institution of the *taboo*, a kind of interdict laid on objects and persons, by which they are made sacred and inviolable. Now this taboo, which more than anything else characterizes these religions, was equally important in Madagascar before Radama's reforms, and exists also among the Malays, who call it Pamali, nay, even among the Australians, who call it Kuinyunda. There are some other customs common to all these nations, as the particular worship of the ghosts of the deceased, some ordeals, &c., but this is of minor importance. The general observance of such a peculiar custom as the taboo by all the peoples belonging to this ethnic family, a custom which rules their whole religion, gives us the right to speak of a Malayo-Polynesian family of religions.

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[1] The myth of the four brothers is met with, *e.g.*, among the Algonkins, the Mayas in Yucatan, the Tzendal branch of the Maya race, the Tarascos in Michoacan near Mexico, the Aztecs, by whom it is combined with that of Quetzalcoatl, all through North America, and even in Peru. See Brinton, *Hero Myths*, pp. 44, 162, 216, 208, 73, 179.

One distinct branch of this family is the Polynesian, which has everywhere the same myths with only local varieties, and the same supreme god Taaroa or Tangaroa. The Micronesian branch is only a subdivision of it. The Melanesian branch differs more widely, but agrees in the main, and the supreme god Ndengei, whether original or borrowed, is evidently the same as Tangaroa. That the Malay branch had its marked subdivisions is very probable; but the settlement of this difficult question must be left to further research. According to ethnologists the Australians and the now extinct Tasmanians do not belong to the Malayo-Polynesian race. But, as their religion shows the same prominent characteristic as the Polynesian, and, moreover, agrees with it in other respects, they must be in some way related.

These are the rough outlines of a genealogical classification of religions. It embraces nearly all of them. Only a few have been purposely left out, such as those of the Dravidas, the Munda tribes, and the Sinhalese in India, partly for want of trustworthy information, partly because it is not yet certain what belongs to them originally and what is due to Hindu influence. At any rate we cannot consider their religions as allied to the Ural-Altaic. We have also omitted the religions of the Basque or Euscaldunac, of which nothing particular is known, and for obvious reasons the Etrurian. Even if the intricate problem with regard to their language could be solved, the Etrurians borrowed so much from the Greek mythology that it would be next to impossible to state what kind of religion they originally had as their own.

Morphological Classification of Religions.—In his *Lectures on the Science of Religion*, pp. 123–143, Prof. Max Müller, who has done so much to raise the comparative study of religions to the rank of a science, criticizes the most usual modes of classification applied to religions, viz., (1) that into true and false, (2) that into revealed and natural, (3) that into national and individual, (4) that into polytheistic, dualistic, and monotheistic, and dismisses each and all of them as useless and impracticable. In this we cannot but acquiesce in his opinion and hold his judgment as decisive. The only exception we should like to take refers to the classification under (3), which, as we shall presently show, contains more truth than he is disposed to admit. And when he winds up his argument with the assertion that "the only scientific and truly genetic classification of religions is the same as the classification of languages" we must dissent from him. Even the genealogical classification of religions does not always run parallel with that of languages. Prof. Max Müller says that, "particularly in the early history of the human intellect, there exists the most intimate relationship between language, religion, and nationality." This may be generally true; we do not deny it. But the farther history advances the more does religion become independent of both language and nationality. And that the stage of development a religion has attained to—the one thing to be considered for a morphological classification—has nothing to do with the language of its adherents is obvious. Now for a really scientific study of religions such a morphological classification is absolutely necessary, and therefore we are bound by our subject to give our opinion with regard to the truly scientific principle on which it ought to be based.

First let us see what has already been done to this effect by one of the best authorities. Prof. W. D. Whitney, in an interesting article "On the so-called Science of Religion," declares for the well-known classification of religions into national and individual. To quote his own words, "There is no more marked distinction among religions than the one we are called upon to make between a race religion—which, like a language, is the collective product of the wisdom of a community, the unconscious growth of generations—and a religion proceeding from an individual founder, who, as leading representative of the better insight and feeling of his time (for otherwise he would meet with no success), makes head against formality and superstition, and recalls his fellowmen to sincere and intelligent faith in a new body of doctrines, of specially moral aspect, to which he himself gives shape and coherence. Of this origin are Zoroastrianism, Mohammedanism, Buddhism; and, from the point of view of the general historian of religions, whatever difference of character and authority he may recognize in its founder, Christianity belongs in the same class with them, as being an individual and universal religion, growing out of one that was limited to a race." We hardly think that this reasoning can be unconditionally assented to. At any rate we must put it in another way. Before the American scholar's essay was published, it had already been judiciously observed by Prof. Max Müller that, though neither a Brahman, nor a Greek, nor a Roman could name the name of the founder of his religion, we discover even there the influence of individual minds or schools or climates. So he thinks that this classification is useful for certain purposes, but fails as soon as we attempt to apply it in a more scientific spirit. This is partially true. What is the wisdom of a community but the wisdom of its more enlightened members, that is, of individuals? Religions of which the origin and history lies in the dark may be called the unconscious growth of generations, but in a figurative sense only. If they have a mythology and a ritual of their own, it may be the result of something like natural selection; but every myth meant to explain natural phenomena, every rite meant to still the wrath or to win the favour of the higher powers and accepted as an integral part of their faith and worship, perhaps first by some more advanced members of a tribe or nation or community only, afterwards by all of them, was originally the creation of one single human mind. On the other hand, if founders of higher religions are themselves "the leading representatives of the better insight and feeling of their time," then here too there is only growth; they are at the head of their contemporaries, because the better insight and feeling of the latter culminate in them, and because they are able to lend them a shape which makes the more advanced ideas and sentiments agreeable to the minds and hearts of the many; but they meet with success only when that which they preach lies hidden and lives unspoken in the minds and hearts of their generation. It is clear then, that on both sides of the line of demarcation between the two categories of religions there are individuals at work, and that on both sides there is growth. The only remaining difference is, that on this side there is consciousness, on that side there is not. But this too cannot serve us. Much in the growth of the so-called race religions was unconscious and therefore anonymous and forgotten; much, however, was not so. We know of many changes for better or worse in national religions, either reforms or reactions, made with full consciousness, because intentionally; and we know the names of the kings or tyrants or other individuals who made them. Who knows if the same was not the case when these religions were born—if what now seems to be the collective product of the wisdom of the community was not simply the product of a tyrant's, a mighty chieftain's *bon plaisir*, or of a renowned magician's influence? Finally, if by "founder of a religion" is meant he whom the professors of that religion revere as a heaven-born messenger of the truth or as the greatest of prophets, or adore as the son of God, the incarnation of the highest, —then what Prof. Whitney says they all did, namely, "give shape and coherence to a body of doctrines of specially moral aspect," does not apply to the most of them. The new body of doctrines in its coherence was never shaped by them, but by the leaders of the community to which their preaching gave rise. We call them founders of a new religion, not because they always intended to found one, but because, perhaps involuntarily, they laid the foundations of it in the new and pregnant principles they revealed to the world by their word and life.

Still, whatever we may have to criticize in Prof. Whitney's proposition, there is indeed no more marked distinction among religions than the one he makes between what he calls race religions and religions proceeding from an individual founder, and no other than this should be the basis of a morphological classification. For between those two great categories or orders to one or other of which all known religions belong and every religion must belong there is a difference not only of degree but of an essential kind, a difference of principle, the one great all-important difference. The principle of the one category is *nature*, that of the other *ethics*.

In the nature religions the supreme gods are the mighty powers of nature, be they demons, spirits, or man-like beings, and ever so highly exalted. There are great mutual differences between these religions, though they belong to the same order,—*e.g.*, a great difference between the Finnic Ukko and the Norse Oðin, between the thunder-god of the Brazilian aborigines and the Vedic Indra or the Olympian Zeus, but it is only a difference of degree; fundamentally they are the same. Nobody denies that one nature religion stands on a much higher level than another. Not only are they either unconsciously and by the drift of public opinion or consciously and intentionally altered, enriched, combined with foreign modes of worship, but in some of them a constant and remarkable progress is also to be noticed. Gods are more and more anthropomorphized, rites humanized. For they are not by any means inaccessible to the influence of moral progress. From an early period moral ideas are combined with religious doctrines, and the old mythology is modified by them. Ethical attributes are ascribed to the gods, especially to the highest. Nay, ethical as well as intellectual abstractions are personified and worshipped as divine beings. But as a rule this happens only in the most advanced stages of nature worship; and, moreover, these ethical personifications are simply incorporated in the old system, and not only not distinguished from the nature gods, but even subordinated to them. If some individuals—philosophers, sages, prophets—have risen to the consciousness that the moral ought to have predominance over the natural, yet nature religion, though strongly mixed with ethical elements, does not recognize this, and those who are called to represent and defend it abhor such independent thinkers and persecute them as dangerous enemies to the faith of the fathers. Nature religions cannot do otherwise, at least if they do not choose to die at once. They can for a long time bear the introduction—let us say, infiltration—of moral, as well as æsthetic, scientific, and philosophical notions into their mythology; they suffer from it, indeed, and this is instinctively felt by the headstrong defenders of the pure old tradition; but they are unable to shut them out, and if they did so they would be left behind and lose their hold on the minds and the hearts of the leading classes among more civilized nations. So they are obliged to let them in, were it only for self-preservation. But the reform must not exceed certain limits. If the ethical elements acquire the upper hand, so that they become the predominating principle, then the old forms break in twain by the too heavy burden of new ideas, and the old rites become obsolete as being useless. If the majority has at last outgrown the traditional worship and mythology—if it comes to the conclusion, which was already the conviction of philosophers, that the old *numina* are only *nomina*, Zeus, Hera, Hestia only names for the sky, the æther, the fire,[1] to which moral attributes can be ascribed only in a tropical sense—then nature religion inevitably dies of inanition. No political power, no mighty priesthood, no poetry, no mysticism like that of the Neo-Platonists, no romanticism like that of Julian; not even an attempt to imitate the organization and the rites of an ethical religion, can save it any longer from utter decay.

When this culminating point has been reached, the way is prepared for the preaching of an ethical religious doctrine. Ethical religions do not exclude the old naturistic elements altogether, but subordinate them to the ethical principle and lend them something of an ethical tinge, that they may be more in accordance with the now prevailing system. The old nature-gods, at least the most important among them, survive, and, though first neglected and thrown into the background by the new ideal or abstract divine beings, come again to the front, but only as serving spirits, ministers, angels (ἄγγελοι, yazatas, &c), or even saints, as all nature now stands under the control of one supernatural ruler in whom the supremacy of moral law is personified. Now the prominent characteristics of ethical religions are just the reverse of that which characterizes the naturistic. Nature religions are polydæmonistic or polytheistic; under favourable circumstances they may rise at best to monolatry. Ethical religions, on the other hand, though not all of them strictly monotheistic or pantheistic, all tend to monotheism and are at least monarchic. In nature religions, though they are not exempt from the control of individuals, and even have in part received from them their particular shape or been reformed by them, the ethical or national aspect prevails over the individual, spontaneous growth over conscious speculation, imagination over reflexion. Ethical religions on the contrary are communities brought together, not by the common belief in national traditions, but by the common belief in a doctrine of salvation, and organized with the aim of maintaining, fostering, propagating, and practising that doctrine. So they are founded by individuals—founded, not instituted or organized, for that as a rule is done by the generation which follows that of the founder—and not always by one single person, but in some cases by a body of priests or teachers. This fundamental doctrine and the system based on it are considered by the adherents to be a divine revelation, and he who first revealed it, or is thought to have revealed it, is considered as an inspired prophet or a son of God. Nay, even if the primitive teaching had an atheistic tendency, as in the case of Buddhism, it is this real or mythical teacher whom they not only revere, but worship as their supreme deity.

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[1] This conclusion as such is utterly false. The gods are no mere *nomina*. They are not the natural phenomena themselves, but spirits, lords, ruling them. The fact is that their worshippers at last become conscious of the naturistic basis of their religion and then reject it.

We now come to the subdivisions of each of the two principal categories. And here we cannot silently pass by the classification of the least advanced religions proposed by Prof. Pfleiderer (*Religionsphilosophie auf geschichtlicher Grundlage*, 2d ed. 1884, vol. ii.), which supersedes the complete classification of religions given by him in an earlier work (*Die Religion, ihr Wesen und ihre Geschichte*). The latter was based on his conception of religion as the fusion of dependence and liberty, but has now been abandoned by the author.

According to Pfleiderer the original religion must have been a kind of indistinct, chaotic naturism, being an adoration of the natural phenomena as living powers; and, as primitive man cannot have had consciousness of his superiority over the animals, nor of his personality and his spiritual nature, he could not conceive these divine powers as personal, or spiritual, or anthropomorphic, but only as living beings.

Then from this primitive naturism sprang:—(1) *anthropomorphic polytheism*, which is decidedly an advance on mythopœic naturism, as it brings the personal gods into relation with the moral life of man, but at the same time has its drawback since it attributes all human passions, faults, and sins to the gods; (2) *spiritism* (*animism*), combined with a primitive idolatry, *fetichism*, each of them not an advance but rather a depravation of religion, caused by the decadence of civilization, which inevitably followed the dispersion and isolation of tribes previously united; (3) *henotheism*, not the henotheism of Max Müller, or of Hartmann, or of Asmus, but a practical henotheism, *i.e.*, the adoration of one God above others as the specific tribal god or as the lord over a particular people, a national or relative monotheism, like that of the ancient Israelites, the worship of an absolute sovereign who exacts passive obedience. This practical monotheism is totally different from the theoretical monotheism, to which the Aryans, with their monistic speculative idea of the godhead, are much nearer.

Passing by the primitive naturism, which is only a matter of speculation, we are bound to admit the real existence of the other three classes specified by Pfleiderer. Only the order in which they are arranged must be changed. For, if spiritism or animism sprang from a primitive not yet animistic naturism, at the same time with, though under different circumstances from, anthropomorphic polytheism and henotheism, how then shall we explain so many traces and remains of a previous animistic belief in each of the latter religious developments? They too must have gone through an animistic stage. And, on the other hand, some traces even of anthropomorphic mythology are not totally wanting in the animistic religions of uncivilized tribes and barbarous nations,—though, of course, in this mythology manlike beings still stand on the same level as, if not much lower than, those having the shape of animals.

The different stages of religious development have been characterized by C. P. Tiele (*Outlines of the History of Religion*, § 3) as follows:—(*a*) a period in which animism generally prevailed, still represented by the so-called nature religions (in the narrower sense), or rather by the polydæmonistic magical tribal religions; (*b*) polytheistic national religions resting on a traditional doctrine; (*c*) nomistic (or, as Prof. Carlo Puini proposes to call them, nomothetic) religions, or religious communities founded on a law or sacred writing and subduing polytheism more or less completely by pantheism or monotheism; (*d*) universal or world-religions, which start from principles and maxims. Though in general maintaining this division, at least for practical use, if we wish to draw up a morphological classification of religions, we shall have to modify and to complete it, and to arrange the different stages under the two principal categories of nature religions and ethical religions.

Nature Religions.—1. To the philosophy of religion we leave the solution of the difficult problem,—What may have been the state of religion before the oldest religion known to us sprang into being, and even before that animistic stage of development which we know only by its survivals in the higher and its ruins in the still existing lower religions? Certain it is that the oldest religions must have contained the germs of all the later growth, and, though perhaps more thoroughly naturistic than the most naturistic now known, must have shown some faint traces at least of awakening moral feelings. Man, we think, in that primitive stage, must have regarded the natural phenomena on which his life and welfare depend as living beings, endowed with superhuman magical power; and his imagination, as yet uncontrolled by observation and reasoning, must frequently have given them the shape of frightful animals, monsters, portentous mythical beings, some of which still survive in the later mythologies. Perhaps the best name for this first stage of religious development might be the "polyzoic" stage.

2. The following naturistic stages are to be classified under three distinct heads:—(*a*) polydæmonistic magical religions under the influence of animism; (*b*) purified magical religions, in which animistic ideas still play a prominent part, but which have grown up to a therianthropic polytheism; (*c*) religions in which the powers of nature are worshipped as manlike though superhuman and semi-ethical beings, or anthropomorphic polytheism.

3. Animism, which exercises a prominent influence on the religions of the first stage (*a*) mentioned above, is a system by which man, having become conscious of the superiority of the spirit over the body and of its relative independence, tries to account for the phenomena of nature, which he, not having the slightest scientific knowledge either of nature or of mind, is unable to explain otherwise. It is not itself a religion, but a sort of primitive philosophy, which not only controls religion, but rules the whole life of man in the childhood of the world. All things living and moving, or startling him by something strange and extraordinary, and of which he does not know the natural causes, he ascribes to the working of mighty spirits, moving freely through earth and air, and, now of their own accord now under compulsion, taking up their abode either temporarily or permanently in some living or some lifeless object. Only the powerful among these spirits, "those on which man feels himself dependent, and before which he stands in awe, acquire the rank of divine beings," and either as invisible or as embodied spirits become objects of worship (spiritism and fetichism). As the principal characteristics of those religions we have to consider—(1) a confused and indeterminate polydæmonistic mythology, though some spirits, especially those directing heavenly phenomena, are held to be more powerful than the others, and the supreme spirit of heaven is generally the mightiest of

all; (2) an implicit belief in the power of magic, which accounts for the high veneration in which sorcerers and fetich-priests are held; (3) the predomination of fear over all other feelings, and the performance of religious acts mostly for selfish ends. For a somewhat more copious exposition of the character and the development of religions under the control of animism we must refer to *Outlines of the History of Religion*, §§ 7–17, and the works there cited.

4. Purified magical religions (*b*) are the connecting link between the polydæmonistic magic religions (*a*) and the anthropomorphic polytheistic (*c*), and ought to be distinguished from each. The gods, though sometimes represented in a human form, more frequently in that of an animal, are really spiritual beings, embodying themselves in all kinds of things, but principally in animals. Most images of the gods are either human bodies with heads of animals or the bodies of animals with human heads. It is therefore we call these religions therianthropic. The worship of animals is one of the principal characteristics of most of them. In a subsequent stage, though surviving sporadically, it is much more restricted. The same may be said of the widespread worship paid to the souls of the departed, which is one of the most important constituent elements of the religions in this stage of development, though it survives in the next stage as well. It is frequently combined, as, *e.g.*, in Egypt, with an elaborate eschatology. Magic and sorcery, though forbidden and even entailing prosecution if exercised by private sorcerers, are still held in high esteem when in the hands of the lawful priests. They are now organized as a traditional ritual and gradually developed into a boundless mysticism. Some of the ancient nature myths have already become legends and supposed primeval history. As might be expected, some of the religions belonging to the therianthropic stage stand nearer to the primitive animism, whilst others draw very nigh to the anthropomorphic stage; and so it would seem that we ought to make a distinction between such therianthropic religions as belong to federations and such as belong to united empires—let us say, the unorganized and the organized. In the latter there is a strong tendency to monotheism and a kind of theocracy, the king being regarded as the living representative of the supreme deity, both of which characteristics are not so prominent in the former.

5. In the anthropomorphic polytheism of the highest nature religions (*c*) there are, as in all subsequent stages, many survivals of what was common in the preceding, but so far as this could be done they have been adapted to the new system and disguised under new names or by means of new explanations. We call this polytheism anthropomorphic because the gods are now all of them superhuman but manlike beings, lords over the powers of nature and reigning over its departments, workers of good and of evil. As manlike beings they show more ethical tendencies and attributes than those of the previous periods. But, being indeed the old nature gods themselves, only remodelled and humanized, and their myths being originally fantastic and even animistic descriptions of natural phenomena, represented as wars and wooings, quarrels and revelries, robberies and tricks of the giant powers of nature, their mythology is full of disgusting narratives, and they are frequently represented as indulging the lowest passions and performing the most degrading acts. Pious poets and grave philosophers felt shocked by such myths, and either tried to mend them or boldly denied them; but they constituted nevertheless the faith of the majority till the fall of nature religion. Only, though essentially nature myths and still felt to be so, they are now no longer considered as an explanation of ever-returning phenomena, but, in accordance with the manlike character of the gods, as a kind of divine history, nay, are worked out into what may be called an imposing epic, beginning with the origin of life and ending only with the fall of the present cosmic economy. The gods themselves are no longer represented as animals or trees or stones; these have now become their symbols and attributes, and are only looked upon as being sacred to them. Of the power they possessed, in their old quality of spirits, to assume all shapes at will the myths of their metamorphoses still bear witness, myths now told by elegant poets for the amusement of their readers, but despised by serious philosophers. The real therianthropic beings of the old mythology, monsters like centaurs, harpies, fauns, satyrs, and others which could not be banished from ancient lore, now represent a lower order and are suffered to act only as followers or ministers or even as enemies of the gods. Not one of the religions in the polytheistic stage was able to elevate itself to the purely ethical standpoint; but, as moral consciousness went on increasing, deeper and more ethical religious ideas gathered round the persons of the most humane gods, the beloved son or daughter of the supreme deity, and gave rise to purer modes of worship which seemed to be forebodings of a time to come.

Ethical Religions.—1. With regard to the ethical religions the question has been mooted—and a rather puzzling question it is—What right have we to divide them into nomistic or nomothetic communities, founded on a law or Holy Scripture, and universal or world religions, which start from principles and maxims, the latter being only three—Buddhism, Christianity, and Mohammedanism? The division has been adopted, among others by Prof. Kuenen, in his *Hibbert Lectures*, though with the important restriction that Islâm, as being essentially particularistic, ought to be excluded from the class of universalistic religions. In an interesting paper (in the Leyden *Theol. Tijdschrift*, 1885, No. 1) Prof. Rauwenhoff rejects the whole class and particularly disapproves of the term "world religions," for which he substitutes that of "world churches." The question deserves to be discussed thoroughly, but for that this is not the place. Here we can only state the results to which a conscientious review of our own opinion and an impartial consideration of our opponents' arguments have led us.

2. We now think that the term "world religions" must be sacrificed, though indeed "world churches" would do no better, perhaps even worse. Without serving longer to determine the character of certain religions, the term "world religions" might still be retained for practical use, to distinguish the three religions which have found their way to different races and peoples and all of which profess the intention to conquer the world, from such communities as are generally limited to a single race or nation, and, where they have extended farther, have done so only in the train of, and in connexion with, a superior civilization. Strictly speaking, there can be no more than one universal or world religion, and if one of the existing religions is so potentially it has not yet reached its goal. This is a matter of belief which lies beyond the limits of scientific classification.

3. Still there is a real difference between two at least of the three above named, which are still contending with one another for supremacy over the nations of the globe, and the other religious communities which no longer try to make proselytes—between Buddhism and Christianity on the one hand, and Confucianism, Brahmanism, Jainism, Mazdaism, and Judaism on the other. And this difference, which ought to be maintained, is indeed one of principle, not of fact only. If the latter, after having been adopted by a nation, have remained stationary for centuries and

even are continuously fading away, while the former now embrace many millions of adherents belonging to various nations and races, and ever go on increasing more or less rapidly, this cannot be due to some fortuitous or external circumstances only, but must have its principal cause in the very nature of each sort of religions.

4. When we call the one particularistic the others universalistic (not universal), the one national the other human, when we describe the one as bound to special doctrines and rites, the others, though equally embodying themselves in doctrines and rites wherever they were organized into churches or state religions, as nevertheless really free from them and starting from principles and maxims, we possibly use words apt to be misunderstood and perhaps wanting some qualification, but the meaning of them on the whole is sufficiently clear. In calling nomistic religions, like Judaism and Mazdaism, particularistic or national, we do not mean to say that they are exclusive in character and that they have not tried to spread beyond the boundaries of the race and the nation to which they belonged originally. They have done so indeed; they hoped to extend their dominion, but they succeeded only where they could impose the nationality or the civilization with which they had grown together, like the Chinese in Corea and Japan, or the Brahmans in several parts of India; and it is known that the proselytes of Judaism always ranked below the born sons of Abraham.

Now Buddhism, Islâm, and Christianity were neither national nor particularistic. All of them were the representatives of ideas surpassing so to say the national horizon; all of them had in view, not the special religious wants of the nation, but more general aspirations of the human heart and mind. Two of them, therefore, were rejected, after a shorter or longer struggle, by the peoples to which their founders belonged by birth; and it is a well-known fact that Mohammedanism, though founded by an Arab, took its fundamental ideas from Judaism and Christianity, and that not the Arabs, but foreign nations, especially the Persians, raised it to the high position which it would not have occupied in the world without them. The national form of the Buddhistic idea was Jainism, that of the Christian idea Ebionitism, and perhaps the Wahhabites may be considered as the national reformers of Mohammedanism; and it is only natural that none of these sects found adherents except among the peoples in the midst of which they arose. Nor were Buddhism, Islâm, and Christianity particularistic. Buddhism "looks for the man; the miseries of existence beset all alike, and its law is a law of grace for all."—So too in its way does Islâm; in the beginning it spreads by conquest, but the faithful of every nationality, whether converted by the force of arms or by the preaching of missionaries, acquire the same rights and dignity as the Arabs. The universalism of Christianity needs no proof. Here, however, the difference begins. We class these three religions under one head, because they resemble one another in so many respects, and because they differ from the other religious communities founded by individuals precisely in that in which they are mutually alike. But we are far from placing them on the same level. Islâm, *e.g.*, is not original, not a ripe fruit, but rather a wild offshoot of Judaism and Christianity. Buddhism, though the most widely spread, has never been victorious except where it had to contend with religions standing on no very high degree of development. For a short time it had a footing in Persian countries, but there its influence was neither deep nor durable, and in China it was not even able to overcome Confucianism and Taoism; it seems to have been driven from India by Brahmanism, without being actually persecuted. Both Islam and Buddhism, if not national, are only relatively universalistic, and show the one-sidedness, the one of the Semitic, the other of the Aryan race. The former represents an important religious idea—the absolute sovereignty of the one God, towards whom man, being nothing himself, has only one duty, that of tacit obedience; it exalts the divine, not combining it with, but opposing it to, the human, which it despises, and therefore neglects the development of ethics. Buddhism on the contrary neglects the divine, preaches the final salvation of man from the miseries of existence through the power of his own self-renunciation; and therefore, as it is atheistic in its origin, it very soon becomes infected by the most fantastic mythology and the most childish superstitions. If religion really is the synthesis of dependence and liberty, we might say that Islâm represents the former, Buddhism the latter element only, while Christianity doés full justice to both of them. Christianity, the pure and unalloyed at least, has fused dependence and liberty, the divine and the human, religion and ethics into an indivisible unity.

5. There are still some other points of difference. Thus, to mention one point only, Mohammedanism in its external features is little better than an extended Judaism. Spread over many countries, adopted by various nations differing in culture, speech, and race, nevertheless it has its holy language, its unvarying rites, its central sanctuary round which the pilgrims from every part of the Mohammedan world assemble every year. Not so with Buddhism and Christianity. If Christian crusaders tried to reconquer their Holy Land from the infidels, and in fact possessed it for a time, if mediæval Buddhist pilgrims desired to see, and some Christian pilgrims even now visit, the places where the cradle of their faiths once stood, all this makes no longer an integral part of their worship, which is not necessarily bound to place or time. The divisions of Buddhism and Christianity are mutually much more independent than those of Mohammedanism. Still, though in this respect Buddhism comes nearer to Christianity, this alone preaches a worship in spirit and in truth; and in that which Rothe called its greatest excellence, in its variety, its changeableness, its power of adapting itself to the religious wants of various generations, peoples, and individuals, in a word, in its elasticity, which is the natural result of its purely spiritual character, Christianity ranks incommensurably high above both its rivals.[1] But we cannot pursue this matter any further.

We now give the following sketch of a morphological classification of religions:—

I. NATURE RELIGIONS.

(*a*) Polydæmonistic Magical Religions under the control of Animism.

To this class belong the religions of the so-called savages or uncivilized peoples, but they are only degraded remnants of what they once must have been.

(*b*) Purified or organized Magical Religions.

Therianthropic Polytheism.

1. *Unorganized.*

Japanese Kami-no-madsu.
The non-Aryan (Dravidian) religions of India, principally in the Deccan.
Religion of the Finns and Ehsts.
The old Arabic religions.
Old Pelasgic religion.
Old Italiote religions.
Etruscan religion before its admixture with Greek elements(?)
The old Slavonic religions.

2. *Organized.*

The semi-civilized religions of America: Maya, Natchez, Toltecs-Aztecs, Muyscas, Incas in Peru.
The ancient religion of the Chinese empire.
Ancient Babylonian (Chaldæan) religion.
Religion of Egypt.

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[1] To prevent misconstruction, it is perhaps not superfluous to state that we are giving here neither a confession of faith nor an apology, but that we have here to treat Christianity simply as a subject of comparative study, from a scientific, not from a religious point of view.

c) Worship of manlike but superhuman and semi-ethical beings. Anthropomorphic Polytheism.

The ancient Vaidic religion (India).
The pre-Zarathustrian Iranic religion (Bactria, Media, Persia).
The younger Babylonian and Assyrian religion.
The religions of the other civilized Semites (Phœnicia, Canaan, Aramæa, Sabæans in South Arabia).
The Celtic, Germanic, Hellenic, and Græco-Roman religions.

II. Ethical Religions.

(*a*) National Nomistic (Nomothetic) religious communities.

Taoism and Confucianism in China.
Brahmanism, with its various ancient and modern sects.
Jainism and primitive Buddhism.
Mazdaism (Zarathustrianism), with its sects.
Mosaism.
Judaism.

(*b*) Universalistic religious communities.

Islâm, Buddhism, Christianity.

We conclude with a few remarks on the history and spread of religions. Between the history of religions and that of religion in general there is no real difference. A history of religions must be something other and more than a collection of the histories of the principal religions, arranged after a chronological or an ethnological scheme. The connecting links and historical relations between them must be kept in view. It ought to be shown how every religion coming to the front on the stage of history is rooted in the past, has been fostered so to speak by one or more of its predecessors, and cannot be maintained without taking up and assimilating the still living elements of the old faith. Special attention must be paid to the spread and intermixture of religions and systems, myths and rites, the cause of so many changes, of thorough reforms as well as of corruption and decay. Thus, even undesignedly the history of religions exhibits the progress of the religious idea in the history of mankind.

The oldest historical documents, contemporaneous with the facts they record, are undoubtedly those of ancient Egypt and Babylonia; perhaps the latter may in the end prove the more ancient of the two. Be this as it may, documentary history begins in western Asia and north-eastern Africa. And it is remarkable that even in that remote past we find the religions both of ancient Babylonia and of Egypt in anything but a primitive state—remarkable, but only natural, as civilization must have reached a rather elevated standpoint to produce such written documents and works of art. Many centuries, at all events a long period, of religious evolution must have preceded the dawn of religious history. Even then and there, just as elsewhere, that which lies behind can only be conjectured, but conjecture may be raised to a high degree of probability by comparing the myths and rites surviving in the historical religions, though they really belong to a former state of development, with those still prevailing among uncivilized tribes. For several centuries these two religions, whatever may have been their genealogical relation, were developed independently, and the task of the historian is, by studying the most ancient records, to give a notion of their earliest state and to point out the faint traces of their internal changes which are still extant. There are some vague allusions to an early Babylonian conquest of western Asia, which might account for the agreement of some ancient modes of worship in the Western countries with those of Babylonia; but before the XVIIIth Dynasty of Egypt (15th or 16th century B.C.) the empires on the banks of the Euphrates and Tigris and that on the banks of the Nile seem not yet to have come into contact. From that time, at least during the rule of the XIXth Dynasty, not a few Semitic deities were admitted into the Egyptian pantheon. In a well-known hymn the victorious Egyptian king is compared to the Semitic Ba'al as well as to the national god Mentu. On the other hand, but much later, some Egyptian religious emblems find their way into Assyria, and several Egyptian gods with Egyptian modes of worship into Phœnicia. Assyrian religion, being an early offshoot of the Babylonian, and with the lapse of time more and more imbued with younger Babylonian elements, spreads westwards with the extension of the Assyrian empire, penetrates into Asia Minor and Syria, and finds followers even among the kings of Judah. But there the prophets, true to their national god Jahveh, and reforming his worship on purely ethical principles, wrestle with unbending perseverance against those foreign idolatrous customs and lay the foundations of that monotheistic community which survives the Babylonian exile, and, having been organized as Judaism, becomes the cradle of Christianity.

Did space permit we would fain pursue the rapid historical sketch, which tends to show how even in ancient times there was a continuous interchange of ideas and rites between the leading religions, those even which are commonly considered as being purely national—that is, so entirely fused with the social and political life of a nation that they seem unfit for adoption by peoples widely different. But a general survey of the history of religions cannot be given here. All that can be done is to indicate in a few words its further course, not without hinting that the same interchange as we have observed in western Asia and Egypt is to be found everywhere.

In eastern Asia the dominating religions are those of China and of India. They too have been developed independently, each radiating from its centre, China proper and Hindustan, so far as either the vast Chinese empire or the Aryan dominion over the Indian peninsula extended. The Chinese civilization seems to be much older than the Indian. But the sources from which a knowledge of the ancient Chinese religion might be drawn have come down to us thoroughly revised and expurgated either by Confucius himself or by some of his followers. The ancient religious literature of India is very extensive, and in it three or four stages of religious thought may without difficulty be found; but the real ancient history of Indian religion is not to be gathered from it. Neither Chinese nor Indian religions have exercised any influence on the progress of religion in the west of Asia or in Europe. They form a world apart. The Chinese religion was adopted by some Mongolian tribes and was introduced into Corea and Japan; Indian settlers, Vaishnavas, Çaivas, or Bauddhas, carried Indian thought and Indian worship with them to some parts of Further India and of the Indian archipelago, but this happened in relatively recent times. For ages and ages they lived quite isolated and self-sufficient—the Chinese either with Lao-tsze seeking the veritable Tao in the highest ideal of absolute isolation, or with Confucius amiably moralizing on the duties of "the perfect man"; the Indian dreaming his monotonous and fantastic dreams and longing for absorption in the eternal Brahm; neither of them suspecting that without them, among what they would have called Western barbarians if they had known of their existence, the world's history was going on as a mighty stream of which they did not even hear the distant roar. It was not until Darius the son of Hystaspes, but chiefly Alexander the Great, had opened the gates of India to Western civilization that an Indian sovereign, converted to Buddhism, could think of benefiting foreign nations by the message of salvation from the miseries of existence, and that Buddhist missionaries went out to nearly every part of Asia.

Meanwhile Medo-Persian supremacy had supplanted the Assyrian and Neo-Babylonian, and with it the Zarathustrian religion (Mazdaism) had come in contact with those of western Asia. This too had its distinct place in the general history of religion. For though it seems not to have spread much farther than the Iranian languages, and the attempts of Mazdayaçnan missionaries to convert certain Tartar or Mongolish tribes were not crowned with extraordinary success, its tenets deeply influenced the post-exilian angelology and demonology of the Jews, and through it the belief on these subjects current among mediæval Christians. Moreover, not indeed the whole system, but still some of its semi-spurious offshoots, remnants of the *OLD EAST ARYAN* mythology, neglected by the Zarathustrian reformers, but afterwards revived and mixed up with Semitic elements, the worship of Mithra and Anâhita, wandered from Asia Minor through Greece and Italy to Germany and found adherents everywhere.

The final and, if we except that of Mosaism, the most interesting chapter of the ancient history of religions is that which narrates the growth, the transformations and vicissitudes, the decline and corruption of the worship belonging to Greece and Rome. Its importance to general history needs no exposition. But its real purport is in the main not realized, or at least misunderstood. It is indeed the history of the spread of that rich and composite mythological system which is called Hellenic religion over the whole civilized world of Europe and part of Asia and Africa, and of the total transformation of the ancient Roman religion by its influence. But, studied in the true historical, that is, genetic and comparative, spirit—not with the jealous narrow-mindedness of the old classical school, whose idol, the self-sufficient and self-educated Greek, has already been broken to pieces, nor with the one-sidedness of some comparative mythologists, who have substituted the self-sufficient Aryan for that imaginary Greek—Hellenic religion appears to be rooted, not only in the old national worship, but also, and even deeper, in the religions of some Eastern peoples, as is the case with Hellenic art and all the other branches of that splendid civilization. It would never have risen so high above the level of old Pelasgic faith and worship, never have spread over so wide an area, never have reigned with ever increasing authority in Etruria and in Rome, had not the deeper religious ideas of Semitic and other Eastern nations, which prevailed in the Phœnician colonies on the islands and coasts of the Mediterranean, and above all in that focus of all kinds of worship, Asia Minor, become assimilated with it, and—for this too must be acknowledged—had it not after all impressed those ideas with the stamp of Aryan fancy and Hellenic taste, the stamp of its own genius. The great stream of religious development which had its sources in Egypt, in Babylon, and in Irân, and many less important affluents, finishes its course in the Græco-Roman religion. With this the old world dies away. But then the preaching of the gospel had already laid the foundations of a new and higher world of religious life, which no more belongs to ancient history.

Modern history of religions is chiefly the history of Buddhism, Christianity, and Islâm, and of their wrestling with the ancient faiths and primitive modes of worship, which slowly fade away before their encroachments, and which, where they still survive in some parts of the world and do not reform themselves after the model of the dominant religion, draw nearer and nearer to extinction.

But the subject is too vast to be treated of in detail here. It has been our object only to show, even for the ancient history of religions, the continuity and coherence which nobody will deny with regard to the modern In both ancient and modern times, religions spread (1) by the influence of superior civilization, (2) by conquest, (3) by colonization or commerce, (4) by missions. Examples are too numerous and too well known to require mention here.

Literature.—The numerous monographs on special religions, as well as treatises on the philosophy of religion, on mythology, ou comparative mythology even, must be excluded from this notice. Only the most important collections of historical monographs, and those philosophical works which are not purely or principally speculative, but are based on the comparative study of the religions themselves, will be mentioned.

For the so-called science of religion in general see Benjamin Constant, *De la Religion considérée dans sa source, ses formes, et ses développements*, 5 vols., Paris, 1824-31; E. Spiess, *De religionum indagationis comparativæ vi ac dignitate theologica* Jena, 1871; F. Max Muller, *Chips from a German Workshop*, vol. i., London, 1867; Id., *Introduction to the Science of Religion*. London, 1873; Émile Burnouf, *La Science des Religions*, 4th ed., Paris, 1885; Daniel G. Brinton, *The Religious Sentiment, its Source and Aim*, New York, 1876; A. Réville, *Prolégomènes de l'Histoire des Religions*, Paris, 1881; W. D. Whitney, "On the so-called Science of Religion," in the *Princeton Review*; Id., *Oriental and Linguistic Studies*, 1st and 2d series, New York, 1873-74; L. Vèzes, *De la Religion et des Religions*, Montauban, s.a.

A more or less complete history of religions (narrative and descriptive) was attempted by Meiners, *Allg. kritische Geschichte der Religionen*, 2 vols., Hanover, 1806-7, A. v. Colln, *Lehrbuch der vorchristl. Religionsgeschichte*, Lemgo, 1855; J. H. Scholten, *Geschiedenis der godsdienst en wijsbegeerte*, 3d ed., Leyden, 1863; J. Gardner, *The Religions of the World*, London, 1872; C. P. Tiele, *Outlines of the History of Religion to the spread of the Universal Religions*, transl. by J. E. Carpenter, London, 1877 (a totally re-written Dutch edition is in preparation). The history of the principal religions of the world is described in the series of monographs published at Haarlem entitled *De Voornaamste Godsdiensten* (*Islamism*, by Dozy, 1863; *Pârsism*, by Tiele, 1864; *Buddhism*, by Kern, 1883-84; *Greek Religion*, by Van Oordt, 1864; *Norse Religion*, by Meyboom, 1868; *Israel*, 2 vols., by Kuenen, 1869-70; *Roman Catholicism*, by Pierson, 4 vols., 1868-74; *Protestantism*, by Rauwenhoff, 2 vols., 1865-71). See, too, C. P. Tiele, *Hist. comparée des religions de l'Égypte et des peuples Sémitiques*, trans. by G. Collins, Paris, 1882; A. Réville, *Les religions des peuples non-civilisés*, Paris, 1883; Id., *Les religions du Mexique, de l'Amér. centrale, et du Pérou*, Paris, 1885 (compare the Hibbert Lectures for 1884). Of another series, under the title *Oriental Religions and their relation to Universal Religion*, by Samuel Johnson, three volumes only are published (*India*, 2d ed., London, 1873; *China*, Boston, 1877; *Persia*, 1885). P. D. Chantepie de la Saussaye published four popular sketches of the religions of Confucius, Lao-tsze, Zarathustra, and Buddha, but with copious notes and references, Utrecht, 1883. Equally popular is G. Rawlinson's *Religions of the Ancient World*, London, s.a.

To the comparative study of religions and to the philosophy of the history of religions belong O. Pfleiderer, *Die Religion, ihr Wesen und ihre Geschichte*, Berlin, 1869; Id., *Religionsphilosophie auf geschichtlicher Grundlage*, 1878 (2d ed. revised and enlarged, in 2 vols., 1883-84); E. Renan, *Études d'histoire religieuse*, 2d ed., Paris, 1857; Jas. Freeman Clarke, *Ten Great Religions, an Essay in Comparative Theology*, Boston, 1871 (called by Prof. Whitney an industrious collector and an impartial reporter); E. F. Langhans, *Das Christenthum und seine Mission im Lichte der Weltgeschichte*, Zurich, 1875; A. M. Fairbairn, *Studies in the Philosophy of Religion and History*, 1876; Chas. Newton Scott, *The Foregleams of Christianity*, London, 1877; J. Stuart Blackie, *The Natural History of Atheism*, London, 1877; C. Puini, *Saggi di storia della Religione*, Florence, 1882; E. von Hartmann, *Das relig. Bewusstsein der Menschheit im Stufengange seiner Entwickelung*, Berlin, 1882; Jul. Happel, *Das Christenthum und die heutige vergleichende Religionsgeschichte*, Leipsic, 1882. See, too, the Hibbert Lectures of F. Max Müller, 1878, and of A. Kuenen, *National Religions and Universal Religions*, 1882. The connexion between religion on the one side and state and society on the other is discussed by J. C. Bluntschli, *Altasiatische Gottes- und Weltideen*, Nördlingen, 1866; C. Twesten, *Die religiös., polit., und socialen Ideen der asiat. Culturvölker und der Aegypter*, 2 vols., Berlin, 1872 (ed. by M. Lazarus); Gilliot, *Études histor. et crit. sur les religions et institutions comparées*, Paris, 1883. E. Wippermann's *Altorient. Religionsstaaten*, Marburg, 1851, is now antiquated.

The views of the present writer on various subjects relating to the science of religion have been expounded in several volumes of the *Theol. Tijdschrift* and *De Gids*. Only a few of these papers have been translated into German or French. See, *e.g.*, *Revue politique et littéraire*, 12th August 1876 and 12th January 1878. In the *Theol. Tijdschrift* are to be found some articles on cognate subjects by Profs. Kuenen and Rauwenhoff and by Dr A. Bruining. Valuable contributions to the history of religions are given by the *Revue de l'Histoire des Religions*, edited by Vernes, 1880-84, and by Jean Réville, 1885. Prof. Max Müller is rendering an important service to the comparative study of religions by his collection of translations entitled *Sacred Books of the East*, of which some twenty-four volumes have appeared, and which is still in course of publication. (C. P. T.)

REMAINDER, REVERSION. In the view of English law a remainder or reversion is classed either as an incorporeal hereditament or, with greater correctness, as an estate in expectancy (see Real Estate). That is to say, it is a present interest subject to an existing estate in possession called the particular estate, which must determine before the estate in expectancy can become an estate in possession. A remainder or reversion is in strictness confined to real estate, whether legal or equitable, though a similar interest may exist in personalty. The particular estate and the remainder or reversion together make up the whole estate over which the granter has power of disposition.[1] Accordingly a remainder or reversion limited on an estate in fee simple is void. The difference between a remainder and a reversion, stated as simply as possible, is that the latter is that undisposed-of part of the estate which after the determination of the particular estate will fall into the possession of the original grantor or his representative, while a remainder is that part of the estate which under the same circumstances will fall into the possession of a person other than the original grantor or his representative. A reversion in fact is a special instance of a remainder, distinguishable from it in two important respects:—(1) a reversion arises by operation of law on every grant of an estate where the whole interest is not parted with, whereas a remainder is created by express words; (2) tenure exists between the reversioner and the tenant of the particular estate, but not between the latter and the remainderman. Accordingly rent service is said to be an incident of a reversion but not of a remainder, and a reversioner could distrain for it at common law (see Rent). A reversion may be limited upon any number of remainders, each of them as it falls into possession becoming itself a particular estate. Thus A may grant an estate for life or for years to B, with remainder to C, with remainder to D, with a reversion or ultimate remainder to himself. A remainder or reversion may be alienated either by deed or by will. A conveyance by the tenant of a particular estate to the remainderman or reversioner is called a surrender; a conveyance by the remainderman or reversioner to the tenant is a release.

Remainder.—Remainders are either vested or contingent. "An estate is vested in interest when there is a present fixed right of future enjoyment. An estate is contingent when a right of enjoyment is to accrue on an event which is dubious and uncertain. A contingent remainder is a remainder limited so as to depend on an event or condition which may never happen or be performed, or which may not happen or be performed till after the determination of the preceding estate" (Fearne, *Contingent Remainders*, 2, 3). Contingent remainders are of two kinds, those limited to uncertain persons and those limited on uncertain events. A grant by A to B for life, followed by a remainder in fee to the heir of C is an example of a contingent remainder.[2] Until the death of C he can have no heir. If C die during the lifetime of B, the contingent remainder of his heir becomes vested; if C survive B, the remainder is at common law destroyed owing to the determination of the particular estate, for every remainder must have a particular estate to support it. In the case of a contingent remainder, it must become vested during the continuance of the particular estate or at the instant of its determination. This rule of law no doubt arose from the disfavour shown by the law to contingent remainders on their first introduction. They were not firmly established even when Littleton wrote in the reign of Edward IV. (see Williams, *Real Property*, pt. ii. ch. ii.). The inconveniences resulting from this liability of contingent remainders to destruction were formerly overcome by the device of appointing trustees to preserve contingent remainders at law. Equitable contingent remainders, it should be noticed, were indestructible, for they were supported by the legal estate. In recent times the matter has been dealt with by Act of Parliament. By 8 & 9 Vict. c. 106, § 8, a contingent remainder is rendered capable of taking effect notwithstanding the determination by forfeiture, surrender, or merger of any preceding estate of freehold in the same manner as if such determination had not happened. The case of determination by any other means is met by 40 & 41 Vict. c. 33. The Act provides that a contingent remainder which would have been valid as a springing or shifting use or executory devise or other limitation had it not had a sufficient estate to support it as a contingent remainder is, in the event of the particular estate determining before the contingent remainder vests, to be capable of taking effect as though the contingent remainder had originally been created as a springing or shifting use or executory devise or other executory limitation. It will accordingly only be good if the springing use, &c. (for which see Trust), would be good. If the springing use be void as a breach of the rule against perpetuities (see Real Estate), the remainder will likewise be void. It may be noticed that, apart from this Act, there is some uncertainty as to the application of the rule against perpetuities to remainders. The better opinion is that it applies to equitable remainders and to legal remainders expectant upon an estate for life limited to an unborn person. In the latter case the rule as applied to contingent remainders is somewhat different from that affecting executory interests. The period is different, the remainder allowing the tying up of property for a longer time than the executory interest. There is also the further difference that the rule does not affect a contingent remainder if it become vested before the determination of the particular estate. An executory interest is void if it may transgress the rule, even though it do not actually do so. The subject of remainders would not be complete without a reference to the famous rule in "Shelley's Case" (1 Coke's *Reports*, 93 b). The rule is that when the ancestor by any gift or conveyance takes an estate of freehold, and in the same gift or conveyance an estate is limited, either mediately or immediately, to his heirs or the heirs of his body, in such a case the word "heirs" is a word of limitation and not of purchase; that is to say, the estate of the ancestor is not a life or other freehold estate with remainder to the heirs or heirs of the body, but an estate in fee or an estate tail according to circumstances. The rule is a highly technical one, and has led to much litigation and in many cases without a doubt to the defeat of a testator's intentions. It is said to have had its origin in the wish of the law to preserve to the lords their right of wardship, which would have been ousted by the heir taking as purchaser and not as successor.

The State laws of the United States affecting remainders will be found in Washburn, *Real Property*, vol. ii. bk. ii. ch. iv. § 7. As a general rule contingent remainders have been rendered of little practical importance by enactments that they shall take effect as executory devises or shall not determine on determination of the particular estate. The rule in "Shelley's Case" is the common law where it is not repealed by statute. The prevailing spirit of legislation in the States is unfavourable to its continuance.

Reversion.—Unlike remainders, all reversions are present or vested estates. The law of reversion, like that of remainder, has been considerably modified by statute. It was formerly considered that on the grant of the reversion the tenant should have the opportunity of objecting to the substitution of a new landlord. It was therefore necessary that he should attorn tenant to the purchaser. Without such attornment the grant was void, unless indeed attornment were compelled by levying a fine. The necessity of attornment was abolished by 4 & 5 Anne c. 16. Its only use at present seems to be in the case of mortgage. A mortgagor in possession sometimes attorns tenant to the mortgagee in order that the latter may treat him as his tenant and distrain for his interest as rent. The legal view that rent was incident to the reversion led at common law to a destruction of the rent by destruction of the reversion. This would of course chiefly happen in the case of an under-tenant and his immediate reversioner, if the intermediate became merged in the superior reversion. To obviate this difficulty it was provided by 8 & 9 Vict. c. 106, § 9, that, on surrender or merger of a reversion expectant on a lease, the rights under it should subsist to the reversion conferring the next vested right. The question as to what covenants run with the reversion is one of the most difficult in law. The rule of common law seems to have been that covenants ran with the land but not with the reversion, that is to say, the benefit of them survived to a new tenant but not to a new landlord. The effect of the Act of 32 Hen. VIII. c. 34, and of the Conveyancing Act, 1881 (44 & 45 Vict. c. 41, §§ 10, 11, 58), has been to annex to the reversion as a general rule the benefit of the rent and the lessee's covenants and the burden of the lessor's covenants. Merely collateral covenants, however, do not run with the reversion, but are regarded as personal contracts between lessor and lessee. At common law on the severance of a reversion a grantee of part of the reversion could not take advantage of any condition for re-entry, on the ground that the condition was entire and not severable. This doctrine was abolished by one of Lord St Leonard's Acts in 1859. The Conveyancing Act, 1881, § 12, now provides in wider terms than those of the Act of 1859 that on severance of the reversion every condition capable of apportionment is to be apportioned. In order to guard against fraudulent concealment of the death of a *cestui que*

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[1] Compare the life-rent and fee of Scotch law.

[2] A contingent remainder amounting to a freehold cannot be limited on a particular estate less than a freehold.

vie, or person for whose life any lands are held by another, it was provided by 6 Anne c. 18 that on application to the Court of Chancery by the person entitled in remainder, reversion, or expectancy, the *cestui que vie* should be produced to the court or its commissioners, or in default should be taken to be dead. The purchase of a reversionary interest might formerly have been set aside in a court of equity on the ground of inadequacy of price. This rule of equity no longer exists. It was enacted by 31 Vict. c. 4 (which extends to the United Kingdom) that no purchase made *bona fide* of a reversionary interest in real or personal estate shall be set aside merely on the ground of under-value. The Act does not affect those cases in which the courts relieve against such purchases on the ground of fraud or duress—the cases, for instance, of exorbitant bargains made by money-lenders with expectant heirs. In Scotland reversion is generally used in a sense approaching that of the equity of redemption of English law. A reversion is either legal, as in an adjudication, or conventional, as in a wadset. Reversions are registered under the system established by the Act 1617 c. 16 (see REGISTRATION).

In the United States the Act of 32 Hen. VIII. c. 34 "is held to be in force in Massachusetts, Pennsylvania, Illinois, and Connecticut, but was never in force in New York till re-enacted" (Washburn, *Real Property*, vol. i. 432). (J. Wt.)

REMBRANDT (1607–1669). REMBRANDT HARMENS VAN RIJN, the chief of the Dutch school of painting and one of the greatest painters the world has seen, was born in Leyden on the 15th July 1607.[1] It is only within the past thirty years that we have come to know anything of the real history of the man. Up to that time we had but a tissue of fables connected with his name and representing him as ignorant, boorish, and avaricious. These fictions, resting on the loose assertions of Houbraken (*De Groote Schouburgh*, 1718), have been cleared away by the untiring researches of Scheltema and other Dutchmen, notably by C. Vosmaer, whose elaborate work (*Rembrandt, sa Vie et ses Œuvres*, 1868, 2d ed. 1877) will remain as the basis of our knowledge of the man and of the chronological development of the artist.[2] Rembrandt's high position in European art rests on the originality of his mind, the power of his imagination, his profound sympathy with his subjects, the boldness of his system of light and shade, the thoroughness of his modelling, his subtle colour, and above all on the intense humanity of the man. He was great in conception and in execution, a poet as well as a painter, an idealist and also a realist; and this rare union is the secret of his power. From his dramatic action and mastery of expression Rembrandt has been well called "the Shakespeare of Holland." To understand aright his position in art, we must consider rapidly his surroundings and note the influences which affected him; we shall thus find what he had in common with his time and understand better how far he was really a new power, an original genius.

It must be borne in mind that in the beginning of the 17th century Holland had risen to great power. Though not yet formally free from the Spanish yoke, she had broken the fetters by the heroic efforts of the former generation, and had entered on her grand career of national enterprise. Science and literature flourished in her universities, poetry and the stage were favoured by her citizens, and art found a home not only in the capital but in the provincial towns. It was a time also of new ideas. Old conventional forms in religion, philosophy, and art had fallen away, and liberty was inspiring new conceptions. It is with those of art that we have to deal. Here there were no church influences at work to fetter the painter in the choice and treatment of his subject, no academies to prescribe rules. Left to himself, therefore, the artist painted the life of the people among whom he lived and the subjects which interested them. It was thus a living history that he painted,—scenes from the everyday life and amusements of the people, often mean and vulgar it must be confessed, the civic rulers, the regents of the hospitals and the heads of the guilds, and the civic guards who defended their towns. So also with the religious pictures which were produced under the influence of these environments. The dogmas and legends of the Church of Rome were no longer of interest to such a nation; but the Bible was read and studied with avidity, and from its page the artist drew directly the scenes of the simple narrative. The Old and New Testaments and the Apocrypha were the sources from which, without any interference of Jesuit inquisitors, he drew his inspiration. This change had been coming on steadily since the Reformation, a change that implied a growing freedom from trammels and a larger and more human view of the subjects treated. Perhaps the earliest trace of this new aspect of Bible story is to be found in the pictures painted in Rome about the beginning of the 17th century by Adam Elsheimer of Frankfort, who had undoubtedly a great influence on the Dutch painters studying in Italy. These in their turn carried back to Holland the simplicity and the picturesque effect which they found in Elsheimer's work. Among these, the precursors of Rembrandt, may be mentioned Moeyaert, Ravesteyn, Lastman, Pinas, Honthorst, and Bramer. Influenced doubtless by these painters, Rembrandt determined to work out his own ideas of art on Dutch soil, resisting apparently every inducement to visit Italy. Though an admirer of the great Italian masters, he yet maintained his own individuality in the most marked manner. It is strange that we have no evidence that he ever met his greatest Dutch rival, the brillant Frans Hals, his senior by some fifteen years.

Rembrandt was born in the house No. 3 Weddesteg, on the rampart at Leyden overlooking the Rhine. The house belonged to his father Gerrit Harmen van Rijn, a well-to-do miller, and still exists, but the windmill is no more. He was the fourth son, and, as the older boys had been sent to trade, his parents resolved that he should enter a learned profession. With this view he was sent to the High School at Leyden; but the boy soon manifested his dislike of the prospect and determined to be a painter. Accordingly he was placed for three years under Swanenburch, a connexion of the Van Rijn family. This master was a painter of no great merit, but he enjoyed some reputation from his having studied in Italy. His next master was Lastman of Amsterdam, a painter of very considerable power. In Lastman's works we can trace the germs of the colour and sentiment of his greater pupil, though his direct influence cannot have been great, as it is said by Orlers that Rembrandt remained with him only six months, after which time he returned to Leyden, about 1623. During the early years of his life at Leyden Rembrandt seems to have devoted himself entirely to studies, painting and etching the people around him, the beggars and cripples, every picturesque face and form he could get hold of. Life, character, and above all light were the aims of these studies. His mother was a frequent model, and we can trace in her features the strong likeness to her son, especially in the portraits of himself at an advanced age. So far as we know there is no likeness of his father, who died about 1632. The last portrait of his mother is that of the Belvidere Gallery of Vienna, painted the year before her death in 1640. One of his sisters also frequently sat to him, and Bode suggests that she must have accompanied him to Amsterdam and kept house for him till he married. This conjecture rests on the number of portraits of the same young woman painted in the early years of his stay in Amsterdam and before he met his bride. Then, again, in the many portraits of himself painted in his early life we can see with what zeal he set himself to master every form of expression, now grave now gay, at one time with a smile at another with a frown,—how thoroughly he learned to model the human face not from the outside but from the inner man Careful in detail and thorough in work, these studies were the foundation of his later triumphs. Dr Bode gives fifty as the number of the portraits of himself, most of them painted in youth and in old age, the times when he had leisure for such work.

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[1] This is now generally accepted as the year of his birth, though some hold it should be 1606 or 1608.

[2] Vosmaer's first volume, on the precursors and apprenticeship of Rembrandt, was published in 1863. New light has since been thrown on important points by Dr Bode (*Holländische Malerei*, 1883), De Roever, De Vries, and others.

Rembrandt's earliest pictures were painted in the last four years of his stay at Leyden, from 1627 to 1631. Bode mentions about nine pictures as known to belong to these years, chiefly paintings of single figures, as St Paul in Prison and St Jerome; but now and then compositions of several, as Samson in Prison and Presentations in the Temple. The prevailing tone of all these pictures is a greenish-grey, the effect being somewhat cold and heavy. The gallery at Cassel gives us a typical example of his studies of the heads of old men, firm and hard in workmanship and full of detail, the effects of light and shade being carefully thought out. His work was now attracting the attention of the lovers of art in the great city of Amsterdam; and, urged by their calls, he removed about 1631 to live and die there. His life has few incidents and these only personal, for he lived among the simple burgher citizens, moving in an excellent circle of men of science, divines, poets, artists, and friends of art. At one bound he leaped into the position of the first portrait painter of the city, and received numerous commissions. During the early years of his residence there are at least forty known portraits from his hand, firm and solid in manner and staid in expression. It has been remarked that the fantasy in which he indulged through life was reserved only for the portraits of himself and his immediate connexions. The excellent painter Thomas De Keyser was then in the height of his power, and his influence is to be traced in some of Rembrandt's smaller portraits. Pupils also now flocked to his house in the Bloemgracht, among them Gerard Douw, who was nearly of his own age. The first important work executed by Rembrandt in Amsterdam is Simeon in the Temple, of the Hague Museum, a fine early example of his treatment of light and shade and of his subtle colour. The concentrated light falls on the principal figure, his favourite way of arresting attention, while the background is full of mystery. The surface is smooth and enamelled, and all the details are carefully wrought out, while the action of light on the mantle of Simeon shows how soon he had felt the magical effect of the play of colour. Between the small Simeon of 1631 and the life-sized Lesson in Anatomy of 1632 there is a great difference. In the latter we have the first of the great portrait subjects, —Tulp the anatomist, the early friend of Rembrandt, discoursing to his seven associates, who are ranged with eager heads round the foreshortened body. The subject was not new, for it had been treated in former years by the Mierevelds, A. Pietersen, and others, for the Hall of the Surgeons But it was reserved for Rembrandt to make it a great picture by the grouping of the expressive portraits and by the completeness of the conception. The colour is quiet and the handling of the brush timid and precise, while the light and shade are somewhat harsh and abrupt. But it is a marvellous picture for a young man of twenty-five, and it is generally accepted as the first milestone in the career of the painter, and as marking a new departure.

In the forty long years of Rembrandt's incessant activity as an artist about seven hundred pictures are known to have come from his own hand. It is therefore clearly impossible within the space at our disposal to notice more than the prominent works in their order. Besides the Pellicorne family portraits of 1632, we have the caligraphist Coppenol of the Cassel Gallery, interesting in the first place as an early example of Rembrandt's method of giving permanent interest to a portrait by converting it into a picture. He invests it with a sense of life by a momentary expression as Coppenol raises his head towards the spectator while he is mending a quill. The same motive is to be found in the Shipbuilder, 1633 (of Buckingham Palace), who looks up from his work with a sense of interruption at the approach of his wife. But the worthy Coppenol, "the Phœnix of the Pen," has another charm for us; he was one of Rembrandt's earliest friends in his new abode and remained true to the end, being painted thrice and etched twice by the artist, the last of whose portrait etchings (1661) was *the* Coppenol of large size. The two small pictures of the Philosopher of the Louvre date from 1633, delicate in execution and full of mysterious effect. The year 1634 is especially remarkable as that of his marriage with Saskia van Ulenburgh, a beautiful, fair-haired Frisian maiden of good connexions. Till her death in 1642 she was the centre of his life and art, and lives for us in many a canvas as well as in her own portraits. On her the painter lavished his magical power, painting her as the Queen Artemisia or Bathsheba, and as the wife of Samson,—always proud of her long fair locks, and covering her with pearls and gold as precious in their play of colour as those of the Indies. A joyous pair as we see them in the Dresden Gallery, Saskia sitting on his knee while he laughs gaily, or promenading together in a fine picture of 1636, or putting the last touches of ornament to her toilette, for thus Bode interprets the so-called Burgomaster Pancras and his Wife. These were his happy days when he painted himself in his exuberant fantasy, and adorned himself, at least in his portraits, in scarfs and feathers and gold chains. Saskia brought him a marriage portion of forty thousand guilders, a large sum for those times, and she brought him also a large circle of good friends in Amsterdam. She bore him four children, Rumbartus and two girls successively named Cornelia after his beloved mother, all of whom died in infancy, and Titus, named after Titia a sister of Saskia. We have several noble portraits of Saskia, a good type of the beauty of Holland, all painted with the utmost love and care, at Cassel (1633), at Dresden (1641), and a posthumous one (1643) at Berlin. But the greatest in workmanship and most pathetic in expression seems to us, though it is decried by Bode, that of Antwerp (1641), in which it is impossible not to trace declining health and to find a melancholy presage of her death, which took place in 1642. Then truly went out the light of Rembrandt's life.

Returning to Rembrandt's work, we find one of the greatest portraits of 1634 to be the superb full length portrait of Martin Daey, which with that of Madame Daey, painted according to Vosmaer some years later, formed one of the ornaments of the Van Loon collection at Amsterdam. Both now belong to Baron Gustave de Rothschild. From the firm detailed execution of this portrait one turns with wonder to the broader handling of the Old Woman, aged eighty-three, in the National Gallery, of the same year, remarkable for the effect of reflected light and still more for the sympathetic rendering of character.

The life of Samson supplied many subjects in these early days. The so-called Count of Gueldres Threatening his Father-in-law of the Berlin Gallery has been restored to its proper signification by M. Kolloff, who finds it to be Samson. It is forced and violent in its action. But the greatest of this series, and one of the prominent pictures of Rembrandt's work, is the Marriage of Samson of the Dresden Gallery, painted in 1638. Here Rembrandt gives the rein to his imagination and makes the scene live before us. Except the bride (Saskia), who sits calm and grand on a dais in the centre of the feast, with the full light again playing on her flowing locks and wealth of jewels, all is animated and full of bustle. Samson, evidently a Rembrandt of fantasy, leans over a chair propounding his riddle to the Philistine lords. In execution it is a great advance on former subject pictures; it is bolder in manner, and we have here signs of his approaching love of warmer tones of red and yellow. It is also a fine example of his magic play of colour.

The story of Susannah also occupied him in these early years, and he returned to the subject in 1641 and 1653. The Bather of the National Gallery may also be another interpretation of the same theme. In all of these pictures the woman is coarse in type and lumpy in form, though the modelling is soft and round, the effect which Rembrandt always strove to gain. Beauty of form was outside his art. But the so-called Danae (1636) at St Petersburg is a sufficient reply to those who decry his nude female forms. As flesh painting it glows with colour and life, and the blood seems to pulsate under the warm skin. In the picturesque story of Tobit Rembrandt found much to interest him, as we see in the beautiful small picture of the Arenberg collection at Brussels. Sight is being restored to the aged Tobias, while with infinite tenderness his wife holds the old man's hand caressingly. The momentary action is complete, and the picture goes straight to the heart. In the Berlin Gallery he paints the anxiety of the parents as they wait the return of their son. In 1637 he painted the fine picture now in the Louvre of the Flight of the Angel; and the same subject is grandly treated by him, apparently about 1645, in the picture exhibited in the winter exhibition at Burlington House in 1885. Reverence and awe are shown in every attitude of the Tobit family. A similar lofty treatment is to be found in the Christ as the Gardener appearing to Mary of 1638 (Buckingham Palace).

We have now arrived at the year 1640, the threshold of his second manner, which extended to 1654, the middle age of Rembrandt. During the latter part of the previous decade we find the shadows more transparent and the blending of light and shade more perfect. There is a growing power in every part of his art. The coldness of his first manner had disappeared, and the tones were gradually changing into golden-brown. He had passed through what Bode calls his "Sturm-und-Drang" period of exaggerated expression, as in the Berlin Samson, and had attained to a truer, calmer form of dramatic expression, of which the Manoah of Dresden is a good example (1641). Whether it was that he was getting tired of painting commissioned portraits, that he was independent of them, or that he aimed at higher flights, it is certain that these portraits painted "to order" became more rare about this time, and that those which we have are chiefly friends of his circle, such as the Mennonite Preacher (C. C. Ansloo) and the Gilder (Le Doreur), a fine example of his golden tone, formerly in the Morny collection and now in America. His own splendid portrait (1640) in the National Gallery illustrates the change in his work. It describes the man well,—strong and robust, with powerful head, firm and compressed lips and determined chin, with heavy eye-brows, separated by a deep vertical furrow, and with eyes of keen penetrating glance,—altogether a self-reliant man that would carry out his own ideas, careless whether his popularity waxed or waned. The fantastic rendering of himself has disappeared; he seems more conscious of his dignity and position. He has now many friends and pupils, and numerous commissions, even from the stadtholder; he has bought a large house in the Breedstraat, in which during the next sixteen years of his life he gathered his large collection of paintings, engravings, armour, and costume which figure afterwards in his inventory. His taste was wide and his purchases large, for he was joint owner with picture dealers of paintings by Giorgione and Palma Vecchio, while for a high-priced Marcantonio Raimondi print he gave in exchange a fine impression of his Christ Healing the Sick, which has since been known as the Hundred Guilder Print. The stadtholder was not a prompt payer, and an interesting correspondence took place between Rembrandt and Constantin Huygens, the poet and secretary of the prince. The Rembrandt letters which have come down to us are few, and these are therefore of importance. Rembrandt puts a high value on the picture, which he says had been painted "with much care and zeal," but he is willing to take what the prince thinks proper; while to Huygens he sends a large picture as a present for his trouble in carrying through the business. There is here no sign of the grasping greed with which he has been charged, while his unselfish conduct is seen in the settlement of the family affairs at the death of his mother in 1640.

The year 1642 is remarkable for the great picture formerly known as the Night Watch, but now more correctly as the Sortie of the Banning Cock Company, another of the landmarks of Rembrandt's career, in which twenty-nine life-sized civic guards are introduced issuing pell-mell from their club house. Such guilds of arquebusiers had been painted admirably before by Ravesteyn and notably by Frans Hals, but Rembrandt determined to throw life and animation into the scene, which is full of bustle and movement. One can almost hear the beating of the drum and the barking of the dog. The dominant colour is the citron yellow uniform of the lieutenant, wearing a blue sash, while a Titian-like red dress of a musketeer, the black velvet dress of the captain, and the varied green of the girl and drummer, all produce a rich and harmonious effect. The background has become dark and heavy by accident or neglect, and the scutcheon on which the names are painted is scarcely to be seen.

But this year of great achievement was also the year of his great loss, for Saskia died in 1642, leaving Rembrandt her sole trustee for her son Titus, but with full use of the money till he should marry again or till the marriage of Titus. The words of the will express her love for her husband and her confidence in him. With her death his life was changed. Bode has remarked that there is a pathetic sadness in his pictures of the Holy Family,—a favourite subject at this period of his life. All of these he treats with the naive simplicity of Reformed Holland, giving us the real carpenter's shop and the mother watching over the Infant reverently and lovingly, with a fine union of realism and idealism. It is true indeed that the circumstances of his time and country made it impossible for him to attempt to realize the ancient forms of Hebrew life, or to revive the bye-past race of Judæa. He was content, as the old Italians were, with the types around him. The street in which he lived swarmed with Dutch and Portuguese Jews, and many a Jewish rabbi sat to him. He accepted their turbans and local dress as characteristic of the people. But in his religious pictures it is not the costume we look at; what strikes us is the profound perception of the sentiment of the story, making them true to all time and independent of local circumstance. A notable example of this feeling is to be found in the Woman Taken in Adultery of the National Gallery, painted in 1644 in the manner of the Simeon of the Hague.

Beyond the ordinary claims of art it commands our attention from the grand conception of the painter who here as in other pictures and etchings has invested Christ with a majestic dignity which recalls Leonardo and no other. A similar lofty ideal is to be found in his various renderings of the Pilgrims at Emmaus, notably in the Louvre picture of 1648, in which, as Mrs Jameson says, "he returns to those first spiritual principles which were always the dowry of ancient art. Here we have before us a countenance pale and tender, meek and lowly of heart, adorned only with holiness and a glorified life." From the same year we have the Good Samaritan of the Louvre, the story being told with intense pathos. The helpless suffering of the wounded man, the curiosity of the boy on tiptoe, the excited faces at the upper window, are all conveyed with masterly skill. In these two last pictures we find a broader touch and freer handling, while the tones pass into a dull yellow and brown with a marked predilection for deep rich red. Whether it was that this scheme of colour found no favour with the Amsterdamers, who, as Hoogstraten tells us, could not understand the Sortie, it seems certain that Rembrandt was not invited to take any leading part in the celebration of the congress of Westphalia of this year (1648), a year famous in Dutch history for the European declaration of the independence of Holland, and in Dutch art as the subject of Terburg's picture in the National Gallery and of Van der Helst's famous Banquet of the Civic Guard at Amsterdam.

Rembrandt touched no side of art without setting his mark on it, whether in still life, as in his dead birds or the Slaughtered Ox of the Louvre, or in his drawings of elephants and lions, all of which are instinct with life. But at this period of his career we come upon a branch of his art on which he left, both in etching and in painting, the stamp of his genius, viz., landscape. Roeland Roghman, but ten years his senior, evidently influenced his style, for the resemblance between their works is so great that, as at Cassel, there has been confusion of authorship. Hercules Seghers also was much appreciated by Rembrandt, for at his sale eight pictures by this master figure in the inventory, and Vosmaer discovered that Rembrandt had worked on a plate by Seghers and had added figures to an etched Flight into Egypt. The earliest pure landscape known to us from Rembrandt's hand is the Winter Scene of Cassel (1646), silvery and delicate. As a rule in his painted landscape he aims at grandeur and poetical effect, as in the Repose of the Holy Family of 1647 (till recently called the Gipsies), a moonlight effect, clear even in the shadows. The Canal of Lord Lansdowne, and the Mountain Landscape with the Approaching Storm, the sun shining out behind the heavy clouds, are both conceived and executed in this spirit. A similar poetical vein runs through the Castle on the Hill of Cassel, in which the beams of the setting sun strike on the castle while the valley is sunk in the shades of approaching night. More powerful still is the weird effect of Lord Lansdowne's Windmill, with its glow of light and darkening shadows. In all these pictures light with its magical influences is the theme of the poet-painter. From the number of landscapes by himself in the inventory of his sale, it would appear that these grand works were not appreciated by his contemporaries. The last of the landscape series dates from 1655 or 1656, the close of the middle age or manhood of Rembrandt, a period of splendid power. In the Joseph Accused by Potiphar's Wife of 1654 we have great dramatic vigour and perfect mastery of expression, while the brilliant colour and glowing effect of light and shade attest his strength. To this period also belongs the great portrait of himself in the Fitzwilliam Museum at Cambridge.

But evil days were at hand. The long-continued wars and civil troubles had worn out the country. Trade and commerce languished, and in Amsterdam hundreds of houses were empty. Rembrandt's brothers had suffered, and money was scarce. His own and doubtless Saskia's means were tied up in his house and in his large collection of valuable pictures, and we find Rembrandt borrowing considerable sums of money on the security of his house to keep things going. Perhaps, as Bode suggests, this was the reason of his extraordinary activity at this time. Then, unfortunately, in this year of 1654, we find Rembrandt involved in the scandal of having a child by his servant Hendrickie Jaghers or Stoffels, as appears by the books of the Reformed Church at Amsterdam. He recognized the child and gave it the name of Cornelia after his much-loved mother, but there is no proof that he married the mother, and the probability is against such a marriage, as the provisions of Saskia's will would in that case have come into force, and her fortune would have passed at once to her son Titus. Hendrickie seems to have continued to live with him, for we find her claiming a chest as her property at his sale in 1658. Doubtless she is the peasant girl of Rasdorf to whom Houbraken says Rembrandt was married. Sad as the story is, Hendrickie has an interest for us. Bode asserts that in his art there was always a woman in close relationship to Rembrandt and appearing in his work—his mother, his sister, and then Saskia. Are there any traces of Hendrickie? What if the little servant maid of ten years, painted about 1645 (Dulwich Gallery), and again in the Demidoff picture of the same year, in which the girl is painted in the red dress of a Dutch orphan, in both cases smiling and leaning over a window, were the maidservant of his house in 1654? The ages would correspond. Bode suggests that the beautiful portrait of the Lady in the Salon Carré of the Louvre and the Amor and Cupid of the same gallery may represent Hendrickie and her child. Both pictures belong to this date, and by their treatment are removed from the category of Rembrandt's usual portraits. But if this is conjecture, we get nearer to fact when we look at the picture exhibited at Burlington House in 1883 to which tradition has attached the name of "Rembrandt's Mistress." At a glance one can see that it is not the mere head of a model, as she lies in bed raising herself to put aside a curtain as if she heard a well-known footstep. It is clearly a woman in whom Rembrandt had a personal interest. The date is clearly 165 , the fourth figure being illegible; but the brilliant carnations and masterly touch connect it with the Potiphar's Wife of 1654 and the Jaghers period. It is painful to turn from this attempt to trace the life of Rembrandt in his work to the sadder side of the story. In 1656 his financial affairs became more involved, and the Orphans' Chamber transferred the house and ground to Titus, though Rembrandt was still allowed to take charge of Saskia's estate. Nothing, however, could avert the ruin of the painter, who was declared bankrupt in July 1656, an inventory of all his property being ordered by the Insolvency Chamber. The first sale took place in 1657 in the Keizerskroon hotel, Thomas Jacobz Haring, a well-known name in connexion with Rembrandt's art, being auctioneer; and the second, at which the larger part of the etchings and drawings were disposed of, in 1658—"collected by Rembrandt himself with much love and care," says the catalogue. The sum realized, under 5000 guilders, was but a fraction of their value. The time was unfavourable over the whole of Europe for such sales, the renowned collection of Charles I. of England having brought but a comparatively small sum in 1653. Driven thus from his house, stripped of everything he possessed even to his table linen, Rembrandt took a modest lodging in the same Keizerskroon hostelry (the amounts of his bills are in record), apparently without friends and thrown entirely on himself. But there was no failure here, for this dark year of 1656 stands out prominently as one in which some of his greatest works were produced, as, for example, John the Baptist Preaching in the Wilderness, belonging to Lord Dudley, and Jacob Blessing the Sons of Joseph, of the Cassel Gallery. It is impossible not to respect the man who, amid the utter ruin of his affairs, could calmly conceive and carry out such noble work. Yet even in his art one can see that the tone of his mind was sombre. Instead of the brilliancy of 1654 we have for two or three years a preference for dull yellows, reds, and greys, with a certain measure of uniformity of tone. The handling is broad and rapid, as if to give utterance to the ideas which crowded on his mind. There is less caressing of colour for its own sake, even less straining after vigorous effect of light and shade. Still the two pictures just named are among the greatest works of the master. To the same year belongs the Lesson in Anatomy of Johann Deyman, another of the many men of science with whom Rembrandt was closely associated. The subject is similar to the great Tulp of 1632, but his manner and power of colour had advanced so much that Sir Joshua Reynolds, in his visit to Holland in 1781, was reminded by it of Michelangelo and Titian.[1] Vosmaer ascribes to the same year, though Bode places it later, the famous portrait of Jan Six, the future burgomaster, consummate in its ease and character, as Six descends the steps of his house drawing on his glove. The connexion between Rembrandt and the great family of Six was long and close, and is honourable to both. Jan married a daughter of Tulp the anatomist, one of Rembrandt's earliest friends. In 1641 the mother of Six, Anna Wymer, had been painted with consummate skill by Rembrandt, who also executed in 1647 the beautiful etching of Six standing by a window reading his tragedy of "Medea," afterwards illustrated by his friend. Now he paints his portrait in the prime of manhood, and in the same year of gloom paints for him the masterly John the Baptist. Six, if he could not avert the disaster of Rembrandt's life, at least stood by him in the darkest hour, when certainly the creative energy of Rembrandt was in full play. The same period gives us the Master of the Vineyard, and the Adoration of the Magi of Buckingham Palace.

After the sale of the house in the Breedstraat Rembrandt retired to the Rosengracht, an obscure quarter at the west end of the city. Vosmaer thinks he has traced the very house, but some doubts have been thrown on this discovery by De Roever. We are now drawing to the splendid close of his career in his third manner, in which his touch became broader, his impasto more solid, and his knowledge more complete. Hastening on by quicker steps, we may mention the Old Man with the Grey Beard of the National Gallery (1657), and the Bruyningh, the Secretary of the Insolvents' Chamber, of Cassel (1658), both leading up to the great portraits of the Syndics of the Cloth Hall of 1661. Nearly thirty years separate us from the Lesson in Anatomy, years of long-continued observation and labour. The knowledge thus gathered, the problems solved, the mastery attained, are shown here in abundance. Rembrandt returns to the simplest gamut of colour, but shows his skill in the use of it, leaving on the spectator an impression of absolute enjoyment of the result, unconscious of the means. The plain burghers dealing with the simple concerns of their guild arrest our attention as if they were the makers of history. They live for ever.

In his old age Rembrandt continued to paint his own portrait as assiduously as in his youthful and happy days. About twenty of these portraits are known, a typical one being found in the National Gallery. All show the same self reliant expression, though broken down indeed by age and the cares of a hard life. There is in Stockholm a large and unfinished picture which, if painted by Rembrandt, belongs to the late years of his life (etched by Waltner, *Gaz. des Beaux-Arts*, Nov. 1874). It is catalogued as the Oath of John Ziska, certainly a strange subject for Rembrandt. Bode accepts the more natural interpretation of Prof. Anton Springer, viz., the Feast of Judas Maccabæus, and ascribes the picture to an earlier date than that given by Vosmaer. Havard, however, after careful examination, attributes the work to Carel Fabritius.

About the year 1663 Rembrandt painted the (so-called) Jewish Bride of the Van der Hoop Gallery and the Family Group of Brunswick, the last and perhaps the most brilliant works of his life, bold and rapid in execution and marvellous in the subtle mixture and play of colours in which he seems to revel. The woman and children are painted with such love that the impression is conveyed that they represent a fancy family group of the painter in his old age. This idea received some confirmation from the supposed discovery that he left a widow Catherine Van Wyck and two children, but this theory falls to the ground, for De Roever has shown (*Oud Holland*, 1883) that Catherine was the widow of a marine painter Theunisz Blanckerhoff, who died about the same time as Rembrandt. The mistake arose from a miscopying of the register. The subject of these pictures is thus more mysterious than ever.

In 1668 Titus, the only son of Rembrandt, died, leaving one child, and on 8th October 1669 the great painter himself passed away, leaving two children, and was buried in the Wester Kerk. He had outlived his popularity, for his manner of painting, as we know from contemporaries, was no longer in favour with a people who preferred the smooth trivialities of Van der Werff and the younger Mieris, the leaders of an expiring school.

We must give but a short notice of Rembrandt's achievements in etching. Here he stands out by universal confession as first, excelling all by his unrivalled technical skill, his mastery of expression, and the lofty conceptions of many of his great pieces, as in the Death of the Virgin, the Christ Preaching, the Christ Healing the Sick (the Hundred Guilder Print), the Presentation to the People, the Crucifixion, and others. So great is his skill simply as an etcher that one is apt to overlook the nobleness of the etcher's ideas and the depth of his nature, and this tendency has been doubtless confirmed by the enormous difference in money value between "states" of the same plate, rarity giving in many cases a fictitious worth in the eyes of collectors. The points of difference between these states arise from the additions and changes made by Rembrandt on the plate; and the prints taken off by him have been subjected to the closest inspection by Bartsch, Gersaint, Wilson, Daulby, De Claussin, C. Blanc, Willshire, Seymour Haden, Middleton, and others, who have described them at great length and to whom the reader is referred. The classification of Rembrandt's etchings adopted till lately was the artificial one of treating them according to the subject, as Biblical, portrait, landscape, and so on; and to Vosmaer must be ascribed the credit of being the first to view Rembrandt's etched work, as he has done his work in painting, in the more scientific and interesting line of chronology. This method has been developed by Mr Seymour Haden and Mr Middleton, and is now universally accepted. But even so recently as 1873 M. C. Blanc, in his fine work *L'Œuvre complet de Rembrandt*, still adhères to the older and less intelligent arrangement, resting his preference on the frequent absence of dates on the etchings and more strangely still on the equality of the work. Mr Seymour Haden's reply is conclusive, "that the more important etchings which may be taken as types are dated, and that, the style of the etchings at different periods of Rembrandt's career being fully as marked as that of his paintings, no more difficulty attends the classification of one than of the other." Indeed M. Vosmaer points out in his life of Rembrandt that there is a marked parallelism between Rembrandt's painted and etched work, his early work in both cases being timid and tentative, while he gradually gains strength and character both with the brush and the graver's tools. M. Vosmaer's scheme of chronological order has doubtless been challenged in some respects, but it gave the deathblow to the older system. Mr Seymour Haden has started the theory that many of the etchings ascribed to Rembrandt up to 1640 were the work of his pupils, and seems to make out his case, though it may be carried too far. He argues (in his monograph on the *Etched Work of Rembrandt*, 1877) that Rembrandt's real work in etching began after Saskia's death, when he assumes that Rembrandt betook himself to Elsbroek, the country house of his "powerful friend" Jan Six. But it must be remembered that the future burgomaster was then but a young student of twenty-four, a member of a great family it is true, but unmarried and taking as yet no share in public life. That Rembrandt was a frequent visitor at Elsbroek, and that the Three Trees and other etchings may have been produced there, may be admitted without requiring us to believe that he had left Amsterdam as his place of abode. The great period of his etching lies between 1639 and 1661, after which the old painter seems to have renounced the needle. In these twenty years were produced his greatest works in portraiture, landscape, and Bible story. They bear the impress of the genius of the man.

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[1] This picture has had a strange history. It had suffered by fire and was sold to a Mr Chaplin of London in 1841, was exhibited in Leeds in 1868, and again disappeared, ultimately to be found in the magazines of the South Kensington Museum as a doubtful Rembrandt. The patriotism of some Dutch lovers of art restored it to its native country; and it now hangs, a magnificent fragment, in the Museum of Amsterdam.

In addition to the authors named, the reader is referred to W. Bürger (the *nom de plume* of Th. Thoré), *Musées de la Hollande*, 1858-1860; E. Fromentin, *Maîtres d'autrefois*; H. Havard, *L'École Hollandaise*; Scheltema, *Rembrand, Discours sur sa Vie*, 1866; Ath. Cocquerel fils, *Rembrandt, son individualisme dans l'art*, Paris, 1869.—Since the foregoing was put in type, a new and valuable work on Rembrandt, chiefly as the etcher, has appeared from the pen of M. Eugène Dutuit (*L'Œuvre complet de Rembrandt*, Paris, 1885). M. Dutuit rejects the classification of M. C. Blanc as dubious and unwarranted, dismisses the chronological arrangement proposed by M. Vosmaer and adopted by Mr Seymour Haden and Mr Middleton as open to discussion and lacking in possibility of proof, and reverts to the order established by Gersaint, ranging his materials under twelve heads:—Portraits (real and supposed), Old Testament and New Testament subjects, histories, landscapes, &c. (J. F. W.)

REMIGIUS (or **Remedius**, as the name is spelt in Fredegarius and elsewhere), or **Remi**, was born of noble parents and, according to a later tradition, in the district of Laon. In one of his own letters, written apparently about 512 A.D., Remigius speaks of himself as having been a bishop for fifty-three years. This throws back his election to about 459; and, as all his earlier biographers agree in making him twenty-one years of age on his appointment to this office, the date of his birth may be fixed at somewhere about the year 438. The bishopric was forced upon the young recluse by the townspeople of Rheims, who in this century had not yet lost the right of electing their own pastor. For the next thirty-seven years of Remigius's life we have no clue excepting one, or at most two, allusions in the letters of Sidonius Apollinaris (*Ep.* viii. 14; ix. 7, 8),—both of which epistles M. Baret has assigned to from 472 to 474. It is true that Fredegarius (Du Chesne, i. 728), writing about 658, and the later biographers associate the name of Remigius with that of Clovis in the story of the famous vase of Soissons. But the earlier account of Gregory (*c.* 590) lends no sanction to this association; and it is not till 496 that Remigius figures definitely in history. On the Christmas day of this year he baptized Clovis at Rheims with the greatest pomp. "Bow thy head meekly, O Sicambrian," were his words to the royal convert; "adore what thou hast burnt and burn what thou hast adored." Two of the king's sisters were baptized about the same time; and on the death of one of these, Albofledis, Remigius wrote Clovis a letter of consolation that is still preserved (Dom. Bouq. iv. 51). The traditions and perhaps the documents of Hincmar's time enumerated the immense possessions conferred by Clovis upon his favourite prelate. Remigius, in his turn, does not seem to have been slack in urging the orthodox king to undertake the deliverance of his fellow believers who in southern Gaul reluctantly submitted to the yoke of the Aryan Burgundians and Visigoths. His intrigues with the discontented bishops of Burgundy are said to have paved the way for Clovis's invasion (500). Hincmar has preserved the tradition that Remigius blessed Clovis before he set out on his war against the Visigoths (507); and we still have the letter in which he recommends the king to be merciful in his new conquests (Bouquet, iv. 52; see, however, Junghans's remarks on the probable date of this letter).

It is not, however, solely as a statesman or as the mentor of a barbarian king that Remigius claims attention. In Hincmar's time he was recognized as the second founder of the church of Rheims, to whose influence that see owed the greater part of its possessions; and in such a matter the popular tradition can hardly have been entirely wrong. One of his few remaining letters is directed in the most vigorous terms against the encroachments of a neighbouring bishop, Falco of Maestricht (Bouq., iv. 53). He is said to have established a bishopric at Laon, his native place. So great was his fame that it reached the ears of Alaric and his Gothic counsellors at Toulouse, and that, at last, Pope Hormisdas or one of his immediate predecessors appointed him his vicar throughout the Frankish domains. Of Remigius's writings only a few verses and the letters alluded to above have been preserved; but his credit for learning and eloquence is amply attested by Sidonius Apollinaris and Gregory of Tours. The former, writing to Remigius (*c.* 472), declares him to be unsurpassed by any living orator.

Gregory has also preserved the tradition that Remigius was bishop of Rheims for more than seventy years (*De Gloria Conf.*, 89), a fact which inclines us to lay some confidence on the more detailed statement of Hincmar that he died on January 13, in the ninety-sixth year of his age, after an episcopate of seventy-four years. Hence we may fix upon 533 as the date of his decease, more especially as this conclusion coincides well enough with the little that is known as to the chronology of his two immediate successors (Ste Marthe, ix. 10–13). In 882, when the Northmen were threatening a descent upon the unwalled city of Rheims, Hincmar had the body of St Remi removed from its first resting-place in the little church of St Christopher to Épernay. Next year it was brought back to Rheims, but it was not restored to its original home till some years later. We learn from Gregory of Tours that, even so early as the reign of Childebert II. (575–596) the first of October was held sacred to the memory of the saint. During the Carlovingian times this day became one of the great feasts of the year, its observance being sanctioned by the council of Mainz in 813 and a capitulary of Louis le Debonnaire in 821 (Dessailly). In 1049 Pope Leo IX. assisted at the removal of the relics and issued a decree for the observation of the fête.

The authorities for the life of St Rèmi are very meagre. An almost contemporary *Vita Remigii*, written in the popular Latin of the period (*cothurno Gallicano*), and known to Gregory of Tours, was, according to Hincmar, almost entirely destroyed in the troubled times of Charles Martel, but not before it had been abbreviated and stripped of nearly all historic value by Fortunatus between the years 565 and 590. This abridgment, which still exists, formed the basis of the *Vita Remigii* written by Hincmar, archbishop of Rheims from 845 to 882, who, however, professes to incorporate with his work some fragments of the original *Vita* and other ancient documents, as he has most certainly incorporated the living traditions of his own age. In the course of the next century Flodoard, a canon of Rheims (*ob.* 966), compiled his account of St Remi, by making a very free use of his predecessors' labours, with, however, some traditional information of his own. The above works are all in Migne's *Patrologia*, vols. lxxxviii., cxxv., &c. See also Fredegarius and Gregory of Tours, whose authority is only second to that of Fortunatus. The scattered documents of the Merovingian period are to be found in the great collections of A. Du Chesne, Bouquet, and Labbé. Le Cointe's *Annales Ecclesiastici*, vol. i.; Mabillon's *Annales Ordinis Bened.*, vol. i.; Ste Marthe's *Gallia Christiana*, vol. ix.; and the *Acta Sanctorum* (October 1), which contains the best modern life of St Remi, may be consulted with advantage. Of French lives see that by the prior Armand. The so-called *Testamentum Remigii*, which has been preserved in a longer and shorter form by Flodoard and

Hincmar, has lately found an able champion of its authenticity in the Abbé Dessailly. For Remigius's connexion with Vedastus (who assisted in the conversion of Clovis), St Medard, St Eleutherius, &c., see the Bollandist *Vita Remigii* alluded to above and the *Acta Sanctorum* for Feburary 6, June 8, and February 20.

REMIREMONT, the chief town of an arrondissement of the department of the Vosges, France, 17 miles south-south-east of Épinal by rail, on the banks of the Moselle where it is joined by the Moselotte. It is a pretty and well-built town picturesquely surrounded by forest-clad mountains, and commanded by Fort Parmont, one of the line of defensive works along the Moselle. Besides a great cotton spinning-mill (30,000 spindles) brought from Mülhausen after the war of 1870, it possesses tanneries, weaving-factories, and saw-mills; and it trades in timber, cattle, cheese, coopers' wares, &c. The more interesting buildings belong to the ancient abbey, to which the town owes most of its fame. The abbey church was consecrated to Pope Leo IX. in person in 1051. The abbatial residence (which now contains the mairie, the court-house, and the public library) has been twice rebuilt in modern times (in 1750, and again after the fire of 1871), but the original plan and style have been preserved in the imposing front, the vestibule, and the grand staircase. The population of the town was 6212 in 1871, and 7857 in 1881; that of the commune 6510 and 8126.

Remiremont has its name from St Romaric, one of the companions of St Columban of Luxeuil, who founded a monastery and a convent on the hills above the site where the town now stands. On the destruction of these establishments by the Hungarians in 910 A.D. the nuns took refuge at Remiremont, and their new convent became famous under an abbess who "carried not a crosier but a sceptre." Enriched by dukes of Lorraine, kings of France, and emperors of Germany, the ladies of Remiremont ultimately attained to great power. The abbess was a princess of the empire, and received consecration at the hands of the pope at Rome. The canonesses (fifty in number) were selected only from those who could give proof of noble descent. Their property comprised fifty-two signiories and twenty-two petty lordships. On Whitsun Monday the neighbouring parishes paid homage to the chapter in a ceremony called the "Kyrioles"; and on their accession dukes of Lorraine had to come to Remiremont with great pomp to swear to continue their protection. The "War of the Scutcheons" (Panonceaux) in 1566 between the duke and the abbess ended in favour of the duke; and the abbess never recovered her former position. The townsfolk took advantage of this and similar contests to extend their municipal privileges. In the 17th century the ladies of Remiremont fell away so much from the original monastic rule as to take the title of countesses, renounce their vows, and marry. The town was attacked by the French in 1638, and ruined by the earthquake of 1682. With the rest of Lorraine it was joined to France in 1766. The monastery on the hill (Mont de Romeric or Saint Mont) and the nunnery in the town were both suppressed in the Revolution.

REMONSTRANTS meant originally those Dutch Protestants who, after the death of ARMINIUS (*q.v.*), continued to maintain the views associated with his name, and in 1610 presented to the states of Holland and Friesland a "remonstrance" in five articles formulating their points of departure from stricter Calvinism. Their adversaries met them with a "counter remonstrance," and so were known as the Counter Remonstrants. The conflict continued to rage till 1618–19, when the synod of Dort (see DORT, SYNOD OF) established the victory of the stricter school. The judgment of the synod was enforced by the deposition and in some cases the banishment of Remonstrant ministers; but the Government soon became convinced that their party was not dangerous to the state, and in 1630 they were formally allowed liberty to reside in all parts of Holland and build churches and schools. In 1621 they had also received liberty to make a settlement in Schleswig, where they built themselves the town of Friedrichstadt. This colony still exists. The doctrine of the Remonstrants was embodied in 1621 in a *confessio* written by EPISCOPIUS (*q.v.*), their great theologian, while Wytenbogaert gave them a catechism and regulated their churchly order. The Remonstrants adopted a simple synodical constitution; but their importance was henceforth more theological than ecclesiastical. Their seminary in Amsterdam has boasted of many distinguished names—Curcellæus, Limborch, Wetstein, Le Clerc; and their liberal school of theology, which naturally grew more liberal and even rationalistic, reacted powerfully on the state church. The Remonstrants are now a small body (see HOLLAND, vol. xii. p. 66), but respected for their traditions of scholarship and liberal thought.

REMSCHEID, a manufacturing town of Rhenish Prussia, in the district of Düsseldorf, sometimes dignified with the title of the "Rhenish Sheffield," is situated about 20 miles to the north-east of Cologne, at a height of 1120 feet above the sea. It is the centre of the German hardware industry, and large quantities of tools, scythes, skates, and other small articles in iron, steel, and brass are annually made here for exportation to all parts of Europe, the East, and North and South America. In 1880 the commune contained 30,029 inhabitants (26,844 Protestants), of whom 11,000 belonged to Remscheid proper and the rest to the manufacturing villages with which it is grouped. The name of Remscheid occurs in a document of 1132, and the town received the first impulse to its industrial importance through the immigration of Protestant refugees from France and Holland.

RÉMUSAT, ABEL (1788–1832), a distinguished Chinese scholar, was born at Paris, 5th September 1788. His father, a surgeon, superintended his early education in person and designed him for the medical profession. Jean Pierre Abel Rémusat graduated with distinction as M.D. in 1813, and for a short time held a hospital appointment, but his heart had long been in other studies. A Chinese herbal in the collection of the Abbé Tersan had attracted his attention when he was still a lad; he taught himself to read by great perseverance and with very imperfect helps, and at the end of five years' study he produced in 1811 an *Essai sur la langue et la littérature Chinoises*, and a paper on foreign languages among the Chinese, which procured him the patronage of De Sacy. In 1814 a chair of Chinese was founded at the Collége de France, and Rémusat was placed in it. From this time he gave himself wholly to the languages of the Extreme East, and published a long series of useful works, among which his contributions from Chinese sources to the history of the Tartar nations claim special notice. Rémusat became an editor of the *Journal de Savants* in 1818, and founder and first secretary of the Paris Asiatic Society in 1822; he held also in the course of his life various honourable and lucrative Government appointments. He married in 1830, but had no children. He died at Paris, 4th June 1832, and his *éloge* was written by De Sacy.

RÉMUSAT, CHARLES FRANÇOIS MARIE, COMTE DE (1797–1875), French politician and man of letters, was born at Paris on the 13th March 1797. His father, also Comte de Rémusat, of a good though not very distinguished family in the district of Toulouse, was a man of considerable literary taste, of much administrative ability, and of moderate Liberal views in politics. He was chamberlain to Napoleon, but disapproved of the emperor's absolutist government and aggressive policy, and after the restoration became prefect first of the Haute Garonne and then of the Nord. His wife (mother of Charles) was a still more remarkable person, whose full abilities have only recently been made known. Her maiden name was Claire Élisabeth Jeanne Gravier de Vergennes. She was born in 1780, and was early introduced to the salons, which reopened after the cessation of the Terror. She married the Comte de Rémusat when she was very young, and was long attached to the service of Josephine, to whom she was finally *dame du palais.* Talleyrand was a particular admirer of hers, and she was generally recognized as a woman of great intellectual capacity as well as of much personal grace and charm. After her death (1824) an *Essai sur l'Éducation des Femmes* was published and received an academic *couronne.* But it was not till 1879, when her grandson M. Paul de Rémusat published her memoirs, which have since been followed by some correspondence with her son, that justice could be generally done to her literary talent. The light thrown on the Napoleonic court by this remarkable book was great, and Madame de Rémusat appeared as hardly the inferior of the best memoir and letter writers of the previous century. The same documents contained much information on the youth and education of her son Charles. He very early developed political views more decidedly Liberal than those of his parents, and, being bred to the bar, published in 1820 a short pamphlet on jury trial. He was also an active journalist, showing in philosophy and literature the special influence of Cousin. He was, however, at the same time a thorough man of the world, and is said to have furnished to no small extent the original of Balzac's brilliant egoist Henri de Marsay. He took no active part in politics till the revolution of July, when he signed the journalists' protest against the Ordinances, and in the following October was elected deputy for Toulouse. He then ranked himself with the "doctrinaires," and supported (being a speaker of no small power) most of those measures of restriction on popular liberty which rapidly made the July monarchy unpopular with French Radicals. In 1836 he became under-secretary of state for the interior, but did not hold the post long. He then became an ally of Thiers, and in 1840 held the ministry of the interior for a short time. In the same year he became an Academician. For the rest of Louis Philippe's reign he was in opposition till he joined Thiers in his brief and hopeless attempt at a ministry in the spring of 1848 During this time Rémusat constantly spoke in the chamber, but was still more active in literature, especially on philosophical subjects,—the most remarkable of his works being his book on *Abélard* (1845). In 1848 he was elected, and in 1849 re-elected, for the department of Haute Garonne and sat on the Conservative side. But he would not support Louis Napoleon, and had to leave France after the *coup d'état;* nor did he re-enter political life at all during the second empire, though his son M. Paul de Rémusat stood for the Haute Garonne, and was very nearly elected, in 1869. Nor would he at first accept the advances made him after the establishment of the third republic. In 1871 he was appointed minister of foreign affairs and accepted the post. Although minister he was not a deputy, and on standing for Paris in September 1873 he was beaten by M. Barodet. A month later he was elected (having already resigned with Thiers) for the Haute Garonne by a very great majority. He died at Paris on the 6th April 1875.

During his long abstention from political life Rémusat continued to write on his favourite subjects of philosophical history and especially English philosophical history. *Saint Anselme de Cantorbéry* appeared in 1854; *L'Angleterre au XVIIIème siècle* in 1856 (2d ed. enlarged, 1865); *Bacon, sa vie, son temps, &c.*, in 1858; *Channing, sa vie et ses œuvres*, in 1862; *John Wesley* in 1870; *Lord Herbert of Cherbury* in 1874; *Histoire de la philosophie en Angleterre depuis Bacon jusqu'à Locke*, in 1875; besides other and minor works. The impression derived from these and from the political records of his life is that he was on the whole one of those men whose performances are unequal to their powers. He wrote well, was a forcible speaker, and an acute critic; but his adoption of the indeterminate eclecticism of Cousin in philosophy and of the somewhat similarly indeterminate liberalism of Thiers in politics probably had a bad effect on him, though both no doubt accorded with his critical and unenthusiastic turn of mind.

RENAISSANCE

RENAISSANCE is a term which has recently come into use to indicate a well-known but indefinite space of time and a certain phase in the development of the European races. On the one hand it denotes the transition from that period of history which we call the Middle Ages to that which we call Modern. On the other hand it implies those changes in the intellectual and moral attitude of the Western nations by which the transition was characterized. If we insist upon the literal meaning of the word, the Renaissance was a re-birth; and it is needful to inquire of what it was the re-birth. The metaphor of Renaissance may signify the entrance of the European nations upon a fresh stage of vital energy in general, implying a fuller consciousness and a freer exercise of faculties than had belonged to the mediæval period. Or it may mean the resuscitation of simply intellectual activities, stimulated by the revival of antique learning and its application to the arts and literatures of modern peoples. Upon our choice between these two interpretations of the word depend important differences in any treatment of the subject. The former has the disadvantage of making it difficult to separate the Renaissance from other historical phases—the Reformation, for example—with which it ought not to be confounded. The latter has the merit of assigning a specific name to a limited series of events and group of facts, which can be distinguished for the purpose of analysis from other events and facts with which they are intimately but not indissolubly connected. In other words, the one definition of Renaissance makes it denote the whole change which came over Europe at the close of the Middle Ages. The other confines it to what was known by our ancestors as the Revival of Learning. Yet, when we concentrate attention on the recovery of antique culture, we become aware that this was only one phenomenon or symptom of a far wider and more comprehensive alteration in the conditions of the European races. We find it needful to retain both terms, Renaissance and Revival of Learning, and to show the relations between the series of events and facts which they severally imply. The Revival of Learning must be regarded as a function of that vital energy, an organ of that mental evolution, which brought the modern world, with its new conceptions of philosophy and religion, its re-awakened arts and sciences, its firmer grasp on the realities of human nature and the world, its manifold inventions and discoveries, its altered political systems, its expansive and progressive forces, into being. Important as the Revival of Learning undoubtedly was, there are essential factors in the complex called the Renaissance with which it can but remotely be connected. When we analyse the whole group of phenomena which have to be considered, we perceive that some of the most essential have nothing or little to do with the recovery of the classics. These are, briefly speaking, the decay of those great fabrics, church and empire, which ruled the Middle Ages both as ideas and as realities; the appearance of full-formed nationalities and languages; the enfeeblement of the feudal system throughout Europe; the invention and application of paper, the mariner's compass, gunpowder, and printing; the exploration of continents beyond the ocean; and the substitution of the Copernican for the Ptolemaic system of astronomy. Europe in fact had been prepared for a thorough-going metamorphosis before that new ideal of human life and culture which the Revival of Learning brought to light had been made manifest. It had recovered from the confusion consequent upon the dissolution of the ancient Roman empire. The Teutonic tribes had been Christianized, civilized, and assimilated to the previously Latinized races over whom they exercised the authority of conquerors. Comparative tranquillity and material comfort had succeeded to discord and rough living. Modern nationalities, defined as separate factors in a common system, were ready to cooperate upon the basis of European federation. The ideas of universal monarchy and of indivisible Christendom, incorporated in the Holy Roman Empire and the Roman Church, had so far lost their hold that scope was offered for the introduction of new theories both of state and church which would have seemed visionary or impious to the mediæval mind. It is therefore obvious that some term, wider than Revival of Learning, descriptive of the change which began to pass over Europe in the 14th and 15th centuries, has to be adopted. That of Renaissance, Rinascimento, or Renascence is sufficient for the purpose, though we have to guard against the tyranny of what is after all a metaphor. We must not suffer it to lead us into rhetoric about the deadness and the darkness of the Middle Ages, or hamper our inquiry with preconceived assumptions that the re-birth in question was in any true sense a return to the irrecoverable pagan past. Nor must we imagine that there was any abrupt break with the Middle Ages. On the contrary, the Renaissance was rather the last stage of the Middle Ages, emerging from ecclesiastical and feudal despotism, developing what was original in mediæval ideas by the light of classic arts and letters, holding in itself the promise of the modern world. It was therefore a period and a process of transition, fusion, preparation, tentative endeavour. And just at this point the real importance of the revival of learning may be indicated. That rediscovery of the classic past restored the confidence in their own faculties to men striving after spiritual freedom; revealed the continuity of history and the identity of human nature in spite of diverse creeds and different customs; held up for emulation master-works of literature, philosophy, and art; provoked inquiry; encouraged criticism; shattered the narrow mental barriers imposed by mediæval orthodoxy. Humanism, a word which will often recur in the ensuing paragraphs, denotes a specific bias which the forces liberated in the Renaissance took from contact with the ancient world,—the particular form assumed by human self-esteem at that epoch,—the ideal of life and civilization evolved by the modern nations. It indicates the endeavour of man to reconstitute himself as a free being, not as the thrall of theological despotism, and the peculiar assistance he derived in this effort from Greek and Roman literature, the *litteræ humaniores*, letters leaning rather to the side of man than of divinity.

It is now apparent in what sense the Renaissance has to be treated in this article. It will be considered as implying a comprehensive movement of the European intellect and will toward self-emancipation, toward reassertion of the natural rights of the reason and the senses, toward the conquest of this planet as a place of human occupation, and toward the formation of regulative theories both for states and individuals differing from those of mediæval times. The revival of learning will be treated as a decisive factor in this process of evolution on a new plan. To exclude the Reformation and the Counter-Reformation wholly from the survey is impossible, as will appear more plainly in the sequel. These terms indicate moments in the whole process of modern history which were opposed, each to the other, and both to the Renaissance; and it is needful to bear in mind that they have, scientifically speaking, a quite separate existence. Yet if the history of Europe in the 16th century of our era came to be written with the brevity with which we write the history of Europe in the 6th century B.C., it would be difficult at the distance of time implied by that supposition to distinguish the Italian movement of the Renaissance in its origin from the German movement of the Reformation. Both would be seen to have a common starting-point in the reaction against long dominant ideas which were becoming obsolete, and also in the excitation of faculties which had during the same period been accumulating energy.

The Renaissance, if we try to regard it as a period, was essentially the transition from one historical stage to another. It cannot therefore be confined within strict chronological limits. This indecision inherent in the nature of a process which involved neither a political revolution nor the promulgation of a new religious creed, but was a gradual metamorphosis of the intellectual and moral state of Europe, is further augmented by the different epochs at which the several nations were prepared to bear their share in it. England, for example, was still feudal and mediæval when Italy had socially and mentally entered on the modern stadium. A brother of the Black Prince banqueted with Petrarch in the palace of Galeazzo Visconti. That is to say, the founder of Italian humanism, the representative of Italian despotic state-craft, and the companion of Froissart's heroes met together at a marriage feast. The memories which these names evoke prove how impossible it is to fix boundaries in time for a movement which in 1368 had reached nearly the same point in Italy as it afterwards attained at the close of the 16th century in England. The Renaissance must indeed be viewed mainly as an internal process whereby spiritual energies latent in the Middle Ages were developed into actuality and formed a mental habit for the modern world. The process began in Italy, and gradually extended to the utmost bounds of Europe, producing similar results in every nation, and establishing a common civilization.

There is one date, however, which may be remembered with advantage as the starting-point in time of the Renaissance, after the departure from the Middle Ages had been definitely and consciously made by the Italians. This is the year 1453, when Constantinople, chosen for his capital by the first Christian emperor of Rome, fell into the hands of the Turk. One of the survivals of the old world, the shadow of what had been the Eastern empire, now passed suddenly away. Almost at the same date that visionary revival of the Western empire, which had imposed for six centuries upon the imagination of mediæval Europe, hampering Italy and impeding the consolidation of Germany, ceased to reckon among political actualities; while its more robust rival, the Roman Church, seemed likely to sink into the rank of a petty Italian principality. Three lights of mediæval Christendom, the Eastern empire, the Holy Roman empire, and the papacy, at this point of time severally suffered extinction, mortal enfeeblement, and profound internal transformation. It was demonstrated by the destruction of the Eastern and the dotage of the Western empire, and by the new papal policy which Nicholas V. inaugurated, that the old order of society was about to be superseded. Nothing remained to check those centrifugal forces in state and church which substituted a confederation of rival European powers for the earlier ideal of universal monarchy, and separate religious constitutions for the previous Catholic unity. At the same time the new learning introduced by the earlier humanists awakened free thought, encouraged curiosity, and prepared the best minds of Europe for speculative audacities from which the schoolmen would have shrunk, and which soon expressed themselves in acts of cosmopolitan importance. The new learning had been received gladly. Its vast significance was hardly understood. Both secular and spiritual potentates delighted in the beauty and fascination of those eloquent words which scholars, poets, and critics uttered—"words indeed, but words which drew armed hosts behind them!"

If we look a little forward to the years 1492–1500, we obtain a second date of great importance. In these years the expedition of Charles VIII. to Naples opened Italy to French, Spanish, and German interference. The leading nations of Europe began to compete for the prize of the peninsula, and learned meanwhile that culture which the Italians had perfected. In these years the secularization of the papacy was carried to its final point by Alexander VI., and the Reformation became inevitable. The same period was marked by the discovery of America, the exploration of the Indian seas, and the consolidation of the Spanish nationality. It also witnessed the application of printing to the diffusion of knowledge, the revolution effected in military operations by the use of gunpowder, and the revolution in cosmology which resulted from the Copernican discovery. Thus, speaking roughly, the half century between 1450 and 1500 may be termed the culminating point of the Renaissance. The transition from the mediæval to the modern order was now secured if not accomplished, and a Rubicon had been crossed from which no retrogression to the past was possible. Looking yet a little farther, to the years 1527 and 1530, a third decisive date is reached. In the first of these years happened the sack of Rome, in the second the pacification of Italy by Charles V. under a Spanish hegemony. The age of the Renaissance was now closed for the land which gave it birth. The Reformation had taken firm hold on northern Europe. The Counter-Reformation was already imminent.

It must not be imagined that so great a change as that implied by the Renaissance was accomplished without premonitory symptoms and previous endeavours. In the main we mean by it the recovery of freedom for the human spirit after a long period of bondage to oppressive ecclesiastical and political orthodoxy,—a return to the liberal and practical conceptions of the world which the nations of antiquity had enjoyed, but upon a new and enlarged platform. This being so, it was inevitable that the finally successful efforts after self-emancipation should have been anticipated from time to time by strivings within the ages that are known as dark and mediæval. It is therefore part of the present inquiry to pass in review some of the claimants to be considered precursors of the Renaissance. First of all must be named the Frank in whose lifetime the dual conception of universal empire and universal church, divinely appointed, sacred, and inviolable, began to control the order of European society. Charles the Great lent his forces to the plan of resuscitating the Roman empire at a moment when his own power made him the arbiter of western Europe, when the papacy needed his alliance, and when the Eastern empire had passed under the usurped regency of a female. He modelled a spurious Roman empire, which was surnamed "Holy," in consequence of the diplomatic contract struck by him with the bishop of Rome, and in obedience to the prevailing theological beliefs of Latin Christianity The Holy so-called Roman but essentially Teutonic empire owed such substance as the fabric possessed to Frankish armies and the sinews of the German people. As a structure composed of divers ill-connected parts it fell to pieces at its builder's death, leaving little but the incubus of a memory, the fascination of a mighty name, to dominate the mind of mediæval Europe. As an idea, the empire grew in visionary power, and remained one of the chief obstacles in the way of both Italian and German national coherence. Real force was not in it, but rather in that counterpart to its unlimited pretensions, the church, which had evolved it from barbarian night, and which used her own more vital energies for undermining the rival of her creation. Charles the Great, having proclaimed himself successor of the Cæsars, was obscurely ambitious of imitating the Augusti also in the sphere of letters. He caused a scheme of humanistic education to be formulated, and gave employment at his court to rhetoricians, of whom Alcuin was the most considerable. But very little came of the revival of learning which Charles is supposed to have encouraged; and the empire he restored was accepted by the mediæval intellect in a crudely theological and vaguely mystical spirit. We should, however, here remember that the study of Roman law, which was one important precursory symptom of the Renaissance, owed much to mediæval respect for the empire as a divine institution. This, together with the municipal Italian intolerance of the Lombard and Frankish codes, kept alive the practice and revived the science of Latin jurisprudence at an early period.

Philosophy attempted to free itself from the trammels of theological orthodoxy in the hardy speculations of some schoolmen, notably of Scotus Erigena and Abelard. These innovators found, however, small support, and were defeated by opponents who used the same logical weapons with authority to back them. Nor were the rationalistic opinions of the Averroists without their value, though the church condemned these deviators from her discipline as heretics. Such mediæval materialists, moreover, had but feeble hold upon the substance of real knowledge. Imperfect acquaintance with authors whom they studied in Latin translations made by Jews from Arabic commentaries on Greek texts, together with almost total ignorance of natural laws, condemned them to sterility. Like the other schiomachists of their epoch, they fought with phantoms in a visionary realm. A similar judgment may be passed upon those Paulician, Albigensian, Paterine, and Epicurean dissenters from the Catholic creed who opposed the phalanxes of orthodoxy with frail imaginative weapons, and alarmed established orders in the state by the audacity of their communistic opinions. Physical science struggled into feeble life in the cells of Gerbert and Roger Bacon. But these men were accounted magicians by the vulgar; and, while the one eventually assumed the tiara, the other was incarcerated in a dungeon. The schools meanwhile resounded still to the interminable dispute upon abstractions. Are only universals real, or has each name a corresponding entity? From the midst of the Franciscans who had persecuted Roger Bacon because he presumed to know more than was consistent with human humility arose John of Parma, adopting and popularizing the mystic prophecy of Joachim of Flora. The reign of the Father is past, the reign of the Son is passing; the reign of the Spirit is at hand. Such was the formula of the Eternal Gospel, which, as an unconscious forecast of the Renaissance, has attracted retrospective students by its felicity of adaptation to their historical method. Yet we must remember that this bold intuition of the abbot Joachim indicated a monastic reaction against the tyrannies and corruptions of the church, rather than a fertile philosophical conception The Fraticelli spiritualists, and similar sects who fed their imagination with his doctrine, expired in the flames to which Fra Dolcino, Longino, and Margharita were consigned. To what extent the accusations of profligate morals brought against these reforming sectarians were justified remains doubtful; and the same uncertainty rests upon the alleged iniquities of the Templars. It is only certain that at this epoch the fabric of Catholic faith was threatened with various forms of prophetic and Oriental mysticism, symptomatic of a widespread desire to grasp at something simpler, purer, and less rigid than Latin theology afforded. Devoid of criticism, devoid of sound learning, devoid of a firm hold on the realities of life, these heresies passed away without solid results and were forgotten.

We are too apt to take for granted that the men of the Middle Ages were immersed in meditations on the other world, and that their intellectual exercises were confined to abstractions of the schools, hallucinations of the fancy, allegories, visions. This assumption applies indeed in a broad sense to that period which was dominated by intolerant theology and deprived of positive knowledge. Yet there are abundant signs that the native human instincts, the natural human appetites, remained unaltered and alive beneath the crust of orthodoxy. In the person of a pope like Boniface VIII. those ineradicable forces of the natural man assumed, if we may trust the depositions of ecclesiastics well acquainted with his life, a form of brutal atheistic cynicism. In the person of an emperor, Frederick II., they emerged under the more agreeable garb of liberal culture and Epicurean scepticism. Frederick dreamed of remodelling society upon a mundane type, which anticipated the large toleration and cosmopolitan enlightenment of the actual Renaissance. But his efforts were defeated by the unrelenting hostility of the church, and by the incapacity of his contemporaries to understand his aims. After being forced in his lifetime to submit to authority, he was consigned by Dante to hell. Frederick's ideal of civilization was derived in a large measure from Provence, where a beautiful culture had prematurely bloomed, filling southern Europe with the perfume of poetry and gentle living. Here, if anywhere, it seemed as though the ecclesiastical and feudal fetters of the Middle Ages might be broken, and humanity might enter on a new stage of joyous unimpeded evolution. This was, however, not to be. The church preached Simon de Montfort's crusade, and organized Dominic's Inquisition; what Quinet calls the "Renaissance sociale par l'Amour" was extirpated by sword, fire, famine, and pestilence. Meanwhile the Provençal poets had developed their modern language with incomparable richness and dexterity, creating forms of verse and modes of emotional expression which determined the latest mediæval phase of literature in Europe. The naturalism of which we have been speaking found free utterance now in the fabliaux of jongleurs, lyrics of minnesingers, tales of trouvères, romances of Arthur and his knights,—compositions varied in type and tone, but in all of which sincere passion and real enjoyment of life pierce through the thin veil of chivalrous mysticism or of allegory with which they were sometimes conventionally draped. The tales of Lancelot and Tristram, the lives of the troubadours and the Wachtlieder of the minnesingers, sufficiently prove with what sensual freedom a knight loved the lady whom custom and art made him profess to worship as a saint. We do not need to be reminded that Beatrice's adorer had a wife and children, or that Laura's poet owned a son and daughter by a concubine, in order to perceive that the mystic passion of chivalry was compatible in the Middle Ages with commonplace matrimony or vulgar illegitimate connexions. But perhaps the most convincing testimony to the presence of this ineradicable naturalism is afforded by the Latin songs of wandering students, known as *Carmina Burana*, written by the self-styled Goliardi. In these compositions, remarkable for their facile handling of mediæval Latin rhymes and rhythms, the allegorizing mysticism which envelops chivalrous poetry is discarded. Love is treated from a frankly carnal point of view. Bacchus and Venus go hand in hand, as in the ancient ante-Christian age. The open-air enjoyments of the wood, the field, the dance upon the village green, are sung with juvenile lightheartedness. No grave note, warning us that the pleasures of this earth are fleeting, that the visible world is but a symbol of the invisible, that human life is a probation for the life beyond, interrupts the tinkling music as of castanets and tripping feet which gives a novel charm to these unique relics of the 13th century. Goliardic poetry is further curious as showing how the classics even at that early period were a fountainhead of pagan inspiration. In the taverns and low places of amusement haunted by those lettered songsters, on the open road and in the forests trodden by their vagrant feet, the deities of Greece and Rome were not in exile, but at home within the hearts of living men. Thus, while Christendom was still preoccupied with the crusades, two main forces of the Renaissance, naturalism and enthusiasm for antique modes of feeling, already brought their latent potency to light, prematurely indeed and precociously, yet with a promise that was destined to be kept.

When due regard is paid to these miscellaneous evidences of intellectual and sensual freedom during the Middle Ages, it will be seen that there were by no means lacking elements of native vigour ready to burst forth. What was wanting was not vitality and licence, not audacity of speculation, not lawless instinct or rebellious impulse. It was rather the right touch on life, the right feeling for human independence, the right way of approaching the materials of philosophy, religion, scholarship, and literature, that failed. The courage that is born of knowledge, the calm strength begotten by a positive attitude of mind, face to face with the dominant overshadowing Sphinx of theology, were lacking. We may fairly say that natural and untaught people had more of the just intuition that was needed than learned folk trained in the schools. But these people were rendered licentious in revolt or impotent for salutary action by ignorance, by terror, by uneasy dread of the doom declared for heretics and rebels. The massive vengeance of the church hung over them, like a heavy sword suspended in the cloudy air. Superstition and stupidity hedged them in on every side, so that sorcery and magic seemed the only means of winning power over nature or insight into mysteries surrounding human life. The path from darkness to light was lost; thought was involved in allegory; the study of nature had been perverted into an inept system of grotesque and pious parable-mongering; the pursuit of truth had become a game of wordy dialectics. The other world with its imagined heaven and hell haunted the conscience like a nightmare. However sweet this world seemed, however fair the flesh, both world and flesh were theoretically given over to the devil. It was not worth while to master and economize the resources of this earth, to utilize the goods and ameliorate the evils of this life, while every one agreed, in theory at any rate, that the present was but a bad prelude to an infinitely worse or infinitely better future. To escape from these preoccupations and prejudices except upon the path of conscious and deliberate sin was impossible for all but minds of rarest quality and courage; and these were too often reduced to the recantation of their supposed errors no less by some secret clinging sense of guilt than by the church's iron hand. Man and the actual universe kept on reasserting their rights and claims, announcing their goodliness and delightfulness, in one way or another; but they were always being thrust back again into Cimmerian regions of abstractions, fictions, visions, spectral hopes and fears, in the midst of which the intellect somnambulistically moved upon an unknown way.

It is just at this point that the Revival of Learning intervened to determine the course of the Renaissance. Mediæval students possessed a considerable portion of the Latin classics, though Greek had become in the fullest sense of the phrase a dead language. But what they retained of ancient literature they could not comprehend in the right spirit. Between them and the text of poet or historian hung a veil of mysticism, a vapour of misapprehension. The odour of unsanctity clung around those relics of the pagan past. Men bred in the cloister and the lecture-room of the logicians, trained in scholastic disputations, versed in allegorical interpretations of the plainest words and most apparent facts, could not find the key which might unlock those stores of wisdom and of beauty. Petrarch first opened a new method in scholarship, and revealed what we denote as humanism. In his teaching lay the twofold discovery of man and of the world. For humanism, which was the vital element in the Revival of Learning, consists mainly of a just perception of the dignity of man as a rational, volitional, and sentient being, born upon this earth with a right to use it and enjoy it. Humanism implied the rejection of those visions of a future and imagined state of souls as the only absolute reality, which had fascinated the imagination of the Middle Ages. It involved a vivid recognition of the goodliness of man and nature, displayed in the great monuments of human power recovered from the past. It stimulated the curiosity of latent sensibilities, provoked fresh inquisition into the groundwork of existence, and strengthened man's self-esteem by knowledge of what men had thought and felt and done in ages when Christianity was not. It roused a desire to reappropriate the whole abandoned provinces of mundane energy, and a hope to emulate antiquity in works of living loveliness and vigour. The Italians of the 14th century, more precocious than the other European races, were ripe for this emancipation of enslaved intelligence. In the classics they found the food which was required to nourish the new spirit; and a variety of circumstances, among which must be reckoned the pride of a nation boasting of its descent from the Populus Romanus, rendered them apt to fling aside the obstacles that had impeded the free action of the mind through many centuries. Petrarch not only set his countrymen upon the right method of studying the Latin classics, but he also divined the importance of recovering a knowledge of Greek literature. To this task Boccaccio addressed himself, and he was followed by numerous Italian enthusiasts, who visited Byzantium before its fall as the sacred city of a new revelation. The next step was to collect MSS., to hunt out, copy, and preserve the precious relics of the past. In this work of accumulation Guarino and Filelfo, Aurispa and Poggio, took the chief part, aided by the wealth of Italian patricians, merchant-princes, and despots, who were inspired by the sacred thirst for learning. Learning was then no mere pursuit of a special and recluse class. It was fashionable and it was passionate, pervading all society with the fervour of romance. For a generation nursed in decadent scholasticism and stereotyped theological formulæ it was the fountain of renascent youth, beauty, and freedom, the shape in which the Helen of art and poetry appeared to the ravished eyes of mediæval Faustus. It was the resurrection of the mightiest spirits of the past. "I go," said Cyriac of Ancona, the indefatigable though uncritical explorer of antiquities, "I go to awake the dead!" This was the enthusiasm, this the vitalizing faith, which made the work of scholarship in the 15th century so highly strung and ardent. The men who followed it knew that they were restoring humanity to its birthright after the expatriation of ten centuries. They were instinctively aware that the effort was for liberty of action, thought, and conscience in the future. This conviction made young men leave their loves and pleasures, grave men quit their counting-houses, churchmen desert their missals, to crowd the lecture rooms of philologers and rhetoricians. When Greek had been acquired, MSS. accumulated, libraries and museums formed, came the age of printers and expositors. Aldus Manutius in Italy, Froben in Basel, the Étiennes in Paris, committed to the press what the investigators had recovered. Nor were there wanting at the same time men who dedicated their powers to Hebrew and Oriental erudition, laying, together with the Grecians, a basis for those Biblical studies which advanced the Reformation. Meanwhile the languages of Greece and Rome had been so thoroughly appropriated that a final race of scholars, headed by Politian, Pontano, Valla, handled once again in verse and prose both antique dialects, and thrilled the ears of Europe with new-made pagan melodies. The church itself at this epoch lent its influence to the prevalent enthusiasm. Nicholas V. and Leo X., not to mention intervening popes who showed themselves tolerant of humanistic culture, were heroes of the classical revival. Scholarship became the surest path of advancement to ecclesiastical and political honours. Italy was one great school of the new learning at the moment when the German, French, and Spanish nations were invited to her feast.

Nature Italian humanism.

It will be well to describe briefly, but in detail, what this meeting of the modern with the ancient mind effected over the whole field of intellectual interests. In doing so, we must be careful to remember that the study of the classics did but give a special impulse to pent-up energies which were bound in one way or another to assert their independence. Without the Revival of Learning the direction of those forces would have been different; but that novel intuition into the nature of the world and man which constitutes what we describe as Renaissance must have emerged. As the facts, however, stand before us, it is impossible to dissociate the rejection of the other world as the sole reality, the joyous acceptance of this world as a place to live and act in, the conviction that "the proper study of mankind is man," from humanism. Humanism, as it actually appeared in Italy, was positive in its conception of the problems to be solved, pagan in its contempt for mediæval mysticism, invigorated for sensuous enjoyment by contact with antiquity, yet holding in itself the germ of new religious aspirations, profounder science, and sterner probings of the mysteries of life than had been attempted even by the ancients. The operation of this humanistic spirit has now to be traced.

Relation of Dante, Petrarch, Boccaccio, and Villani to the Revival of Learning.

It is obvious that Italian literature owed little at the outset to the revival of learning. The *Divine Comedy*, the *Canzoniere*, and the *Decameron* were works of monumental art, deriving neither form nor inspiration immediately from the classics, but applying the originality of Italian genius to matter drawn from previous mediæval sources. Dante showed both in his epic poem and in his lyrics that he had not abandoned the sphere of contemporary thought. Allegory and theology, the vision and the symbol, still determine the form of masterpieces which for perfection of workmanship and for emancipated force of intellect rank among the highest products of the human mind. Yet they are not mediæval in the same sense as the song of Roland or the Arthurian cycle. They proved that, though Italy came late into the realm of literature, her action was destined to be decisive and alterative by the introduction of a new spirit, a firmer and more positive grasp on life and art. These qualities she owed to her material prosperity, to her freedom from feudalism, to her secularized church, her commercial nobility, her political independence in a federation of small states. Petrarch and Boccaccio, though they both held the mediæval doctrine that literature should teach some abstruse truth beneath a veil of fiction, differed from Dante in this that their poetry and prose in the vernacular abandoned both allegory and symbol. In their practice they ignored their theory. Petrarch's lyrics continue the Provençal tradition as it had been reformed in Tuscany, with a subtler and more modern analysis of emotion, a purer and more chastened style, than his masters could boast. Boccaccio's tales, in like manner, continue the tradition of the fabliaux, raising that literary species to the rank of finished art, enriching it with humour, and strengthening its substance by keen insight into all varieties of character. The *Canzoniere* and the *Decameron* distinguish themselves from mediæval literature, not by any return to classical precedents, but by free self-conscious handling of human nature. So much had to be premised in order to make it clear in what relation humanism stood to the Renaissance, since the Italian work of Dante, Petrarch, and Boccaccio is sufficient to indicate the re-birth of the spirit after ages of apparent deadness. Had the Revival of Learning not intervened it is probable that the vigorous efforts of these writers alone would have inaugurated a new age of European culture. Yet, while noting this reservation of judgment, it must also be remarked that all three felt themselves under some peculiar obligation to the classics. Dante, mediæval as his temper seems to us, chose Virgil for his guide, and ascribed his mastery of style to the study of Virgilian poetry. Petrarch and Boccaccio were, as we have seen, the pioneers of the new learning. They held their writings in the vernacular cheap, and initiated that contempt for the mother tongue which was a note of the earlier Renaissance. It may further be observed that Giovanni Villani, the first chronicler who used Italian for the compilation of a methodical history, tells us how he was impelled to write by musing on the ruins of Rome and thinking of the vanished greatness of the Latin race. We have therefore to recognize this fact that the four greatest writers of the 14th century, while the Revival of Learning was yet in its cradle, each after his own fashion acknowledged the vivifying touch upon their spirit of the antique genius. They seem to have been conscious that they could not give the desired impulse to modern literature and art without contact with the classics; and, in spite of the splendour of their achievements in Italian, they found no immediate followers upon that path.

Relation of humanism to scholarship and literature.

The fascination of pure study was so powerful, the Italians at that epoch were so eager to recover the past, that during the 15th century we have before our eyes the spectacle of this great nation deviating from the course of development begun in poetry by Dante and Petrarch, in prose by Boccaccio and Villani, into the channels of scholarship and antiquarian research. The language of the *Canzoniere* and *Decameron* was abandoned for revived Latin and discovered Greek. Acquisition supplanted invention; imitation of classical authors suppressed originality of style. The energies of the Italian people were devoted to transcribing codices, settling texts, translating Greek books into Latin, compiling grammars, commentaries, encyclopædias, dictionaries, epitomes, and ephemerides. During this century the best histories—Bruno's and Poggio's annals of Florence, for example—were composed in Latin after the manner of Livy. The best dissertations, Landino's *Camaldunenses*, Valla's *De Voluptate*, were laboured imitations of Cicero's *Tusculans*. The best verses, Pontano's elegies, Politian's hexameters, were in like manner Latin; public orations upon ceremonial occasions were delivered in the Latin tongue; correspondence, official and familiar, was carried on in the same language; even the fabliaux received, in Poggio's *Facetiæ*, a dress of elegant Latinity. The noticeable barrenness of Italian literature at this period is referable to the fact that men of genius and talent devoted themselves to erudition and struggled to express their thoughts and feelings in a speech which was not natural. Yet they were engaged in a work of incalculable importance. At the close of the century the knowledge of Greece and Rome had been reappropriated and placed beyond the possibility of destruction; the chasm between the old and new world had been bridged; mediæval modes of thinking and discussing had been superseded; the staple of education, the common culture which has brought all Europe into intellectual agreement, was already in existence. Humanism was now an actuality. Owing to the uncritical veneration for antiquity which then prevailed, it had received a strong tincture of pedantry. Its professors, in their revolt against the Middle Ages, made light of Christianity and paraded paganism. What was even worse from an artistic point of view, they had contracted puerilities of style, vanities of rhetoric, stupidities of wearisome citation. Still, at the opening of the 16th century, it became manifest what fruits of noble quality the Revival of Letters was about to bring forth for modern literature. Two great scholars, Lorenzo de' Medici and Politian, had already returned to the practice of Italian poetry. Their work is the first absolutely modern work,—modern in the sense of having absorbed the stores of classic learning and reproduced those treasures in forms of simple, natural, native beauty. Boiardo occupies a similar position by the fusion of classic mythology with chivalrous romance in his *Orlando Innamorato*. But the victor's laurels were reserved for Ariosto, whose *Orlando Furioso* is the purest and most perfect extant example of Renaissance poetry. It was not merely in what they had acquired and assimilated from the classics that these poets showed the transformation effected in the field of literature by humanism. The whole method and spirit of mediæval art had been abandoned. That of the Cinque Cento is positive, defined, mundane. The deity, if deity there be, that rules in it, is beauty. Interest is confined to the actions, passions, sufferings, and joys of human life, to its pathetic, tragic, humorous, and sentimental incidents. Of the state of souls beyond the grave we hear and are supposed to care nothing. In the drama the pedantry of the Revival, which had not injured romantic literature, made itself perniciously felt. Rules were collected from Horace and Aristotle. Seneca was chosen as the model of tragedy; Plautus and Terence supplied the groundwork of comedy. Thus in the plays of Rucellai, Trissino, Sperone, and other tragic poets, the nobler elements of humanism, considered as a revelation of the world and man, obtained no free development. Even the comedies of the best authors are too observant of Latin precedents, although some pieces of Machiavelli, Ariosto, Aretino, Cecchi, and Gelli are admirable for vivid delineation of contemporary manners.

The relation of the plastic arts to the revival of learning is similar to that which has been sketched in the case of poetry. Cimabue started with work which owed nothing directly to antiquity. At about the same time Niccola Pisano studied the style of sculpture in fragments of Græco-Roman marbles. His manner influenced Giotto, who set painting on a forward path. Fortunately for the unimpeded expansion of Italian art, little was brought to light of antique workmanship during the 14th and 15th centuries. The classical stimulus came to painters, sculptors, and architects chiefly through literature. Therefore there was narrow scope for imitation, and the right spirit of humanism displayed itself in a passionate study of perspective, nature, and the nude. Yet we find in the writings of Ghiberti and Alberti, we notice in the masterpieces of these men and their compeers Brunelleschi and Donatello, how even in the 15th century the minds of artists were fascinated by what survived of classic grace and science. Gradually, as the race became penetrated with antique thought, the earlier Christian motives of the arts yielded to pagan subjects. Gothic architecture, which had always flourished feebly on Italian soil, was supplanted by a hybrid Roman style. The study of Vitruvius gave strong support to that pseudo-classic manner which, when it had reached its final point in Palladio's work, overspread the whole of Europe and dominated taste during two centuries. But the perfect plastic art of Italy, the pure art of the Cinque Cento, the painting of Raphael, Da Vinci, Titian, and Correggio, the sculpture of Donatello, Michelangelo, and Sansovino, the architecture of Bramante, Omodeo, and the Venetian Lombardi, however much imbued with the spirit of the classical revival, takes rank beside the poetry of Ariosto as a free intelligent product of the Renaissance. That is to say, it is not so much an outcome of studies in antiquity as an exhibition of emancipated modern genius fired and illuminated by the masterpieces of the past. It indicates a separation from the Middle Ages, inasmuch as it is permanently natural. Its religion is joyous, sensuous, dramatic, terrible, but in each and all of its many-sided manifestations strictly human. Its touch on classical mythology is original, rarely imitative or pedantic. The art of the Renaissance was an apocalypse of the beauty of the world and man in unaffected spontaneity, without side thoughts for piety or erudition, inspired by pure delight in loveliness and harmony for their own sakes.

In the fields of science and philosophy humanism wrought similar important changes. Petrarch began by waging relentless war against the logicians and materialists of his own day. With the advance made in Greek studies scholastic methods of thinking fell into contemptuous oblivion. The newly aroused curiosity for nature encouraged men like Alberti, Da Vinci, Toscanelli, and Da Porta to make practical experiments, penetrate the working of physical forces, and invent scientific instruments. Anatomy began to be studied, and the time was not far distant when Titian should lend his pencil to the epoch-making treatise of Vesalius. The Middle Ages had been satisfied with absurd and visionary notions about the world around them, while the body of man was regarded with too much suspicion to be studied. Now the right method of interrogating nature with patience and loving admiration was instituted. At the same time the texts of ancient authors supplied hints which led to discoveries so far-reaching in their results as those of Copernicus, Columbus, and Galileo. In philosophy, properly so-called, the humanistic scorn for mediæval dulness and obscurity swept away theological metaphysics as valueless. But at first little beyond empty rhetoric and clumsy compilation was substituted. The ethical treatises of the scholars are deficient in substance, while Ficino's attempt to revive Platonism betrays an uncritical conception of his master's drift. It was something, however, to have shaken off the shackles of ecclesiastical authority; and, even if a new authority, that of the ancients, was accepted in its stead, still progress was being made toward sounder methods of analysis. This is noticeable in Pomponazzo's system of materialism, based on the interpretation of Aristotle, but revealing a virile spirit of disinterested and unprejudiced research. The thinkers of southern Italy, Telesio, Bruno, and Campanella, at last opened the two chief lines on which modern speculation has since moved. Telesio and Campanella may be termed the predecessors of Bacon. Bruno was the precursor of the idealistic schools. All three alike strove to disengage their minds from classical as well as ecclesiastical authority, proving that the emancipation of the will had been accomplished. It must be added that their writings, like every other product of the Renaissance, except its purest poetry and art, exhibit a hybrid between mediæval and modern tendencies. Childish ineptitudes are mingled with intuitions of maturest wisdom, and seeds of future thought germinate in the decaying refuse of past systems.

Humanism in its earliest stages was uncritical. It absorbed the relics of antiquity with omnivorous appetite, and with very imperfect sense of the distinction between worse and better work. Yet it led in process of time to criticism. The critique of literature began in the lecture room of Politian, in the printing-house of Aldus, and in the school of Vittorino. The critique of Roman law started, under Politian's auspices, upon a more liberal course than that which had been followed by the powerful but narrow-sighted glossators of Bologna. Finally, in the court of Naples arose that most formidable of all critical engines, the critique of established ecclesiastical traditions and spurious historical documents. Valla by one vigorous effort destroyed the False Decretals and exposed the Donation of Constantine to ridicule, paving the way for the polemic carried on against the dubious pretensions of the papal throne by scholars of the Reformation. A similar criticism, conducted less on lines of erudition than of persiflage and irony, ransacked the moral abuses of the church and played around the very foundations of Christianity. This was tolerated with approval by men who repeated Leo X.'s witty epigram: "What profit has not that fable of Christ brought us!" The same critical and philosophic spirit working on the materials of history produced a new science, the honours of which belong to Machiavelli. He showed, on the one side, how the history of a people can be written with a recognition of fixed principles, and at the same time with an artistic feeling for personal and dramatic episodes. On the other side, he addressed himself to the analysis of man considered as a political being, to the anatomy of constitutions and the classification of governments, to the study of motives underlying public action, the secrets of success and the causes of failure in the conduct of affairs. The unscrupulous rigour with which he applied his scientific method, and the sinister deductions he thought himself justified in drawing from the results it yielded, excited terror and repulsion. Nevertheless, a department had been added to the intellectual empire of mankind, in which fellow-workers, like Guicciardini at Florence, and subsequently Sarpi at Venice, were not slow to follow the path traced by Machiavelli.

The object of the foregoing paragraphs has been to show in what way the positive, inquisitive, secular, exploratory spirit of the Renaissance, when toned and controlled by humanism, penetrated the regions of literature, art, philosophy, and science. It becomes at this point of much moment to consider how social manners in Italy were modified by the same causes, since the type developed there was in large measure communicated together with the new culture to the rest of Europe. The first subject to be noticed under this heading is education. What has come to be called a classical education was the immediate product of the Italian Renaissance. The universities of Bologna, Padua, and Salerno had been famous through the Middle Ages for the study of law, physics, and medicine; and during the 15th and 16th centuries the two first still enjoyed celebrity in those faculties. But at this period no lecture-rooms were so crowded as those in which professors of antique literature and language read passages from the poets and orators, taught Greek, and commented upon the systems of philosophers. The mediæval curriculum offered no defined place for the new learning of the Revival, which had indeed no recognized name. Chairs had therefore to be founded under the title of rhetoric, from which men like Chrysoloras and Guarino, Filelfo and Politian, expounded orally to hundreds of eager students from every town of Italy and every nation in Europe their accumulated knowledge of antiquity. One mass of Greek and Roman erudition, including history and metaphysics, law and science, civic institutions and the art of war, mythology and magistracies, metrical systems and oratory, agriculture and astronomy, domestic manners and religious rites, grammar and philology, biography and numismatics, formed the miscellaneous subject matter of this so-styled rhetoric. Notes taken at these lectures supplied young scholars with hints for further exploration; and a certain tradition of treating antique authors for the display of general learning, as well as for the elucidation of their texts, came into vogue, which has determined the method of scholarship for the last three centuries in Europe. The lack of printed books in the first period of the Revival, and the comparative rarity of Greek erudition among students, combined with the intense enthusiasm aroused for the new gospel of the classics, gave special value to the personal teaching of these professors. They journeyed from city to city, attracted by promises of higher pay, and allured by ever-growing laurels of popular fame. Each large town established its public study, academy, or university, similar institutions under varying designations, for the exposition of the *litteræ humaniores.* The humanists, or professors of that branch of knowledge, became a class of the highest dignity. They were found in the chanceries of the republics, in the papal curia, in the council chambers of princes, at the headquarters of condottieri, wherever business had to be transacted, speeches to be made, and the work of secretaries to be performed. Furthermore, they undertook the charge of private education, opening schools which displaced the mediæval system of instruction, and taking engagements as tutors in the families of despots, noblemen, and wealthy merchants. The academy established by Vittorino da Feltre at Mantua under the protection of Gian Francesco Gonzaga for the training of pupils of both sexes, might be chosen as the type of this Italian method. His scholars, who were lodged in appropriate buildings, met daily to hear the master read and comment on the classics. They learned portions of the best authors by heart, exercised themselves in translation from one language to another, and practised composition in prose and verse. It was Vittorino's care to see that, while their memories were duly stored with words and facts, their judgment should be formed by critical analysis, attention to style, and comparison of the authors of a decadent age with those who were acknowledged classics. During the hours of recreation suitable physical exercises, as fencing, riding, and gymnastics, were conducted under qualified trainers. From this sketch it will be seen how closely the educational system which came into England during the reigns of the Tudors, and which has prevailed until the present time, was modelled upon the Italian type. English youths who spend their time at Eton between athletic sports and Latin verses, and who take an Ireland with a first class in "Greats" at Oxford, are pursuing the same course of physical and mental discipline as the princes of Gonzaga or Montefeltro in the 15th century.

The humanists effected a deeply penetrating change in social manners. Through their influence as tutors, professors, orators, and courtiers, society was permeated by a fresh ideal of culture. To be a gentleman in Italy meant at this epoch to be a man acquainted with the rudiments at least of scholarship, refined in diction, capable of corresponding or of speaking in choice phrases, open to the beauty of the arts, intelligently interested in archæology, taking for his models of conduct the great men of antiquity rather than the saints of the church. He was also expected to prove himself an adept in physical exercises and in the courteous observances which survived from chivalry. The type is set before us by Castiglione in that book upon the courtier which went the round of Europe in the 16th century. It is further emphasized in a famous passage of the *Orlando Innamorato* where Boiardo compares the Italian ideal of an accomplished gentleman with the coarser type admired by nations of the north. To this point the awakened intelligence of the Renaissance, instructed by humanism, polished by the fine arts, expanding in genial conditions of diffused wealth, had brought the Italians at a period when the rest of Europe was comparatively barbarous.

This picture has undoubtedly a darker side. Humanism, in its revolt against the Middle Ages, was, as we have seen already, mundane, pagan, irreligious, positive. The Renaissance can, after all, be regarded only as a period of transition, in which much of the good of the past was sacrificed while some of the evil was retained, and neither the bad nor the good of the future was brought clearly into fact. Beneath the surface of brilliant social culture lurked gross appetites and savage passions, unrestrained by mediæval piety, untutored by modern experience. Italian society exhibited an almost unexampled spectacle of literary, artistic, and courtly refinement crossed by brutalities of lust, treasons, poisonings, assassinations, violence. A succession of worldly pontiffs brought the church into flagrant discord with the principles of Christianity. Steeped in pagan learning, emulous of imitating the manners of the ancients, used to think and feel in harmony with Ovid and Theocritus, and at the same time rendered cynical by the corruption of papal Rome, the educated classes lost their grasp upon morality. Political honesty ceased almost to have a name in Italy. The Christian virtues were scorned by the foremost actors and the ablest thinkers of the time, while the antique virtues were themes for rhetoric rather than moving-springs of conduct. This is apparent to all students of Machiavelli and Guicciardini, the profoundest analysts of their age, the bitterest satirists of its vices, but themselves infected with its incapacity for moral goodness. Not only were the Italians vitiated; but they had also become impotent for action and resistance. At the height of the Renaissance the five great powers in the peninsula formed a confederation of independent but mutually attractive and repellent states. Equilibrium was maintained by diplomacy, in which the humanists played a foremost part, casting a network of intrigue over the nation which helped in no small measure to stimulate intelligence and create a common medium of culture, but which accustomed statesmen to believe that everything could be achieved by wire-pulling. Wars were conducted on a showy system by means of mercenaries, who played a safe game in the field and developed a system of bloodless campaigns. Meanwhile the people grew up unused to arms. When Italy between the years 1494 and 1530 became the battle-field of French, German, and Spanish forces, it was seen to what a point of helplessness the political, moral, and social conditions of the Renaissance had brought the nation.

It was needful to study at some length the main phenomena of the Renaissance in Italy, because the history of that phase of evolution in the other Western races turns almost entirely upon points in which they either adhered to or diverged from the type established there. Speaking broadly, what France, Germany, Spain, and England assimilated from Italy at this epoch was in the first place the new learning, as it was then called. This implied the new conception of human life, the new interest in the material universe, the new method of education, and the new manners, which we have seen to be inseparable from Italian humanism. Under these forms of intellectual enlightenment and polite culture the renascence of the human spirit had appeared in Italy, where it was more than elsewhere connected with the study of classical antiquity. But that audacious exploratory energy which formed the motive force of the Renaissance as distinguished from the Revival of Learning took, as we shall see, very different directions in the several nations who now were sending the flower of their youth to study at the feet of Italian rhetoricians.

The Renaissance ran its course in Italy with strange indifference to consequences. The five great powers, held in equilibrium by Lorenzo de' Medici, dreamed that the peninsula could be maintained *in statu quo* by diplomacy. The church saw no danger in encouraging a pseudo-pagan ideal of life, violating its own principle of existence by assuming the policy of an aggrandizing secular state, and outraging Christendom openly by its acts and utterances. Society at large was hardly aware that an intellectual force of stupendous magnitude and incalculable explosive power had been created by the new learning. Why should not established institutions proceed upon the customary and convenient methods of routine, while the delights of existence were augmented, manners polished, arts developed, and a golden age of epicurean ease made decent by a state religion which no one cared to break with because no one was left to regard it seriously? This was the attitude of the Italians when the Renaissance, which they had initiated as a thing of beauty, began to operate as a thing of power beyond the Alps.

Revival of Learning in Germany. Germany was already provided with universities, seven of which had been founded between 1348 and 1409. In these haunts of learning the new studies took root after the year 1440, chiefly through the influence of travelling professors, Peter Luder and Samuel Karoch. German scholars made their way to Lombard and Tuscan lecture-rooms, bringing back the methods of the humanists. Greek, Latin, and Hebrew erudition soon found itself at home on Teutonic soil. Like Italian men of letters, these pioneers of humanism gave a classic turn to their patronymics; unfamiliar names, Crotus Rubeanus and Pierius Græcus, Capnion and Lupambulus Ganymedes, Œcolampadius and Melanchthon, resounded on the Rhine. A few of the German princes, among whom Maximilian, the prince cardinal Albert of Mainz, Frederick the Wise of Saxony, and Eberhard of Würtemberg deserve mention, exercised a not insignificant influence on letters by the foundation of new universities and the patronage of learned men. The cities of Strasburg, Nuremberg, Augsburg, Basel, became centres of learned coteries, which gathered round scholars like Wimpheling, Brant, Peutinger, Schedel, and Pirckheimer, artists like Dürer and Holbein, printers of the eminence of Froben. Academies in imitation of Italian institutions came into existence, the two most conspicuous, named after the Rhine and Danube, holding their headquarters respectively at Heidelberg and Vienna. Crowned poets, of whom the most eminent was Conrad Celtes Protucius (Pickel!), emulated the fame of Politian and Pontano. Yet, though the Renaissance was thus widely communicated to the centres of German intelligence, it displayed a different character from that which it assumed in Italy. Gothic art, which was indigenous in Germany, yielded but little to southern influences. Such work as that of Dürer, Vischer, Cranach, Schöngauer, Holbein, consummate as it was in technical excellence, did not assume Italian forms of loveliness, did not display the paganism of the Latin races. The modification of Gothic architecture by pseudo-Roman elements of style was incomplete. What Germany afterwards took of the Palladian manner was destined to reach it on a circuitous route from France. In like manner the new learning failed to penetrate all classes of society with the rapidity of its expansion in Italy, nor was the new ideal of life and customs so easily substituted for the mediæval. The German aristocracy, as Æneas Sylvius had noticed, remained for the most part barbarous, addicted to gross pleasures, contemptuous of culture. The German dialects were too rough to receive that artistic elaboration under antique influences which had been so facile in Tuscany. The doctors of the universities were too wedded to their antiquated manuals and methods, too satisfied with dulness, too proud of titles and diplomas, too anxious to preserve ecclesiastical discipline and to repress mental activity, for a genial spirit of humanism to spread freely. Not in Cologne or Tübingen but in Padua and Florence did the German pioneers of the Renaissance acquire their sense of liberal studies. And when they returned home they found themselves encumbered with stupidities, jealousies, and rancours. Moreover, the temper of these more enlightened men was itself opposed to Italian indifference and immorality; it was pugnacious and polemical, eager to beat down the arrogance of monks and theologians rather than to pursue an ideal of æsthetical self-culture. To a student of the origins of German humanism it is clear that something very different from the Renaissance of Lorenzo de' Medici and Leo X. was in preparation from the first upon Teutonic soil. Far less plastic and form-loving than the Italian, the German intelligence was more penetrative, earnest, disputative, occupied with substantial problems. Starting with theological criticism, proceeding to the stage of solid studies in the three learned languages, German humanism occupied the attention of a widely scattered sect of erudite scholars; but it did not arouse the interest of the whole nation until it was forced into a violently militant attitude by Pfefferkorn's attack on Reuchlin. That attempt to extinguish honest thought prepared the Reformation; and humanism after 1518 was absorbed in politico-religious warfare.

Relatio humanis to the German Reform tion. The point of contact between humanism and the Reformation in Germany has to be insisted on; for it is just here that the relation of the Reformation to the Renaissance in general makes itself apparent. As the Renaissance had its precursory movements in the mediæval period, so the German Reformation was preceded by Wickliffe and Huss, by the discontents of the Great Schism, and by the councils of Constance and Basel. These two main streams of modern progress had been proceeding upon different tracks to diverse issues, but they touched in the studies stimulated by the Revival, and they had a common origin in the struggle of the spirit after self-emancipation. Johann Reuchlin, who entered the lecture-room of Argyropoulos at Rome in 1482, Erasmus of Rotterdam, who once dwelt at Venice as the house guest of the Aldi, applied their critical knowledge of Hebrew and of Greek to the elucidation and diffusion of the Bible. To the Germans, as to all nations of that epoch, the Bible came as a new book, because they now read it for the first time with eyes opened by humanism. The touch of the new spirit which had evolved literature, art, and culture in Italy sufficed in Germany to recreate Christianity. This new spirit in Italy emancipated human intelligence by the classics; in Germany it emancipated the human conscience by the Bible. The indignation excited by Leo X.'s sale of indulgences, the moral rage stirred in Northern hearts by papal abominations in Rome, were external causes which precipitated the schism between Teutonic and

Latin Christianity. The Reformation, inspired by the same energy of resuscitated life as the Renaissance, assisted by the same engines of the printing-press and paper, using the same apparatus of scholarship, criticism, literary skill, being in truth another manifestation of the same world-movement under a diverse form, now posed itself as an irreconcilable antagonist to Renaissance Italy. It would be difficult to draw any comparison between German and Italian humanists to the disparagement of the former. Reuchlin was no less learned than Pico; Melanchthon no less humane than Ficino; Erasmus no less witty, and far more trenchant, than Petrarch; Ulrich von Hutten no less humorous than Folengo; Paracelsus no less fantastically learned than Cardano. But the cause in which German intellect and will were enlisted was so different that it is difficult not to make a formal separation between that movement which evolved culture in Italy and that which restored religion in Germany, establishing the freedom of intelligence in the one sphere and the freedom of the conscience in the other. The truth is that the Reformation was the Teutonic Renaissance. It was the emancipation of the reason on a line neglected by the Italians, more important indeed in its political consequences, more weighty in its bearing on rationalistic developments than the Italian Renaissance, but none the less an outcome of the same ground-influences. We have already in this century reached a point at which, in spite of stubborn Protestant dogmatism and bitter Catholic reaction, we can perceive how the ultimate affranchisement of man will be the work of both.

The Catholic revival in Italy.

The German Reformation was incapable of propagating itself in Italy, chiefly for the reason that the intellectual forces which it represented and employed had already found specific outlet in that country. It was not in the nature of the Italians, sceptical and paganized by the Revival, to be keenly interested about questions which seemed to revive the scholastic disputes of the Middle Ages. It was not in their external conditions, suffering as they were from invasions, enthralled by despots, to use the Reformation as a lever for political revolution. Yet when a tumultuary army of so-called Lutherans sacked Rome in 1527 no sober thinker doubted that a new agent had appeared in Europe which would alter the destinies of the peninsula. The Renaissance was virtually closed, so far as it concerned Italy, when Clement VII. and Charles V. struck their compact at Bologna in 1530. This compact proclaimed the principle of monarchical absolutism, supported by papal authority, itself monarchically absolute, which influenced Europe until the outbreak of the Revolution. A reaction immediately set in both against the Renaissance and the Reformation. The council of Trent, opened in 1545 and closed in 1563, decreed a formal purgation of the church, affirmed the fundamental doctrines of Catholicism, strengthened the papal supremacy, and inaugurated that movement of resistance which is known as the Counter-Reformation. The complex onward effort of the modern nations, expressing itself in Italy as Renaissance, in Germany as Reformation, had aroused the forces of conservatism. The four main instruments of the reaction were the papacy, which had done so much by its sympathy with the revival to promote the humanistic spirit it now dreaded, the strength of Spain, and two Spanish institutions planted on Roman soil—the Inquisition and the Order of Jesus. The principle contended for and established by this reaction was absolutism as opposed to freedom—monarchical absolutism, papal absolutism, the suppression of energies liberated by the Renaissance and Reformation. The partial triumph of this principle was secure, inasmuch as the majority of established powers in church and state felt threatened by the revolutionary opinions afloat in Europe. Renaissance and Reformation were, moreover, already at strife. Both too were spiritual and elastic tendencies toward progress, ideals rather than solid organisms.

The part played by Spain in this period of history was determined in large measure by external circumstance. The Spaniards became one nation by the conquest of Granada and the union of the crowns of Castile and Aragon. The war of national aggrandizement, being in its nature a crusade, inflamed the religious enthusiasm of the people. It was followed by the expulsion of Jews and Moors, and by the establishment of the Inquisition on a solid basis, with powers formidable to the freedom of all Spaniards from the peasant to the throne. These facts explain the decisive action of the Spanish nation on the side of Catholic conservatism, and help us to understand why their brilliant achievements in the field of culture during the 16th century were speedily followed by stagnation. It will be well, in dealing with the Renaissance in Spain, to touch first upon the arts and literature, and then to consider those qualities of character in action whereby the nation most distinguished itself from the rest of Europe. Architecture in Spain, emerging from the Gothic stage, developed an Early Renaissance style of bewildering richness by adopting elements of Arabic and Moorish decoration. Sculpture exhibited realistic vigour of indubitably native stamp; and the minor plastic crafts were cultivated with success on lines of striking originality. Painting grew from a homely stock, until the work of Velazquez showed that Spanish masters in this branch were fully abreast of their Italian compeers and contemporaries. To dwell here upon the Italianizing versifiers, moralists, and pastoral romancers who attempted to refine the vernacular of the *Romancero* would be superfluous. They are mainly noticeable as proving that certain coteries in Spain were willing to accept the Italian Renaissance. But the real force of the people was not in this courtly literary style. It expressed itself at last in the monumental work of *Don Quixote*, which places Cervantes beside Rabelais, Ariosto, and Shakespeare as one of the four supreme exponents of the Renaissance. The affectations of decadent chivalry disappeared before its humour; the lineaments of a noble nation, animated by the youth of modern Europe emerging from the Middle Ages, were portrayed in its enduring pictures of human experience. The Spanish drama, meanwhile, untrammelled by those false canons of pseudo-classic taste which fettered the theatre in Italy and afterwards in France, rose to an eminence in the hands of Lope de Vega and Calderon which only the English, and the English only in the masterpieces of three or four playwrights, can rival. Camoens, in the *Lusiad*, if we may here group Portugal with Spain, was the first modern poet to compose an epic on a purely modern theme, vying with Virgil, but not bending to pedantic rules, and breathing the spirit of the age of heroic adventures and almost fabulous discoveries into his melodious numbers. What has chiefly to be noted regarding the achievements of the Spanish race in arts and letters at this epoch is their potent national originality. The revival of learning produced in Spain no slavish imitation as it did in Italy, no formal humanism, and, it may be added, very little of fruitful scholarship. The Renaissance here, as in England, displayed essential qualities of intellectual freedom, delight in life, exultation over rediscovered earth and man. The note of Renaissance work in Germany was still Gothic. This we feel in the penetrative earnestness of Dürer, in the homeliness of Hans Sachs, in the grotesque humour of *Eulenspiegel* and the *Narrenschiff*, the sombre pregnancy of the Faust legend, the almost stolid mastery of Holbein. It lay not in the German genius to escape from the pro-occupations and the limitations of the Middle Ages, for this reason mainly that what we call mediæval was to a very large extent Teutonic. But on the Spanish peninsula, in the masterpieces of Velazquez, Cervantes, Camoens, Calderon, we emerge into an atmosphere of art, definitely national, distinctly modern, where solid natural forms stand before us realistically modelled, with light and shadow on their rounded outlines, and where the airiest creatures of the fancy take shape and weave a dance of rhythmic, light, incomparable intricacy. The Spanish Renaissance would in itself suffice, if other witnesses were wanting, to prove how inaccurate is the theory that limits this movement to the revival of learning. Touched by Italian influences, enriched and fortified by the new learning, Spanish genius walked firmly forward on its own path. It was only crushed by forces generated in the nation that produced it, by the Inquisition and by despotic Catholic absolutism.

In the history of the Renaissance, Spain and Portugal represent the exploration of the ocean and the colonization of the other hemisphere. The voyages of Columbus and Vespucci to America, the rounding of the Cape by Diaz and the discovery of the sea road to India by Vasco da Gama, Cortes's conquest of Mexico and Pizarro's conquest of Peru, marked a new era for the human race and inaugurated the modern age more decisively than any other series of events has done. It has recently been maintained that modern European history is chiefly an affair of competition between confederated states for the possession of lands revealed by Columbus and Da Gama. Without challenging or adopting this speculation, it may be safely affirmed that nothing so pregnant of results has happened as this exploration of the globe. To say that it displaced the centre of gravity in politics and commerce, substituting the ocean for the Mediterranean, dethroning Italy from her seat of central importance in traffic, depressing the eastern and elevating the western powers of Europe, opening a path for Anglo-Saxon expansiveness, forcing philosophers and statesmen to regard the Occidental nations as a single group in counterpoise to other groups of nations, the European community as one unit correlated to other units of humanity upon this planet, is truth enough to vindicate the vast significance of these discoveries. The Renaissance, far from being the re-birth of antiquity with its civilization confined to the Mediterranean, with its Hercules' Pillars beyond which lay Cimmerian darkness, was thus effectively the entrance upon a quite incalculably wider stage of life, in which mankind at large has since enacted one great drama.

While Spanish navies were exploring the ocean, and Spanish paladins were overturning empires, Charles V. headed the reaction of Catholicism against reform. Stronger as king of Spain than as emperor, for the empire was little but a name, he lent the weight of his authority to that system of coercion and repression which enslaved Italy, desolated Germany with war, and drowned the Low Countries in blood. Philip II., with full approval of the Spanish nation, pursued the same policy in an even stricter spirit. He was powerfully assisted by two institutions, in which the national character of Spain expressed itself, the Inquisition and the Society of Jesus. Of the former it is not needful to speak here. But we have to observe that the last great phenomenon of the Spanish Renaissance was Ignatius Loyola, who organized the militia by means of which the church worked her Counter-Reformation. His motto, *Perinde ac cadaver*, expressed that recognition of absolutism which papacy and monarchy demanded for their consolidation.

The logical order of an essay which attempts to show how Renaissance was correlated to Reformation and Counter-Reformation has necessitated the treatment of Italy, Germany, and Spain in succession; for these three nations were the three main agents in the triple process to be analysed. It was due to their specific qualities, and to the diverse circumstances of their external development, that the re-birth of Europe took this form of duplex action on the lines of intellectual and moral progress, followed by reaction against mental freedom. We have now to speak of France, which earliest absorbed the influence of the Italian revival, and of England, which received it latest. The Renaissance may be said to have begun in France with Charles VIII.'s expedition to Naples, and to have continued until the extinction of the house of Valois. Louis XII. and Francis I. spent a considerable portion of their reigns in the attempt to secure possession of the Italian provinces they claimed. Henry II.'s queen was Catherine of the Medicean family; and her children, Charles IX. and Henry III., were Italianated Frenchmen. Thus the connexion between France and Italy during the period 1494–1589 was continuous. The French passed to and fro across the Alps on military and peaceful expeditions. Italians came to France as courtiers, ambassadors, men of business, captains, and artists. French society assumed a strong Italian colouring, nor were the manners of the court very different from those of an Italian city, except that externally they remained ruder and less polished. The relation between the crown and its great feudatories, the military bias of the aristocracy, and the marked distinction between classes which survived from the Middle Ages, rendered France in many vital points unlike Italy. Yet the annals of that age, and the anecdotes retailed by Brantôme, prove that the royalty and nobility of France had been largely Italianized.

It is said that Louis XII. brought Fra Giocondo of Verona back with him to France, and founded a school of architects. But we need not have recourse to this legend for the explanation of such Italian influences as were already noticeable in the Renaissance buildings on the Loire. Without determining the French style, Italian intercourse helped to stimulate its formation and development. There are students of the 15th century in France who resent this intrusion of the Italian Renaissance. But they forget that France was bound by inexorable laws of human evolution to obey the impulse which communicated itself to every form of art in Europe. In the school of Fontainebleau, under the patronage of Francis I., that Italian influence made itself distinctly felt; yet a true French manner had been already formed, which, when it was subsequently applied at Paris, preserved a marked national quality. The characteristic of the style developed by Bullant, De l'Orme, and Lescot, in the royal or princely palaces of Chenonceaux, Chambord, Anet, Écouen, Fontainebleau, the Louvre, and elsewhere, is a blending of capricious fancy and inventive richness of decoration with purity of outline and a large sense of the beauty of extended masses. Beginning with the older castles of Touraine, and passing onward to the Tuileries, we trace the passage from the mediæval fortress to the modern pleasure house, and note how architecture obeyed the special demands of that new phenomenon of Renaissance civilization, the court. In the general distribution of parts these monumental buildings express the peculiar conditions which French society assumed under the influence of Francis I. and Diane de Poitiers. In details of execution and harmonic combinations they illustrate the precision, logic, lucidity, and cheerful spirit of the national genius. Here, as in Lombardy, a feeling for serene beauty derived from study of the antique has not interrupted the evolution of a style indigenous to France and eminently characteristic of the French temperament.

During the reign of Francis I. several Italian painters of eminence visited France. Among these Del Rosso, Primaticcio, Del Sarto, and Da Vinci are the most famous. But their example was not productive of a really great school of French painting. It was left for the Poussins and Claude Lorraine in the next century, acting under mingled Italian and Flemish influences, to embody the still active spirit of the classical revival. These three masters were the contemporaries of Corneille, and do not belong to the Renaissance period. Sculpture, on the contrary, in which art, as in architecture, the mediæval French had been surpassed by no other people of Europe, was practised with originality and power in the reigns of Henry II. and Francis I. Ponzio and Cellini, who quitted Italy for France, found themselves outrivalled in their own sphere by Jean Goujon, Cousin, and Pilon. The decorative sculpture of this epoch, whether combined with architecture or isolated in monumental statuary, ranks for grace and suavity with the best of Sansovino's. At the same time it is unmistakably inspired by a sense of beauty different from the Italian,—more piquant and pointed, less languorous, more mannered perhaps, but with less of empty rhythmical effect. All this while, the minor arts of enamelling, miniature, glass-painting, goldsmith's work, jewellery, engraving, tapestry, wood-carving, pottery, &c., were cultivated with a spontaneity and freedom which proved that France, in the middle point between Flanders and Italy, was able to use both influences without a sacrifice of native taste. It may indeed be said in general that what is true of France is likewise true of all countries which felt the artistic impulses of the Renaissance. Whether we regard Spain, the Netherlands, or Germany at this epoch, we find a national impress stamped upon the products of the plastic and the decorative arts, notwithstanding the prevalence of certain forms derived from the antique and Italy. It was only at a later period that the formalism of pseudo-classic pedantry reduced natural and national originality to a dead unanimity.

French literature was quick to respond to Renaissance influences. De Comines, the historian of Charles VIII.'s expedition to Naples, differs from the earlier French chroniclers in his way of regarding the world of men and affairs. He has the perspicuity and analytical penetration of a Venetian ambassador. Villon, his contemporary, may rather be ranked, so far as artistic form and use of knowledge are concerned, with poets of the Middle Ages, and in particular with the Goliardi. But he is essentially modern in the vividness of his self-portraiture, and in what we are wont to call realism. Both De Comines and Villon indicate the entrance of a new quality into literature. The Rhétoriqueurs, while protracting mediæval traditions by their use of allegory and complicated metrical systems, sought to improve the French language by introducing Latinisms. Thus the Revival of Learning began to affect the vernacular in the last years of the 15th century. Marot and his school reacted against this pedantry. The Renaissance displayed itself in their effort to purify the form and diction of poetry. But the decisive revolution was effected by Ronsard and his comrades of the Pléiade. It was their professed object to raise French to a level with the classics, and to acclimatize Italian species of verse. The humanistic movement led these learned writers to engraft the graces of the antique upon their native literature, and to refine it by emulating the lucidity of Petrarch. The result of their endeavour was immediately apparent in the new force added to French rhythm, the new pomp, richness, colouring, and polish conferred upon poetic diction. French style gradually attained to fixity, and the alexandrine came to be recognized as the standard line in poetry. D'Aubigné's invective and Regnier's satire, at the close of the 16th century, are as modern as Voltaire's. Meanwhile the drama was emerging from the mediæval mysteries; and the classical type, made popular by Garnier's genius, was elaborated, as in Italy, upon the model of Seneca and the canons of the three unities. The tradition thus formed was continued and fortified by the illustrious playwrights of the 17th century. Translation from Greek and Latin into French progressed rapidly at the commencement of this period. It was a marked characteristic of the Renaissance in France to appropriate the spoils of Greece and Rome for the profit of the mother tongue. Amyot's *Plutarch* and his *Daphnis and Chloe* rank among the most exquisite examples of beautiful French prose. Prose had now the charm of simplicity combined with grace. To mention Brantôme is to mention the most entertaining of gossips. To speak of Montaigne is to speak of the best as well as the first of essayists. In all the literary work which has been mentioned, the originality and freshness of the French genius are no less conspicuous than its saturation with the new learning and with Italian studies. But the greatest name of the epoch, the name which is synonymous with the Renaissance in France, has yet to be uttered. That, of course, is Rabelais. His incommensurable and indescribable masterpiece of mingled humour, wisdom, satire, erudition, indecency, profundity, levity, imagination, realism, reflects the whole age in its mirror of hyper-Aristophanic farce. What Ariosto is for Italy, Cervantes for Spain, Erasmus for Holland, Luther for Germany, Shakespeare for England, that is Rabelais for France. The Renaissance cannot be comprehended in its true character without familiarity with these six representatives of its manifold and many-sided inspiration.

The French Renaissance, so rich on the side of arts and letters, was hardly less rich on the side of classical studies. The revival of learning has a noble muster-roll of names in France: Turnèbe, the patriarch of Hellenistic studies; the Étiennes of Paris, equalling in numbers, industry, and learning their Venetian rivals; the two Scaligers; impassioned Dolet; eloquent Muret; learned Cujas; terrible Calvin; Ramus, the intrepid antagonist of Aristotle; De Thou and De Bèze; ponderous Casaubon; brilliant young Saumaise. The distinguishing characteristics of French humanism are vivid intelligence, critical audacity and polemical acumen, perspicuity of exposition, learning directed in its applications by logical sense rather than by artistic ideals of taste. Some of the names just mentioned remind us that in France, as in Germany and Holland, the Reformation was closely connected with the revival of learning. Humanism has never been in the narrow sense of that term Protestant; still less has it been strictly Catholic. In Italy it fostered a temper of mind decidedly averse to theological speculation and religious earnestness. In Holland and Germany, with Erasmus, Reuchlin, and Melanchthon, it developed types of character, urbane, reflective, pointedly or gently critical, which, left to themselves, would not have plunged the north of Europe into the whirlpool of belligerent reform. Yet none the less was the new learning, through the open spirit of inquiry it nourished, its vindication of the private reason, its enthusiasm for republican antiquity, and its proud assertion of the rights of human independence, linked by a strong and subtle chain to that turbid revolt of the individual consciousness against spiritual despotism draped in fallacies and throned upon abuses. To this rebellion we give the name of Reformation. But, while the necessities of antagonism to papal Rome made it assume at first the form of narrow and sectarian opposition, it marked in fact a vital struggle of the intellect towards truth and freedom, involving future results of scepticism and rationalistic audacity from which its earlier champions would have shrunk. It marked, moreover, in the condition of armed resistance against established authority which was forced upon it by the Counter-Reformation, a firm resolve to assert political liberty, leading in the course of time to a revolution with which the rebellious spirit of the Revival was sympathetic. This being the relation of humanism in general to reform, French learning in particular displayed such innovating boldness as threw many of its most conspicuous professors into the camp at war with Rome. Calvin, a French student of Picard origin, created the type of Protestantism to which the majority of French Huguenots adhered. This too was a moment at which philosophical seclusion was hardly possible. In a nation so tumultuously agitated one side or the other had to be adopted. Those of the French humanists who did not proclaim Huguenot opinions, found themselves obliged with Muretus to lend their talents to the Counter-Reformation, or to suffer persecution for heterodoxy, like Dolet. The church, terrified and infuriated by the progress of reform, suspected learning on its own account. To be an eminent scholar was to be accused of immorality, heresy, and atheism in a single indictment; and the defence of weaker minds lay in joining the Jesuits, as Heinsius was fain to do. France had already absorbed the earlier Renaissance in an Italianizing spirit before the Reformation made itself felt as a political actuality. This fact, together with the strong Italian bias of the Valois, serves to explain in some degree the reason why the Counter-Reformation entailed those fierce entangled civil wars, massacres of St Bartholomew, murders of the Guises, regicides, treasons, and empoisonments that terminated with the compromise of Henry IV. It is no part of the present subject to analyse the political, religious, and social interests of that struggle. The upshot was the triumph of the Counter-Reformation, and the establishment of its principle, absolutism, as the basis of French government. It was a French king who, when the nation had been reduced to order, uttered the famous word of absolutism, "L'État, c'est moi."

The Netherlands—Flemish and Dutch painting.

The Renaissance in the Low Countries, as elsewhere, had its brilliant age of arts and letters. During the Middle Ages the wealthy free towns of Flanders flourished under conditions not dissimilar to those of the Italian republics. They raised miracles of architectural beauty, which were modified in the 15th and 16th centuries by characteristic elements of the new style. The Van Eycks, followed by Memling, Metsys, Mabuse, Lucas van Leyden, struck out a new path in the revival of painting and taught Europe the secret of oil-colouring. But it was reserved for the 17th century to witness the flower and fruit time of this powerful art in the work of Porbus, Rubens, and Vandyck, in the Dutch schools of landscape and home-life, and in the unique masterpieces of Rembrandt. We have a right to connect this later period with the Renaissance, because the distracted state of the Netherlands during the 16th century suspended, while it could not extinguish, their æsthetic development. The various schools of the 17th century, moreover, are animated with the Renaissance spirit no less surely than the Florentine school of the 15th or the Venetian of the 16th. The animal vigour and carnal enjoyment of Rubens, the refined Italianizing beauty of Vandyck, the mystery of light and gloom on Rembrandt's panels, the love of nature in Ruysdael, Cuyp, and Van Hooghe, with their luminously misty skies, silvery daylight, and broad expanse of landscape, the interest in common life displayed by Terburg, Van Steen, Douw, Ostade, and Teniers, the instinct for the beauty of animals in Potter, the vast sea spaces of Vanderveldt, the grasp on reality, the acute intuition into character in portraits, the scientific study of the world and man, the robust sympathy with natural appetites, which distinguish the whole art of the Low Countries, are a direct emanation from the Renaissance.

The vernacular in the Netherlands profited at first but little by the impulse which raised Italian, Spanish, French, and English to the rank of classic languages. But humanism, first of all in its protagonist Erasmus, afterwards in the long list of critical scholars and editors, Lipsius, Heinsius, and Grotius, in the printers Elzevir and Plantin, developed itself from the centre of the Leyden university with massive energy, and proved that it was still a motive force of intellectual progress. In the fields of classical learning the students of the Low Countries broke new ground chiefly by methodical collection, classification, and comprehensive criticism of previously accumulated stores. Their works were solid and substantial edifices, forming the substratum for future scholarship. In addition to this they brought philosophy and scientific thoroughness to bear on studies which had been pursued in a more literary spirit. It would, however, be uncritical to pursue this subject further; for the encyclopædic labours of the Dutch philologers belong to a period when the Renaissance was overpast. For the same reason it is inadmissible to do more than mention the name of Spinoza here.

Dutch wars of indepen ence.

The Netherlands became the battlefield of Reformation and Counter-Reformation in even a stricter sense than France. Here the antagonistic principles were plainly posed in the course of a struggle against foreign despotism. The conflict ended in the assertion of political independence as opposed to absolute dominion. Europe in large measure owes the modern ideal of political liberty to that spirit of stubborn resistance which broke the power of Spain. Recent history, and in particular the history of democracy, claims for its province the several stages whereby this principle was developed in England and America, and its outburst in the frenzy of the French Revolution. It is enough here to have alluded to the part played by the Low Countries in the genesis of a motive force which may be described as the last manifestation of the Renaissance striving after self-emancipation.

The insular position of England, combined with the nature of the English people, has allowed us to feel the vibration of European movements later and with less of shock than any of the Continental nations. Before a wave of progress has reached our shores we have had the opportunity of watching it as spectators, and of considering how we shall receive it. Revolutions have passed from the tumultuous stages of their origin into some settled and recognizable state before we have been called upon to cope with them. It was thus that England took the influences of the Renaissance and Reformation simultaneously, and almost at the same time found herself engaged in that struggle with the Counter-Reformation which, crowned by the defeat of the Spanish Armada, stimulated the sense of nationality and developed the naval forces of the race. Both Renaissance and Reformation had been anticipated by at least a century in England. Chaucer's poetry, which owed so much to Italian examples, gave an early foretaste of the former. Wickliffe's teaching was a vital moment in the latter. But the French wars, the Wars of the Roses, and the persecution of the Lollards deferred the coming of the new age; and the year 1536, when Henry VIII. passed the Act of Supremacy through Parliament, may be fixed as the date when England entered definitively upon a career of intellectual development abreast with the foremost nations of the Continent. The circumstances just now insisted on explain the specific character of the English Renaissance. The Reformation had been adopted by consent of the king, lords, and commons; and this change in the state religion, though it was not confirmed without reaction, agitation, and bloodshed, cost the nation comparatively little disturbance. Humanism, before it affected the bulk of the English people, had already permeated Italian and French literature. Classical erudition had been adapted to the needs of modern thought. The hard work of collecting, printing, annotating, and translating Greek and Latin authors had been accomplished. The masterpieces of antiquity had been interpreted and made intelligible. Much of the learning popularized by our poets and dramatists was derived at second hand from modern literature. This does not mean that England was deficient in ripe and sound scholars. More, Colet, Ascham, Cheke, Camden were men whose familiarity with the classics was both intimate and easy. Public schools and universities conformed to the modern methods of study; nor were there wanting opportunities for youths of humble origin to obtain an education which placed them on a level with Italian scholars. The single case of Ben Jonson sufficiently proves this. Yet learning did not at this epoch become a marked speciality in England. There was no class corresponding to the humanists. It should also be remembered that the best works of Italian literature were introduced into Great Britain together with the classics. Phaer's *Virgil*, Chapman's *Homer*, Harrington's *Orlando*, Marlowe's *Hero and Leander*, Fairfax's *Jerusalem Delivered*, North's *Plutarch*, Hoby's *Courtier*—to mention only a few examples—placed English readers simultaneously in possession of the most eminent and representative works of Greece, Rome, and Italy. At the same time Spanish influences reached them through the imitators of Guevara and the dramatists; French influences in the versions of romances; German influences in popular translations of the Faust legend, *Eulenspiegel*, and similar productions. The authorized version of the Bible had also been recently given to the people,—so that almost at the same period of time England obtained in the vernacular an extensive library of ancient and modern authors. This was a privilege enjoyed in like measure by no other nation. It sufficiently accounts for the richness and variety of Elizabethan literature, and for the enthusiasm with which the English language was cultivated.

Arts, letters, and the drama.

Speaking strictly, England borrowed little in the region of the arts from other nations, and developed still less that was original. What is called Jacobean architecture marks indeed an interesting stage in the transition from the Gothic style. But, compared with Italian, French, Spanish, German, and Flemish work of a like period, it is both timid and dry. Sculpture was represented in London for a brief space by Torrigiani; painting by Holbein and Antonio More; music by Italians and Frenchmen of the Chapel Royal. But no Englishmen rose to European eminence in these departments. With literature the case was very different. Wyat and Surrey began by engrafting the forms and graces of Italian poetry upon the native stock. They introduced the sonnet and blank verse. Sidney followed with the sestine and terza rima and with various experiments in classic metres, none of which took root on English soil. The translators handled the octave stanza. Marlowe gave new vigour to the couplet. The first period of the English Renaissance was one of imitation and assimilation. Academies after the Italian type were founded. Tragedies in the style of Seneca, rivalling Italian and French dramas of the epoch, were produced. Attempts to Latinize ancestral rhythms, similar to those which had failed in Italy and France, were made. Tentative essays in criticism and dissertations on the art of poetry abounded. It seemed as though the Renaissance ran a risk of being throttled in its cradle by superfluity of foreign and pedantic nutriment. But the natural vigour of the English genius resisted influences alien to itself, and showed a robust capacity for digesting the varied diet offered to it. As there was nothing despotic in the temper of the ruling classes, nothing oppressive in English culture, the literature of that age evolved itself freely from the people. It was under these conditions that Spenser gave his romantic epic to the world, a poem which derived its allegory from the Middle Ages, its decorative richness from the Italian Renaissance, its sweetness, purity, harmony, and imaginative splendour from the most poetic nation of the modern world. Under the same conditions the Elizabethan drama, which in its totality is the real exponent of the English Renaissance, came into existence. This drama very early freed itself from the pseudo-classic mannerism which imposed on taste in Italy and France. Depicting feudalism in the vivid colours of an age at war with feudal institutions, breathing into antique histories the breath of actual life, embracing the romance of Italy and Spain, the mysteries of German legend, the fictions of poetic fancy and the facts of daily life, humours of the moment and abstractions of philosophical speculation, in one homogeneous amalgam instinct with intense vitality, this extraordinary birth of time, with Shakespeare for the master of all ages, left a monument of the Renaissance unrivalled for pure creative power by any other product of that epoch. To complete the sketch, we must set Bacon, the expositor of modern scientific method, beside Spenser and Shakespeare, as the third representative of the Renaissance in England. Nor should Raleigh, Drake, Hawkins, the semi-buccaneer explorers of the ocean, be omitted. They, following the lead of Portuguese and Spaniards, combating the Counter-Reformation on the seas, opened for England her career of colonization and plantation. All this while the political policy of Tudors and Stewarts tended towards monarchical absolutism, while the Reformation in England, modified by contact with the Low Countries during their struggles, was narrowing into strict reactionary intolerance. Puritanism indicated a revolt of the religious conscience of the nation against the arts and manners of the Renaissance, against the encroachments of belligerent Catholicism, against the corrupt and Italianated court of James I., against the absolutist pretensions of his son Charles. In its final manifestation during the Commonwealth, Puritanism won a transient victory over the mundane forces of both Reformation and Renaissance, as these had taken shape in England. It also secured the eventual triumph of constitutional independence. Milton, the greatest humanistic poet of the English race, lent his pen and moral energies during the best years of his life to securing that principle on which modern political systems at present rest. Thus the geographical isolation of England, and the comparatively late adoption by the English of matured Italian and German influences, give peculiar complexity to the phenomena of Reformation and Renaissance simultaneously developed on our island. The period of our history between 1536 and 1642 shows how difficult it is to separate these two factors in the re-birth of Europe, both of which contributed so powerfully to the formation of modern English nationality.

English reaction against Catholicism, monarchical absolutism and Renaissance culture.

It has been impossible to avoid an air of superficiality, and the repetition of facts known to every schoolboy, in this sketch of so complicated a subject as the Renaissance,—embracing many nations, a great variety of topics, and an indefinite period of time. Yet no other treatment was possible upon the lines laid down at the outset, where it was explained why the term Renaissance cannot now be confined to the Revival of Learning and the effect of antique studies upon literary and artistic ideals. The purpose of this article has been to show that, while the Renaissance implied a new way of regarding the material world and human nature, a new conception of man's destiny and duties on this planet, a new culture and new intellectual perceptions penetrating every sphere of thought and energy: it also involved new reciprocal relations between the members of the European group of nations. The Renaissance closed the Middle Ages and opened the modern era,—not merely because the mental and moral ideas which then sprang into activity and owed their force in large measure to the revival of classical learning were opposed to mediæval modes of thinking and feeling, but also because the political and international relations specific to it as an age were at variance with fundamental theories of the past. Instead of empire and church, the sun and moon of the mediæval system, a federation of peoples, separate in type and divergent in interests, yet bound together by common tendencies, common culture, and common efforts, came into existence. For obedience to central authority was substituted balance of power. Henceforth the hegemony of Europe attached to no crown imperial or papal, but to the nation which was capable of winning it, in the spiritual region by mental ascendency, and in the temporal by force.

That this is the right way of regarding the subject appears from the events of the first two decades of the 16th century, those years in which the humanistic revival attained its highest point in Italy. Luther published his theses in 1517, sixty-four years after the fall of Constantinople, twenty-three years after the expedition of Charles VIII. to Naples, ten years before the sack of Rome, at a moment when France, Spain, and England had only felt the influences of Italian culture but feebly. From that date forward two parties wrestled for supremacy in Europe, to which may be given the familiar names of Liberalism and Conservatism, the party of progress and the party of established institutions. The triumph of the former was most signal among the Teutonic peoples. The Latin races, championed by Spain and supported by the Papacy, fought the battle of the latter, and succeeded for a time in rolling back the tide of revolutionary conquest. Meanwhile that liberal culture which had been created for Europe by the Italians before the contest of the Reformation began continued to spread, although it was stifled in Italy and Spain, retarded in France and the Low Countries, well nigh extirpated by wars in Germany, and diverted from its course in England by the counter-movement of Puritanism. The *auto da fés* of Seville and Madrid, the flames to which Bruno, Dolet, and Paleario were flung, the dungeon of Campanella and the seclusion of Galileo, the massacre of St Bartholomew and the faggots of Smithfield, the desolated plains of Germany and the cruelties of Alva in the Netherlands, disillusioned Europe of those golden dreams which had arisen in the earlier days of humanism, and which had been so pleasantly indulged by Rabelais. In truth the Renaissance was ruled by no *Astræa redux*, but rather by a severe spirit which brought not peace but a sword, reminding men of sternest duties, testing what of moral force and tenacity was in them, compelling them to strike for the old order or the new, suffering no lukewarm halting between two opinions. That, in spite of retardation and retrogression, the old order of ideas should have yielded to the new all over Europe,—that science should have won firm standing ground, and political liberty should have struggled through those birth-throes of its origin,—was in the nature of things. Had this not been, the Renaissance or re-birth of Europe would be a term without a meaning.

Literature.—The special articles on the several arts and the literatures of modern Europe, and on the biographies of great men mentioned in this essay, will give details of necessity here omitted. It may be useful to indicate a few works upon the Renaissance in general. Burckhardt's *Die Cultur der Renaissance in Italien*, Michelet's "Renaissance" (7th vol. of *Histoire de France*), Voigt's *Wiederbelebung des Classischen Alterthums*, Symonds's *Renaissance in Italy*, Marc Monnier's *Renaissance de Dante à Luther*, Muntz's *Précurseurs de la Renaissance* and *Renaissance en Italie et en France*, and Geiger's *Humanismus und Renaissance in Italien und Deutschland* are among the most comprehensive. (J. A. S.)

RENAIX, a manufacturing town of Belgium, in the province of East Flanders, eight miles by rail south of Oudenarde, with a communal population of 14,089 in 1876. It contains the ruins of a castle built in 1638 by Count John of Nassau-Siegen, and a church with the tomb of St Hermes, to whom it is dedicated.

RÉNAUDOT, Eusèbe (1646–1720), theologian and Orientalist, was born in Paris in 1646, and was educated for the church. Notwithstanding his taste for theology and his title of abbé, he never took orders, and much of his life was spent at the French court, where he attracted the notice of Colbert and was often employed in confidential affairs. The unusual learning in Eastern tongues which he had acquired in his youth and continued to maintain amidst the distractions of court life did not bear fruit till he was sixty-two years old. His best-known books, which are still valuable, are the *Historia Patriarcharum Alexandrinorum* (Paris, 1713), and the collection of Eastern liturgies (2 vols., 1715–16). The latter work was designed to supply proofs of the "perpetuity of the faith" of the church on the subject of the sacraments, the topic about which most of his theological writings turned, and which was then, in consequence of the controversies attaching to Arnauld's *Perpétuité de la Foi*, a burning one between French Catholics and Protestants. Rénaudot was not a very fair controversialist, but his learning and industry are unquestionable, and his piety shone the more brightly that it did not withdraw itself from contact with the world. He died in 1720.

RENDSBURG, a town of Prussia, in the province of Schleswig-Holstein, is situated on the Eider, in a flat and sandy district, 20 miles to the west of Kiel. It consists of three parts,—the crowded Altstadt, on an island in the Eider; the Neuwerk, on the south bank of the river; and the Kronwerk, on the north bank. Rendsburg is the chief place in the basin of the Eider, and when in the possession of Denmark was maintained as a strong fortress, guarding the approach to the Cimbric peninsula. Its present importance, however, rests on the commercial facilities afforded by its connexion with the North Sea and the Baltic through the Eider and the Eider Canal, by which a brisk transit trade is carried on in grain, timber, Swedish iron, and coals. The principal industries are cotton-weaving, tanning, and the manufacture of artificial manures; and there is a large iron foundry in the immediate neighbourhood. The population in 1880 was 12,776, including a strong garrison.

The town of Rendsburg came into existence under the shelter of a castle founded by the Danes about the year 1100 on an island of the Eider, and was at first an object of dispute between the Danish kings and the counts of Holstein. In 1252 it was finally adjudged to the latter, and it has since shared their fortunes. The town was surrounded with ramparts in 1539, but the important fortifications of the Kronwerk were not constructed till the end of the 17th century. During the Thirty Years' War Rendsburg was taken both by the Imperialists and the Swedes, but in 1645 it successfully resisted a second siege by the latter. The war of 1848–50 began with the capture of Rendsburg by the Holsteiners by a *coup de main*, and it formed the centre of the German operations. On the departure of the German troops in 1852 the Danes at once set to work to demolish the fortifications.

RENÉ I. (1409–1480), duke of Anjou, count of Provence, and titular king of Naples, was the second son of Louis II. of Aragon, king of Naples, and Yolande, daughter of John I. of Aragon, and was born 16th

January 1409. Although his father was crowned king of Naples at Avignon by Pope Clement VII. in 1384, he was unable to make good his claims. After his death Louis III., the elder son, assumed the title, and in 1423 was adopted by Johanna II. of Naples, and obtained possession of the throne. Dying 15th November 1434, he left his claims to his brother René, who was also appointed heir by Johanna II. at her death in the following year. Meantime René had been imprisoned by the count of Vaudemont for contesting his claims to the dukedom of Lorraine, and therefore appointed his wife Isabella regent in his stead. In 1437 he procured his freedom and the acknowledgment of his right to Lorraine for 400,000 florins, and in the following year landed at Naples and rejoined Isabella. Finding, however, that the task of conquering the kingdom from Alphonso of Aragon was beyond his power, he returned in 1442 to Lorraine, which he afterwards gave over to his son John, titular duke of Calabria. In 1444 he took part at Tours in the peace negotiations between England and France; and, to cement the alliance, Henry VI. espoused his daughter Margaret of Anjou. Subsequently he ceased to concern himself with politics, and devoted his chief attention to literature. He also took a special interest in painting and sculpture, although there appears to have been no foundation for the statement that he practised either of these arts. His closing years were spent in the company of his daughter the exiled queen. He died 10th July 1480.

His *Œuvres Complètes*, with a biography and notes by the count of Quatrebarbes, were published at Paris, 4 vols., 1844–46. See also De Villeneuve-Bargemont, *Histoire de René d'Anjou*, 3 vols., Paris, 1825; Renouvier, *Les peintres et les enlumineurs du roi René*, 1851; and Lecoy de la Marche, *Le roi René*, 2 vols., Paris, 1875.

RENFREW, a county of Scotland, skirting the Firth of Clyde, lies between 55° 40′ 34″ and 55° 57′ 45″ N. lat., and between 4° 13′ and 4° 54′ W. long., and is bounded N. by the Clyde, N.E. by Dumbarton and by Lanark, E. by Lanark, S. by Ayr, and W. by the Firth of Clyde. Its greatest length from west-north-west to east-south-east is 30½ miles, and its greatest breadth at right angles to this 13¼ miles. The area is 253·793 square miles or 162,427·958 acres, of which 2021·179 acres are foreshore and 3621·342 are water. Except a small portion opposite the burgh of Renfrew, the whole county lies to the south of the Clyde. Twenty-seventh among the Scottish counties as regards extent, it is fifth in point of population, and Midlothian alone is as densely populated, the number of inhabitants to the square mile in 1881 having been 1075 in both. For local purposes the county is divided into an upper and a lower ward, the former embracing the two-thirds lying to the east, and having its district centre at Paisley, while the latter contains the parishes of Innerkip, Greenock, Port Glasgow, and Kilmalcolm, and has its district centre at Greenock. The southern border and western part of the county are hilly, but none of the heights rise very much above sea-level, the highest points being Misty Law (1663), East Girt Hill (1673), Hill of Stake (1711), and Burnt Hill (1572), all along the border of Ayrshire. The central part is undulating and, as much of the higher portion of it is well wooded, the scenery is in some places picturesque. Along the greater part of the northern border is a flat tract of clayey carse-land known locally as the "laich lands," and very fertile in favourable seasons.

The principal river is the Clyde, which forms a considerable portion of the northern boundary; and the other chief streams are the White Cart, Black Cart, and Gryfe. The first has its chief sources in the extreme south-east of the county, and flows northward—forming for most of the way the boundary with Lanarkshire—to Cathcart, south of Glasgow, whence it has a westerly course to Paisley, and then again a northerly course till it joins the Clyde a mile north-west of the burgh of Renfrew. The Black Cart issues from Castle Semple Loch near the centre of the southern border of the county, and follows a general north-easterly course to its junction with the White Cart at Inchinnan church a mile west of the burgh of Renfrew. Its most important headwater is the river Calder, which, with smaller streams flowing to it, drains a considerable portion of the southern border and flows into Castle Semple Loch at Lochwinnoch. The Gryfe, which, with a large number of streams flowing to it, drains nearly all the western half of the county, rises at Gryfe Reservoir, 2½ miles south of Greenock, and has a winding easterly course to its junction with the Black Cart at Walkinshaw, 2 miles north-west of Paisley. A number of smaller streams flow direct to the Clyde, the most important being the Kip and the Kelly Burn in the west of the county. The principal lochs are Loch Thom and Gryfe Reservoir, 2½ miles south of Greenock; Castle Semple Loch, near the centre of the southern border; Long Loch and Loch Goin, farther east near the same border; and Balgray and Glen Reservoirs, connected with the Glasgow water supply near the centre of the eastern part of the county. The Glasgow, Paisley, and Johnstone Canal, which formerly united these three towns, has since 1882 been laid dry along the greater part of its course and the bed converted into a railway line.

The rocks throughout the county are Carboniferous, and almost the whole of the Lower Carboniferous or Calciferous Sandstone series is here represented by a thick set of volcanic deposits. The oldest beds are the red sandstones, cornstones, and conglomerates which occupy the extreme west corner between Innerkip and Loch Thom. Overlying these is the upper portion of the Lower Carboniferous—the cement-stone group—which runs from the hills behind Greenock on the west, south-eastward by the high ground south of Paisley, and so on to the south-east corner of the county and thence into Lanarkshire. The cement-stones form the underlying deposits over nearly two-thirds of the county to the south-west and west; but, though the base of this subdivision here consists of the usual white sandstones and cement-stones, yet the great mass of the rocks are contemporaneous lava-flows—basalts, melaphyres, and porphyrites—with interbedded tuffs and volcanic agglomerates which have all issued from a line of vents the positions of which may still be traced by the volcanic necks which remain at several points. In the south-east there are intercalated beds of sandstone, shale, and impure limestone. In some places this series of beds passes conformably up into the overlying Carboniferous Limestone series, which occupies a basin covering nearly one-third of the county to the north-east; but the two subdivisions are oftener brought into contact by faults, a double line of which along the valley of the Black Cart brings a narrow tract of the limestones right across the volcanic beds just described. The base of the Carboniferous Limestone subdivision consists of limestones, the middle portion of a series of valuable seams of coal and ironstone, which are extensively worked, and the upper part of limestones. Masses of intrusive volcanic rocks occur to the south of Johnstone and the north-east of Paisley, and to the north of Johnstone and north-west of Paisley are oil-producing shales, which are worked at Clippens and Walkinshaw. Near Pollokshields, at Thornliebank, and to the east of Barrhead there are small outliers of millstone grit consisting of yellow sandstones; and along the extreme north-east corner of the county to the south of Glasgow the true Coal Measures of the great Lanarkshire and Stirlingshire basin are brought in by a fault which throws them down against the Carboniferous Limestone series. Volcanic dykes of Tertiary age run across the older rocks at various points, some very well marked examples occurring near the centre of the southern border. The Glacial deposits are well marked and interesting, the clays at Jordanhill to the north of the Clyde and near Paisley having yielded numerous species of *Foraminifera* and arctic shells. The beds of economic value are all extensively worked. In 1882 the eighteen collieries within the county produced 114,324 tons of coal out of a total of 20,515,134 tons for all Scotland. 164,523 tons of ironstone out of a total of 2.404,177 tons, 90,804 tons of oil-shale out of a total of 994,487 tons, and 22,554 tons of fireclay out of a total of 435,457 tons. Limestones are also quarried in large quantities for smelting purposes and for the manufacture of lime,—one thin but valuable bed at Orchard, 4 miles south of Glasgow, producing a cement that "sets" under water. Copperas is obtained from the iron pyrites got in the shale, and at one time alum-shale was worked at Hurlet in the north-east and copper in the volcanic rocks about Lochwinnoch.

Farming operations do not differ in detail from those carried on in the adjoining middle and lower wards of Lanarkshire. The climate is very variable; and, as the prevailing west and south-west winds come in from the Atlantic warm and full of moisture, contact with the colder land causes very heavy rains, and the western part of Renfrewshire is one of the wettest districts in Scotland, the mean annual rainfall amounting to over 60 inches. The mean annual temperature is about 48°. The hilly district has a good deal of moss and moorland, but the soil, which is a light earth, is also over considerable areas deep enough to produce good pasture. In the undulating middle district the soil is generally deeper and better, particularly along the streams, where there are tracts of good haughland, but it is also in many places thin and poor. There is a considerable amount of pasture, and the principal crops are oats and barley. On the flat lands adjoining the Clyde the soil is a rich alluvium which, except when soured by excessive rain, produces very heavy crops, a large extent being under wheat. Although mineral workings have injured agriculture in several localities, the large towns in the county and neighbourhood have stimulated improvements, and the arable area has steadily increased. The following table gives a classification of holdings in 1875 and 1880:—

	50 Acres and under.		50 to 100 Acres.		100 to 300 Acres.		300 to 500 Acres.		500 to 1000 Acres.		Above 1000 Acres.		Total.	
	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.
1875	688	10,633	300	23,094	299	45,293	15	5468	9	5580	...	...	1311	90,091
1880	581	8,904	326	25,078	329	50,830	12	4710	5	3308	1	1031	1254	93,861

According to the agricultural returns for 1884 the total area under crops was 95,353, a percentage of 60·8 (57·3 in 1874). The area under corn crops in 1884 was 17,502 acres; under green crops, 6,683 acres; under rotation of grasses, 22,997 acres; under permanent pasture, 47,880 acres; orchards and market-gardens, 158 acres; and woodland, 5424. Of the corn land more than four-fifths was under oats, which occupied 14,132 acres, while 2229 were under wheat, and only 178 under barley. Potatoes were grown on 4351 acres, and turnips and swedes on 2332; while under beans, rye, vetches, &c., there are about 1300 acres annually. The total number of horses in 1884 was 3331; the number of cattle to every 100 acres under cultivation was 28·8, the average for Scotland being 23·6. The large towns in the county and neighbourhood account for a great number of cattle being kept for dairy and feeding purposes. The number of sheep to every 100 acres under cultivation was 33·1, the average for Scotland being 145·1. The number of pigs was 1952. According to the *Miscellaneous Statistics of the United Kingdom* (1879) 5735 proprietors owned 155,321 acres with an estimated gross rental of £990,898. Sir M. R. Shaw Stewart possessed 24,951 acres, Allan Gilmour of Eaglesham 16,516, A. A. Spiers of Elderslie 11,259, H. Lee Harvey of Castlesemple 6500, Sir W. Stirling Maxwell 4773, Lord Blantyre 4449, Duncan Darroch of Gourock 4248, and W. Mure of Caldwell 3624.

Besides the coal, iron, and oil industries already mentioned, the county has extensive, varied, and valuable manufactures, of which the chief are noticed in the separate articles on Greenock and Paisley. Elsewhere there are chemical works, engineering works, foundries, and bleaching, dyeing, and weaving works. There are throughout the shire a large number of excellent roads; and numerous lines and branches of the Caledonian and the Glasgow and South-Western systems afford ample railway communication along the centre, north, and west for both general traffic and minerals. The population has risen from 78,501 in 1801 to 216,947 in 1871 and to 263,374 in 1881 (126,743 males, 136,631 females), more than 100,000 of the increase having taken place between 1851 and 1881. Of the whole number 49,681 men and 21,734 women were engaged in industrial handicrafts or dealt in manufactured substances, and of these 7741 men and 15,547 women were connected with the making of textile fabrics, while 7986 men and 172 women were connected with the working of mineral substances.

The Redistribution Act passed in 1885 extended the parliamentary representation of the county from one to two members. The only royal burgh is Renfrew, which is separately noticed, as are also the parliamentary burghs of Greenock and Paisley. The county also contains part of the south side of Glasgow and its suburbs, the parliamentary burgh of Port Glasgow, the police burghs of Pollokshaws, Gourock, and Johnstone, and a number of small towns and villages.

Historically Renfrewshire first appears as part of the territory of the Damnonii, and thereafter it was part of the British kingdom of Strathclyde. The western part, then known as Strathgryfe, was granted by David I. to Walter, the first high steward of Scotland, and the Stewarts had long a local connexion with it. Somerled, Lord of the Isles, was defeated and slain in the neighbourhood of the burgh of Renfrew in 1164; and Marjory Bruce is said to have been killed by a fall from her horse at Knock Hill between Paisley and Renfrew in 1316. In 1404 the county, which had previously formed part of Lanark, was erected into a separate jurisdiction by Robert III., who created his son James baron of Renfrew, a title still held by the eldest son of the reigning sovereign. In the end of the 17th century the district was famous for its witches; and in 1685, after the failure of the earl of Argyll's ill-conducted enterprise, the earl himself was taken prisoner on the bank of the White Cart opposite Inchinnan church, at the spot marked by the "Argyll Stone," now within the policies of Blythswood House.

See Crawfurd, *Description of the Shire of Renfrew* (1710); Hamilton of Wishaw, *Description of the Sheriffdom of Lanark and Renfrew* (Maitland Club, 1831); Hector, *Selections from the Judicial Records of Renfrewshire* (1876-78); and *A History of the Witches of Renfrewshire* (Paisley, 1809 and 1877).

RENFREW, a royal and parliamentary burgh and the county town of the above county, is situated in the north-east near the south bank of the Clyde, connected with which is a small harbour. The main part of the town is gathered round four streets branching out from an open space called the cross. The town-hall, erected in 1871–73, and restored after partial destruction by fire in 1878, has a massive square tower rising to a height of 105 feet. The railway station is 6 miles west of Glasgow. The industries are connected with two shipbuilding yards, a chemical work, a forge, a dyework, and weaving. Population in 1881, 5115.

The town, which is spoken of as a burgh in 1160, seems to have been in the 16th and early in the 17th century the principal port on the Clyde, one branch of which ran in a channel, now silted up, close behind the houses on the north side of High Street. The original castle of the Stewards seems to have stood on the island called "The King's Inch," between the two channels of the river. Renfrew is one of the Kilmarnock group of parliamentary burghs.

RENI, GUIDO (1575–1642), a prime master in the Bolognese school of painting, and one of the most admired artists of the period of incipient decadence in Italy, was born at Calvenzano near Bologna on 4th November 1575. He is most usually named Guido. His father was a musician of repute, a player on the flageolet; he wished to bring the lad up to perform on the harpsichord. At a very childish age, however, Guido displayed a determined bent towards the art of form, scribbling some attempt at a drawing here, there, and everywhere. He was only nine years of age when Denis Calvart took notice of him, received him into his academy of design by the father's permission, and rapidly brought him forward, so that by the age of thirteen Guido had already attained marked proficiency. Albani and Domenichino became soon afterwards pupils in the same academy. With Albani Guido was very intimate up to the earlier period of manhood, but they afterwards became rivals, both as painters and as heads of ateliers, with a good deal of asperity on Albani's part; Domenichino was also pitted against Reni by the policy of Annibale Caracci. Guido was still in the academy of Calvart when he began frequenting the opposition school kept by Lodovico Caracci, whose style, far in advance of that of the Flemish painter, he dallied with. This exasperated Calvart. Him Guido, not yet twenty years of age, cheerfully quitted, transferring himself openly to the Caracci academy, in which he soon became prominent, being equally skilful and ambitious. He had not been a year with the Caracci when a work of his excited the wonder of Agostino and the jealousy of Annibale. Lodovico cherished him, and frequently painted him as an angel, for the youthful Reni was extremely handsome. After a while, however, Lodovico also felt himself nettled, and he patronized the competing talents of Guercino. On one occasion Guido had made a copy of Annibale's Descent from the Cross; Annibale was asked to retouch it, and, finding nothing to do, exclaimed pettishly, "He knows more than enough" ("Costui ne sa troppo"). On another occasion Lodovico, consulted as umpire, lowered a price which Reni asked for an early picture. This slight determined the young man to be a pupil no more. He left the Caracci, and started on his own account as a competitor in the race for patronage and fame. A renowned work, the story of Callisto and Diana, had been completed before he left.

Guido was faithful to the eclectic principle of the Bolognese school of painting. He had appropriated something from Calvart, much more from Lodovico Caracci; he studied with much zest after Albert Dürer; he adopted the massive, sombre, and partly uncouth manner of Caravaggio. One day Annibale Caracci made the remark that a style might be formed reversing that of Caravaggio in such matters as the ponderous shadows and the gross common forms; this observation germinated in Guido's mind, and he endeavoured after some such style, aiming constantly at suavity. Towards 1602 he went to Rome with Albani, and Rome remained his headquarters for twenty years. Here, in the pontificate of Paul V. (Borghese), he was greatly noted and distinguished. In the garden-house of the Rospigliosi Palace he painted the vast fresco which is justly regarded as his masterpiece—Phœbus and the Hours preceded by Aurora. This exhibits his second manner, in which he had deviated far indeed from the promptings of Caravaggio. He founded now chiefly upon the antique, more especially the Niobe group and the Venus de' Medici, modified by suggestions from Raphael, Correggio, Parmigiano, and Paul Veronese. Of this last painter, although on the whole he did not get much from him, Guido was a particular admirer; he used to say that he would rather have been Paul Veronese than any other master—Paul was more nature than art The Aurora is beyond doubt a work of pre-eminent beauty and attainment; it is stamped with pleasurable dignity, and, without being effeminate, has a more uniform aim after graceful selectness than can readily be traced in previous painters, greatly superior though some of them had been in impulse and personal fervour of genius. The pontifical chapel of Montecavallo was assigned to Reni to paint; but, being straitened in payments by the ministers, the artist made off to Bologna. He was fetched back by Paul V. with ceremonious éclat, and lodging, living, and equipage were supplied to him. At another time he migrated from Rome to Naples, having received a commission to paint the chapel of S. Gennaro. The notorious cabal of three painters resident in Naples—Corenzio, Caracciolo, and Ribera—offered, however, as stiff an opposition to Guido as to some other interlopers who preceded and succeeded him. They gave his servant a beating by the hands of two unknown bullies, and sent by him a message to his master to depart or prepare for death; Guido waited for no second warning, and departed. He now returned to Rome; but he finally left that city abruptly, in the pontificate of Urban VIII., in consequence of an offensive reprimand administered to him by Cardinal Spinola. He had received an advance of 400 scudi on account of an altarpiece for St Peter's, but after some lapse of years had made no beginning with the work. A broad reminder from the cardinal put Reni on his mettle; he returned the 400 scudi, quitted Rome within a few days, and steadily resisted all attempts at recall. He now resettled in Bologna. He had taught as well as painted in Rome, and he left pupils behind him; but on the whole he did not stamp any great mark upon the Roman school of painting, apart from his own numerous works in the papal city.

In Bologna Guido lived in great splendour, and established a celebrated school, numbering more than two hundred scholars. He himself drew in it, even down to his latest years. On first returning to this city, he charged about £21 for a full-length figure (mere portraits are not here in question), half this sum for a half-length, and £5 for a head. These prices must be regarded as handsome, when we consider that Domenichino about the same time received only £10, 10s. for his very large and celebrated picture, the Last Communion of St Jerome. But Guido's reputation was still on the increase, and in process of time he quintupled his prices. He now left Bologna hardly at all: in one instance, however, he went off to Ravenna, and, along with three pupils, he painted the chapel in the cathedral with his admired picture of the Israelites Gathering Manna. His shining prosperity was not to last till the end. Guido was dissipated, generously but indiscriminately profuse, and an inveterate gambler. The gambling propensity had been his from youth, but until he became elderly it did not noticeably damage his fortunes. It grew upon him, and in a couple of evenings he lost the enormous sum of 14,400 scudi. The vice told still more ruinously on his art than on his character. In his decline he sold his time at so much per hour to certain picture dealers; one of them, the Shylock of his craft, would stand by, watch in hand, and see him work. Half-heartedness, half-performance, blighted his product: self-repetition and mere mannerism, with affectation for sentiment and vapidity for beauty, became the art of Guido. Some of these trade-works, heads or half-figures, were turned out in three hours or even less. It is said that, tardily wise, Reni left off gambling for nearly two years; at last he relapsed, and his relapse was followed not long afterwards by his death, caused by malignant fever. This event took place in Bologna on 18th August 1642; he died in debt, but was buried with great pomp in the church of S. Domenico.

Guido was personally modest, although he valued himself on his position in the art, and would tolerate no slight in that relation; he was extremely upright, temperate in diet, nice in his person and his dress. He was fond of stately houses, but could feel also the charm of solitude. In his temper there was a large amount of suspiciousness; and the jealousy which his abilities and his successes excited, now from the Caracci, now from Albani, now from the monopolizing league of Neapolitan painters, may naturally have kept this feeling in active exercise. Of his numerous scholars, Simone Contarini, named Il Pesarese, counts as the most distinguished; he painted an admirable head of Reni, now in the Bolognese Gallery. The portrait in the Uffizi Gallery of Florence is from Reni's own hand. Two other good scholars were Giacomo Semenza and Francesco Gessi.

The character of Guido's art is so well known as hardly to call for detailed analysis, beyond what we have already intimated. His most characteristic style exhibits a prepense ideal, of form rather than character, with a slight mode of handling, and silvery, somewhat cold, colour. In working from the nude he aimed at perfection of form, especially marked in the hands and feet. But he was far from always going to choice nature for his model; he transmuted *ad libitum*, and painted, it is averred, a Magdalene of demonstrative charms from a vulgar-looking colour-grinder. His best works have beauty, great amenity, artistic feeling, and high accomplishment of manner, all alloyed by a certain core of commonplace; in the worst pictures the commonplace swamps everything, and Guido has flooded European galleries with trashy and empty pretentiousness, all the more noxious in that its apparent grace of sentiment and form misleads the unwary into approval, and the dilettante dabbler into cheap raptures. Both in Rome and wherever else he worked he introduced increased softness of style, which was then designated as the modern method. His pictures are mostly Scriptural or mythologic in subject, and between two and three hundred of them are to be found in various European collections—more than a hundred of these containing life-sized figures. The portraits which he executed are few,—those of Sixtus V., Cardinal Spada, and the so-called Beatrice Cenci being among the most noticeable. The identity of the last-named portrait is very dubious; it certainly cannot have been painted direct from Beatrice, who had been executed in Rome before Guido ever resided there. Many etchings are attributed to him—some from his own works, and some after other masters, they are spirited, but rather negligent.

Of other works not already noticed, the following should be named:—in Rome (the Vatican), the Crucifixion of St Peter, an example of the painter's earlier manner; in Forlì, the Conception; in Bologna, the Alms of St Roch (early), the Massacre of the Innocents, and the Pietà, or Lament over the Body of Christ (in the church of the Mendicanti), which is by many regarded as Guido's prime executive work; in the Dresden Gallery, an Ecce Homo; in Milan (Brera Gallery), Saints Peter and Paul; in Genoa (church of S. Ambrogio), the Assumption of the Virgin; in the Berlin Gallery, St Paul the Hermit and St Anthony in the Wilderness. The celebrated picture of Fortune (in the Capitol) is one of Reni's finest treatments of female form; as a specimen of male form, the Samson Drinking from the Jawbone of an Ass (Turin Gallery) might be named beside it. One of his latest works of mark is the

Ariadne, which used to be in the Gallery of the Capitol. The Louvre contains twenty of his pictures, the National Gallery of London seven, and others were once there, now removed to other public collections. The most interesting of the seven is the small Coronation of the Virgin, painted on copper, an elegantly finished work, more pretty than beautiful. It was probably painted before the master quitted Bologna for Rome.

For the life and works of Reni, see Passeri, *Vite de' Pittori*, and Malvasia, *Felsina Pittrice*; also Lanzi, *Storia Pittorica*. (W. M. R.)

RENNELL, JAMES (1742–1830), probably the most celebrated of English geographers, was born on 3d December 1742, near Chudleigh in Devonshire, where his father John Rennell, a man apparently of gentle blood, was the owner of a small farm called Waddon.[1] The register of Chudleigh records the baptism of James Rennell on 21st December. John Rennell, who had married Ann Clark in 1738, seems to have fallen into embarrassed circumstances, and to have taken service in the artillery, with which he served in the duke of Cumberland's campaign in Flanders of 1747–48. The date of his death is uncertain, but he appears never to have rejoined his family. As a boy the son James found a valuable friend in the then vicar of Chudleigh, Gilbert Burrington, by whose advice and assistance he entered the navy in the beginning of 1756. Throughout his Indian career Rennell kept up a regular correspondence with Mr Burrington, and always regarded him with affection and gratitude.

The earliest of Rennell's existing letters show him, in March 1758, as an acting midshipman on board the "Brilliant," 36, Captain Parker, afterwards the famous Admiral Sir Hyde Parker, the elder of two of that name. When attached to the "Brilliant" James Rennell was present at several of those desultory expeditions against the French coast and shipping on which so much strength was squandered in the wars with France. Among these was a landing directed against the works and ships at Cherbourg (August 1758), and two other expeditions to the vicinity of St Malo, which were more futile, and the last of which ended somewhat disastrously. A MS. plan of the Bay of St Cast, where the re-embarkation took place (September 11, 1758), executed by James Rennell at the age of sixteen, and probably his first attempt at topographical work, is now before us. It bears the inscription "Plan of St Cas Bay, J. Rennel fect. 1758. To the Rt. Honble. Lord Howe this plan is dedicated by his obedient humble servant, J. Rennel."[2]

In 1760 Captain Parker, leaving the "Brilliant," took the "Norfolk" to India, and Rennell was to have gone with him, but through some accident missed his ship and went out in the "America," 50, Captain Haldane. On reaching India he rejoined Captain Parker, now in command of the "Grafton," 58, with the fleet engaged in the blockade of Pondicherry, which Coote was besieging on the landward side.

The *Annual Register* for 1830, in a sketch of Rennell's career, gives an anecdote for which we cannot vouch, finding no allusion to it in his letters. It is to the effect that, some sloops of war belonging to the enemy being moored in shallow water, Rennell asked the use of a boat. Accompanied by one sailor he reconnoitred the sloops, and ascertained what he had surmised to be true, viz., that owing to an unusually high tide it was possible to reach those vessels. This information was acted on with complete success. Whatever amount of truth there may be in this anecdote, we know, at least, from his letters that he took part in the cutting out of the "Baleine" and "Hermione," the former a 40-gun frigate, the latter an armed Indiaman, both at anchor before Pondicherry, within a half musket-shot of the place, and that he was a volunteer in one of the boat divisions which attacked the "Baleine." This vessel had no sails bent, and the captors, being exposed for an hour to a very heavy fire from the ramparts, lost severely.

We do not know what good guidance had first turned the lad's attention to surveying, but his letters show that he went to India provided with useful books and instruments, and they contain from time to time notices of various surveys executed by him, *e.g.*, of the harbour of Trincouomalé (or Trincomalee, as we now call it), and of the bay and roads of Diego Rayes,[3] whither the East Indian fleet had gone as the rendezvous of an intended attack on Mauritius, which did not come off.

Captain Parker appears to have been friendly to Rennell, but had little hope of obtaining promotion in the navy for him, and counselled him to try his fortune in the Company's service. Rennell acquiesced, and in the summer of 1762 went, apparently as a surveyor, on board a Company's vessel which was despatched on a reconnaissance to Manila and the neighbouring islands. The only trace we have been able to find of this voyage consists in sundry charts and coast-views published by Alexander Dalrymple, a friend of Rennell's in after days. Such are the Bay of Camorta in the Nicobar Islands, 1762; View of Quedah; Chart of Sambeelan Islands in the Straits of Malacca, 1763; View of Malacca, July, 1762; Chart of Abai Harbour, on north-west of Borneo, 1762.

Of the expedition we have no particulars, but we gather that Rennell looked back on his treatment and service on board with dissatisfaction, though his performance of the duties assigned him recommended him as a man of merit to the authorities at Fort St George. He had missed a great chance in the navy, for during his absence orders came for the expedition against Manila, which ended in the capture of that place in 1762,—an expedition in which Captain Parker took the "Santissima Trinidad," a prize of enormous value. Rennell, however, made many friends at Madras, and had several offers of employment, though he did not think himself at liberty to accept any till the return of Captain Parker and his final discharge from the "Grafton's" books (July 1763). He now obtained the command of a vessel in the Government service, but whilst she lay off Madras, shortly afterwards, a cyclone destroyed every ship save one in the roads, and Rennell's among them. Fortunately he was on shore when the gale came on; but he lost everything.

The city of Madura was then being besieged by a British force in combination with one sent by the nawâb of the Carnatic; and Mr Palk, governor of Fort St George, employed Rennell[4] to superintend the landing of troops and stores for that operation. For his conduct of this service he received the thanks of the Government and a handsome present. Apparently about this time also he made surveys of the coast about Cape Calymere, and of the Paumben Passage. Shortly afterwards, having gone to Calcutta, he found in Captain Tinker, the officer commanding the king's squadron there, a gentleman with whom he had been slightly acquainted in the navy. There was evidently something very engaging in Rennell's manner, aspect, and character, for others as well as Captain Tinker immediately endeavoured to interest in his fortunes the governor of the presidency. This was Henry Vansittart, the successor of Clive, and father of Nicolas Vansittart, who was so long chancellor of the exchequer (1812–1823), and died Lord Bexley. The result was the appointment of Rennell as surveyor of the E. I. Company's dominions in Bengal, "before," as he writes, "I was scarcely apprised of the matter." A few days later he received a commission "for practitioner engineer in the citadel erecting at Calcutta near Fort William"—the fortress, in fact, now so well known by the latter name.

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[1] There were several branches of the family round Chudleigh, and the name occurs on several monuments in Chudleigh church. Four generations of Thomas Rennells, clergymen of some note, were reckoned as relations by James Rennell:—(1) T. Rennell, fellow of Exeter College, Oxford, M.A. of 1699, rector of Bishop's Leighton; (2) T. R., rector of Barnack, called "a very profound scholar . . . with a rich library;" (3) T. R., of King's College, Cambridge, master of the Temple, and dean of Winchester; (4) T. R., editor of the *British Critic*, Christian advocate at Cambridge, vicar of Kensington. As Rennell calls the second his cousin, the first was probably his grandfather's brother; he could hardly have been his father's brother on account of the dates.

[2] He writes the name indifferently Rennel and Rennell till February 2, 1760, when he says to Mr Burrington:—"You desired that in future I would write my name with a double *l*. I shall in the future, but am inclined to think it will be of little use to me." There is, we believe, here some reference to the clerical relations, whom he at that time thought neglectful.

[3] From Rennell's notice of its size and position this is evidently the island now called Rodriguez, about 350 miles north-east of Mauritius.

[4] This siege of Madura belongs to an obscure passage of Indian history, an account of which must be sought in Nelson's *Manual of Madura* (Madras, 1868), and Bishop Caldwell's *History of Tinnevelly* (Madras, 1881). Mohammed Yusuf Khan, a man of great ability, who had been "commander of all the Company's sepoys" (at Madras), and afterwards governor of Madura for the nawâb and the Company, threw off his allegiance in the beginning of 1763. A joint expedition was sent against him, and for a long time had indifferent success. Eventually Marchand, the chief of a French contingent in Yusuf's service, betrayed him to the English commandant, and in the latter part of 1764 it is said that he was hanged, whether by order of the Fort St George Government or of the nawâb is doubtful

Rennell, in a letter announcing his appointment, calls it that of "surveyor-general," but this term is not used in the official record, dated April 9, 1764.[1] The date of his commission in the corps of engineers, as ensign (or "practitioner engineer," as the junior rank was termed), is the same. The corps of Bengal Engineers, which after a creditable existence of just about a century was amalgamated with the Royal Engineers in 1862, was then in its infancy. Only four officers appear as having had commissions earlier than James Rennell, though the subsequent introduction of several officers with higher rank eventually placed more than this number over his head.

Practically, though he was sometimes engaged in works of construction or demolition,[2] Rennell's work as a surveyor occupied the whole of his Indian service, which extended to thirteen years only. In the course of this employment he reduced to order and substantial accuracy the map of Bengal, and accumulated a great part of the material which he afterwards utilized in the determination of all the important points embraced in the first approximately correct map of India. His merits were highly appreciated, and his rise was rapid. In January 1767 his position was raised to that of surveyor-general, and at the same time he was promoted to captain.

In their letter to the court of directors, reporting this promotion, the council at Fort William say:—

> "We have appointed Captain Rennell, a young man of distinguished merit in this branch, surveyor-general, and directed him to form one general chart from those already made, and such as are now on hand, as they can be collected in. This, though attended with great labour, does not prevent his prosecuting his own surveys, the fatigue of which, with the desperate wounds he has lately received in one of them, have already left him but a shattered constitution."[3]

This passage refers to a memorable passage in Rennell's career, which had nearly proved its tragical termination. Bengal proper was in those early days of the Company's administration very far from being the tranquil country that we have known it for so many years (except indeed during its partial share in the agitations of 1857, from the mutiny of several regiments within its boundaries). And it was about a year before the promotion just mentioned that Rennell, on one of his surveying campaigns in northern Bengal, met with the adventure in question

The districts in that quarter (Purniah, Dinajpur, Rangpur, &c.) were at that time habitually ravaged by bodies of marauders, who had their headquarters in the forest-tracts at the foot of the Himalayas, and beyond British jurisdiction. From these forests they used to issue annually in large bands, plundering and levying exactions far and wide, and returning to their jungle-asylum when threatened with pursuit. A few years before (1763) a large body of them had plundered the city of Dacca. They professed to belong to a religious fraternity and were commonly known as the *Sanyâsis*, a name under which they are frequently mentioned in the correspondence of Warren Hastings, sometimes as *Fakirs*. The affair took place in the semi-independent state of Kuch Behar, near the border of Bhutân. Hearing that a party of native soldiers had been sent to put down one of those bands, which had just taken and plundered the capital of the state, Rennell hastened to join the detachment with his own small escort, and came up with it just after the banditti had received a beating. The next day (21st February 1766) was spent in pursuit of the enemy, and in the afternoon Rennell and two other officers, who had gone forward to reconnoitre, found themselves in presence of a large body of the Sanyâsis. Their small escort of native horse rode off, and the officers were surrounded. Rennell's Armenian assistant was killed, his engineer subaltern fought his way clear with a slight wound, Rennell himself retreated fighting to the detachment, and was put in a palankin, covered with sabre-wounds. One blow had cut into his right shoulder blade and through several ribs; his left arm was severely cut in three places, and he had other wounds besides. For surgical help he had to be sent to Dacca, 300 miles off, in an open boat, which he had to direct himself, as he lay on his face, whilst the natives applied onions as a cataplasm to his shoulder. He was long given up, but, under the tender care of his friend Dr Russell, he recovered, though his health was long affected by the loss of blood and severity of the injuries.

On two later occasions Rennell's letters speak of his being attacked or waylaid whilst on survey, in one case by irregulars in the employment of the "jemitdars," *i.e.*, "zemindars," in districts remote from Calcutta, and on another occasion by the "Bootese," or Bhutiás, as we now call them. In a letter dated 30th October 1770 he says in his brief way:—

> "I must not forget to tell you that about a month ago a large leopard jumped at me, and I was fortunate enough to kill him by thrusting my bayonet down his throat. Five of my men were wounded by him, four of them very dangerously. You see I am a lucky fellow at all times."

We gather from this passage that it was common in those days for officers to carry bayonets,—a circumstance which is also set forth in one of the best known portraits of General Wolfe.

Shortly after this last adventure Rennell was allowed to carry out, with a force under his command, a project that he had formed for the suppression of the banditti in the north. Writing on the 3d March 1771, he speaks of having returned successful from this expedition, after marching 320 miles in fifteen days, which he justly observes was "pretty good travelling in that climate, especially for soldiers." This did not, however, put an end to the Sanyâsis, for they are spoken of by Hastings as still a pest in 1773 and 1774.

Rennell's usual residence was at Dacca, though his visits to Calcutta were at least annual. On one of these he married (October 15, 1772) Miss Jane Thackeray, one of the sixteen children of Archdeacon Thackeray, who had been headmaster of Harrow from 1746 to his death in 1760, and who has been called by Dr Butler the "second founder" of the school.[4] Among Dr Thackeray's descendants are to be counted many distinguished Anglo-Indians; and William Makepeace Thackeray of the Civil Service, the grandfather of the great writer who has made that combination of names familiar and illustrious, was a friend of Rennell's and the brother of his wife.

Indian careers were not in those days generally prolonged. Fortunes were reaped more rapidly than in later years, and death likewise mowed with swifter strokes. In the list of Bengal engineers there are thirteen, including Rennell, who received commissions prior to 1770, the earliest in 1761. Of these thirteen, before 1780, six were dead, four had resigned, one had been dismissed, and two only in the year named remained in the service.

Rennell's health had been remarkably good up to his encounter with the Sanyâsis, but from that time it became permanently deteriorated, and in 1777 he resigned, having attained the rank of major two years earlier (January 1775). In those days no regular pension-system existed; but, when permission for Rennell's retirement was given, in December 1776, by the governor and council, it was accompanied by the grant of a pension of 500 rupees a month from the Calcutta treasury, till the court's pleasure should be known. In passing this resolution the board remark that they "think fit to adopt this mode as most satisfactory to Major Rennell, whose fortune will not permit him to leave India without some certainty of support in the decline of life."[5] It is impossible, in reading this last phrase, to withhold a smile at the proverbial longevity of pensioners, when we remember that the illustrious subject of the resolution drew the allowance for fifty-three years after his retirement. The court of directors, after his arrival in England, conferred a pension of £600 a year in lieu of the Calcutta one.

Major Rennell and his wife, with a daughter born at St Helena during a stoppage on the way home, reached England, 12th February 1778. For the rest of his long life he lived in London, and for much the greater part of the time in Nassau Street (formerly called Suffolk Street) near the Middlesex Hospital, a quarter then inhabited by gentlefolks, though now quite deserted by fashion.

When applying in 1776 for permission to retire, Rennell had written—"I desire not to eat the bread of idleness, but rather to make myself as useful as possible, even after my return to England," and went on to submit a scheme for the utilization of the large mass of geographical material laid up and perishing in the India House.[6] He cannot have been long in England before he buckled to this task. He is said to have been offered employment of a considerable character and to have declined it. Of this we know no more; but apparently he had laid out his own course of life, in devoting himself to the laborious literary elucidation of geography, and to that enjoyment of the society of his friends to which he often refers in his correspondence as the chief happiness to which he looked forward in his retirement.

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[1] Extract from *Bengal Public Consultations* of that date (Records in India Office). "Mr Hugh Cameron, who was employed on this establishment as surveyor of the new lands, being deceased 16th ultimo, it is agreed to appoint Mr James Renall (*sic*) in his room, who is recommended to us as a capable person, and by specimens of some surveys made by him which the President now lays before the Board, promises to be a very useful servant."

[2] One of his exceptional employments (July 1768) was the demolition of fortifications round Chandernagore, which the French had commenced "expressly contrary to the treaty of Paris."

[3] Printed in Long's *Extracts from the Fort William Records*. p. 487 (Calcutta 1869).

[4] Rennell, in announcing his marriage to Mr Burrington, speaks of his wife as the "daughter of the late Mr Thackeray who kept Harrow School."

[5] Ms. Records in the India Office

[6] India Office Records.

His first publication after his return was *A Chart of the Banks and Currents at the Lagullas in South Africa* (1778), accompanied by a memoir. In the same year appeared *A Description of the Roads in Bengal and Bahar, &c., printed by order of the Court of Directors.* This is a small 12mo. and only a book of routes. In 1781 came out his *Bengal Atlas, containing Maps of the Theatre of War and Commerce on that side of Hindustan, compiled from the original Surveys, with Tables of Routes and Distances from Calcutta, through the principal Internal Navigations.* This is in folio, and contains twenty-one maps, a work leaving far behind everything in Indian cartography published up to that date. In the same year Rennell read before the Royal Society, to which he had been elected March 8, "An Account of the Ganges and Burrampootur Rivers."

These were preliminary flights. His great work on Indian geography was the *Memoir of a Map of Hindustan*; and even this was of gradual growth. In its first form, as published in 1783, it contained only pp. xiv and 132. A second edition in 1785 had considerable additions. In 1788 a *Memoir* was issued altogether enlarged in scope, and of this again a second edition appeared in 1792, and a third, still enlarged, in 1793, which contains pp. cxli + 428 + 51, pp. 620 in all. The work, which thus went through five developments in all, was that which especially established Rennell's reputation,—though his knowledge and ability were appreciated in London from an early date after his return to Europe, and the continued series of works which he issued from time to time during some five and thirty years spread and augmented his fame as a geographer. After a brief interval of extreme old age, the series was resumed in the publication of valuable posthumous works.

But, to return to earlier days, Rennell speedily found a place in the most intelligent circles of society, counting among his friends, as years passed on, not only men of science and literature like Sir Joseph Banks, Sir Everard Home, Bishop Horsley, Sir George Staunton, Dr Robertson the historian, Dean Vincent, Mr Alexander Dalrymple, Mr William Marsden, &c., but also such men as Lord Mornington (afterwards the famous Marquis Wellesley), Lord Spencer (first lord of the Admiralty 1794-1801), and Lord Holland. His closest friends appear to have been Sir Joseph Banks, Lord Spencer, and Dr Gillies the historian, and in later years Captain (afterwards Sir Francis) Beaufort.

In 1791 he received from the Royal Society, at the hands of the president Sir Joseph Banks, the Copley medal, assigned him for his geographical labours, and especially for his paper "On the Camel's Rate, as applied to Geographical Purposes." The following passage, perhaps not quite free from exaggeration, occurs in the president's address on this occasion:—

> "I should rejoice could I say that Britons . . . could boast a general map of their island as well executed as the Major's delineation of Bengal and Bahar, a tract of countries considerably larger in extent than the whole of Great Britain and Ireland; but it would be injustice to the Major's industry, were I not here to state that the districts he has perambulated and planned exceed probably in extent the whole tract of surveyed country to be found in the maps of the European kingdoms put together; while the accuracy of his particular surveys stands yet unrivalled by the most laborious performance of the best county maps this nation has hitherto been able to produce."

In 1792 Rennell published *The Marches of the British Army in the Peninsula of India during the Campaign of 1790-91, illustrated and explained by a map and other plates*; and in 1794 an 8vo pamphlet entitled *War with France the only security of Britain*, by an "Old Englishman." Some years before this time Rennell had also turned his attention to African geography, in connexion with the African Association, of which he was one of the earliest members. Of this body, which was the progenitor, though not the immediate parent, of the Royal Geographical Society,[1] an account may be read in Mr Clements Markham's most interesting record of the fifty years' work of that society. The association was established in 1788, and sent out several travellers of note. Maps and geographical memoirs from Rennell's pen were issued on various occasions; and especially were his African labours associated with the name and first journey of Mungo Park. Rennell published in all some five or six dissertations on African geography. And this branch of his work may account, after a fashion, for an odd confusion made in a public report of Livingstone's burial in Westminster Abbey.[2]

The *Philosophical Transactions*, whose atmosphere in those days was not confined to the same rarefied altitudes as at present, contain occasional papers from Rennell's hand. We have mentioned the paper on "Camel's Rate" in 1791; in 1793 we have "Observations on a Current that often prevails to the westward of Scilly, and endangers the safety of ships" (the current in question has since been known by Rennell's name), in 1809 "On the Effect of Westerly Winds in raising the Level of the British Channel." In the *Archæologia* we find the following:—in vol. xvii. p. 242, "Observations on the Topography of Ancient Babylon," and in vol. xxi. three dissertations:—(1) p. 92, "On the Voyage and Place of Shipwreck of St Paul"; (2) p. 138, "Concerning the Identity of the Remains at Jerash, whether they are those of Gerasa or Pella"; (3) p. 501, read May 1826, when the venerable author was in his eighty-fourth year, "Concerning the place where Julius Cæsar landed in Britain." This does not, we believe, exhaust the list of his occasional writings, and he gave much incidental help to other writers who touched his own subjects, *e.g.*, to Dean Vincent in his well-known work on the Commerce and Navigation of the Ancients. The detail of these minor works has carried us away from the chronological order of his productions. That which added most largely to the reputation acquired as the geographer of India was his book on the *Geographical System of Herodotus*, 4to, with eleven maps (1800). Another great task undertaken by him was a *Treatise on the Comparative Geography of Western Asia.* On this field he had formed a most comprehensive project, too vast indeed for the time of life at which he undertook it, when probably he had already reached threescore. Of this project his Herodotus was indeed itself a portion, and others were his separate publications of a *Dissertation on the Topography of the Plain of Troy* (4to, 1811), and of the *Illustrations of the Expeditions of Cyrus and the Retreat of the Ten Thousand*, and an additional mass of matter, prepared with many years' labour, and left behind him in a very perfect state of transcription, was published after his death by his daughter, in 2 vols. 8vo, with an atlas (1831).

Another posthumous work was *An Investigation of the Currents of the Atlantic Ocean, and of those which prevail between the Indian Ocean and the Atlantic.* For this work Rennell had examined and collated the logs of a vast number of the ships of war and Indiamen which had traversed those seas during thirty or forty years, re-computing observations, and reducing them to one general system. The results of this toil were left ready for the press, and were published in large charts, with a thin volume of text, under the editorship of Mr John Purdy, in 1832. The first contributions to the scientific knowledge of currents had been Rennell's papers on the Lagullas, and on the Scilly Currents, and the present work contained nearly all that existed in the generalization of such data till more than twenty years after his death.[3]

"Major Rennell," says an account of him, in a work privately printed by a member of his wife's family,[4] "was of middle size, well proportioned, with a grave yet sweet expression on his countenance, which is said to have conciliated the regard of all he spoke with."

The existence of this happy faculty we have already noticed as deducible from his earlier history in India. The sweet gravity of which the writer speaks is very recognizable in his portraits, alike in middle life and in extreme old age.[5] A contemporary, quoted in the work just referred to, said of him:—"In his intercourse with his friends he possesses a remarkable flow of spirits, and abounds with interesting subjects of conversation; at the same time, as to what relates to himself, he is one of the most diffident, unassuming men in the world."

One of the obituary notices at the time of his death says that Rennell's "political and religious feelings are said to have operated in causing him to decline the acceptance of an invitation to become a member of the French National Institute." This can hardly have had any basis of fact. Rennell, in politics, was always attached to what would be called, in present language, the Liberal party; though his Liberalism, as we may gather from the title of his pamphlet of 1794, and from expressions used in the dedication to Earl Spencer of his *Herodotus*, had nothing of that character which loves to disparage those who are jealous for the greatness of England. As a matter of fact he was elected a foreign associate of the Institute during the peace of Amiens, in 1802, and accepted the honour with unmistakable cordiality and satisfaction, as his reply, which we have seen, testifies. In his eighty-third year a gold medal was awarded to Rennell by the Royal Society of Literature; and, as his infirmities prevented his attendance at their place of meeting, a deputation, headed by the president, visited him for the purpose of presenting it at his own house in Nassau Street.

When more than eighty-seven years of age Major Rennell slipped from a chair, and broke his thigh. He hardly ever left his bed afterwards, and died 29th March 1830. He was buried in the nave of Westminster Abbey on the 6th April. A tablet to his memory, with a bust, stands in the north-west angle of the nave.

Mrs Rennell had died in 1810. Three children of the marriage grew up. Of these, Thomas, the second, died in 1846; William, the third, went to India in the Civil Service, and died some years before his father (1819);[1] Jane, the eldest, married Captain Rodd, afterwards Vice-Admiral Sir John Tremayne Rodd, K.C.B., and survived both her brothers, dying in 1863. It was through Lady Rodd's active filial zeal that Rennell's posthumous works were published, including, besides the two already named, a second edition of the *Herodotus*.

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[1] There was an intermediate body called the Raleigh Club, founded in 1826-27, which actually developed into the R.G.S. Rennell's great age doubtless prevented his joining the club. The society was founded the month after his death.

[2] "At Livingstone's feet lies the head of Major Reynell (*sic*), himself a noted African traveller."—*Times*, April 20, 1874.

[3] See Mr A. G. Findlay in the *Jour. Roy. Geog. Soc.*, vol. xxiii.

[4] *Memorials of the Thackeray Family*, by the late Mrs Bayne.

[5] Among portraits we may mention one engraved by Cardon from a drawing by Scott, of which impressions were published in the *European Magazine* for 1802, and in both the posthumous editions of the *Herodotus*. There is another profile, engraved by Daniel after Dance, in a collection of portraits by these artists, and a medallion in porcelain executed at Paris, probably after his death, and showing him in old age. There is also the bust by Baily in Westminster Abbey; and an admirable wax relief of him in old age is in the possession of Major Rodd, his grandson.

What has been said in the enumeration of his writings sufficiently shows how laboriously he worked. But to this great industry were joined in all his works sagacity, excellent judgment, and a love of truth which made him never ashamed to confess a difficulty, and always ready to do justice to other writers. The man whom we find already at fourteen serving as a midshipman in time of war could have grown up with little instruction but what he sought, and found for himself, in the course of his career. On many of the subjects on which he wrote, fresh light has been so abundant that the value of his works as guides has in great measure passed away, yet even now no one can deal with Herodotus or Xenophon without consulting Rennell's views, directly or indirectly. Obliged to depend, as regards the former, for his text on the inaccurate translation of Beloe, it has been shown that Rennell's sagacity often discerned the true meaning of the historian when his interpreter had gone astray. What he did for the geography of India, not by his own surveys merely, but by his labour on the often remoulded *Memoir*, in coordinating the information gathered during forty years, may be best appreciated by a comparison of the celebrated D'Anville's *Éclaircissemens Géographiques sur la Carte de l'Inde* (1753) with the final edition of the *Memoir* (1793). Putting aside the great additions to positive knowledge which favoured the later writer, we are mistaken if the perusal of both works will not leave the impression that, in most of the qualities of a geographer, Rennell's place is not in any respect behind that of the famous Frenchman, for whom he himself always entertained and expressed the deepest respect.

We conclude with an extract from a tribute to his memory which appeared in the *Times* of the day after his funeral in the Abbey:—

> "Another characteristic of this amiable philosopher was the generous facility with which he imparted his stores of learning in conversation. A memory remarkably tenacious, and so well arranged as to be equally ready for the reception or for the distribution of knowledge, made him a depository of facts to which few ever applied in vain; adapting himself to the level of all who consulted him, he had the happy art of correcting their errors without hurting their feelings, and of leading them to truth without convicting them of ignorance."

Till Rennell's time it could hardly be said that England could boast of any geographer of the first class. His pre-eminence in that character is still undisputed, like that of D'Anville in France, and of Ritter in Germany.

In this sketch of Rennell's career, use has been made of a mass of letters addressed, during his service in the navy and in India, to the Rev. G. Burrington, kindly lent by Mr C. Langley of Chudleigh; of papers courteously communicated by Rennell's descendants; of the "Memorials" quoted above; and of India Office records; supplemented by a good deal of other research. (H. Y.)

RENNES, a town of France, formerly the capital of Brittany and now the chief town of the department of Ille-et-Vilaine, is situated at the meeting of the Ille and the Vilaine and at the junction of several lines of railway connecting it with Paris (232 miles east-north-east), St Malo (51 miles north), Brest (147 west-north-west), &c. It is the seat of an archbishop and the headquarters of the 10th corps d'armée (with a large arsenal and barracks). For the most part rebuilt on a regular plan since the seven days' fire of 1720, the town is rendered more monotonous by the houses being of dark-coloured granite and nearly all after the same type. Of trade and industry there is little trace in the dull and deserted streets. The main portion of the old town occupies a hill which looks down on the confluence of the streams. Along the north side flows the Vilaine in a deep hollow bordered with quays and crossed by four bridges leading to the new town near the railway station. The canalized Ille forms the first section of the Ille and Rance Canal which unites St Malo to Rennes, and then descends the Vilaine to Redon, and the canal from Nantes to Brest. The cathedral of Rennes is rebuilt in a pseudo-Ionic style on the site of two churches dating originally from the 4th century. The archbishop's palace occupies in part the site of the abbey of St Melaine, whose church is the sole specimen in the town of 11–13th century architecture. A colossal statue of the Virgin was placed above the dome of this church in 1867. In the palace is preserved the old altar screen from the cathedral, perhaps the finest in all France. The Mordelaise Gate, by which the dukes and bishops used to make their state entry into the town, is a curious example of 15th century architecture, and accidentally preserves a Latin inscription of the 3d century, a dedication by the Redones to the emperor Gordianus. Architecturally the finest building in the town is the old parliament house (now the court-house), designed by Jacques Debrosse in the 17th century, and decorated with statues of legal celebrities, carved work, and paintings by Coypel and Jouvenet. The town-house was erected in the first half of the 18th century by Gabriel, the architect of the Place de la Concorde in Paris. In the modern building occupied by the faculties of law, science, and literature there are scientific collections of various kinds, and one of the finest picture galleries outside of Paris, with pieces by Paul Veronese, Tintoretto, Vandyck, Rembrandt, Rubens, &c., and sketches by Michelangelo, Titian, and other great masters. The town library contains 50,000 volumes and 220 MSS.; and the municipal archives are of primary importance for the history of Brittany. The Promenade du Thabor, with a statue of Duguesclin, the adjoining botanic gardens, the Promenade de la Motte a little lower down, and the Mail, a fine avenue planted in 1657 by the duke of Chaulnes, add greatly to the beauty of Rennes. About 2 miles from the town is the castle of La Prévalaye. The local industries are varied but not extensive. The population of the town in 1881 numbered 57,430; that of the commune 60,974.

Rennes, the chief city of the Redones, was formerly (like some other places in Gaul) called Condate (hence *Condat*, Condé), probably from its position at the confluence of two streams. Under the Roman empire it was included in Lugdunensis Tertia, and became the centre of various Roman roads still recognizable in the vicinity. The name *Urbs Rubra* given to it in the oldest chroniclers is explained by the bands of red brick still found in the foundations of its first circuit of walls. In 843 A.D. Nomenoé, Charles the Bald's lieutenant, declared himself independent and took the title of king of the Bretons; but the country was afterwards torn to pieces by the struggles of the various counts who wished to make themselves masters of it and by the invasions of the Normans. About the close of the 10th century Conan le Tort, count of Rennes, subdued the whole province, and it was his son and successor Geoffrey who first took the title duke of BRITTANY (*q.v.*). It was at Rennes the dukes were crowned; and before entering the city by the Mordelaise Gate they had to swear to preserve the privileges of the church, the nobles, and the commons of Brittany. During the War of Succession the city was captured by Jean de Montfort in 1341, by Charles of Blois in 1342, and again by Jean de Montfort. During the troubles of the League the duke of Mercœur attempted to make himself independent at Rennes (1589), but his scheme was defeated by the loyalty of the local parliament. Henry IV. entered the city in state on May 9, 1598. An insurrection at Rennes caused by the taxes imposed by Louis XIV., in spite of the advice of the parliament, was cruelly suppressed by the duke of Chaulnes, governor of the province. The parliament was banished to Vannes till 1689, and the inhabitants crushed with forfeits and in great numbers put to death. The fire of 1720 which destroyed eight hundred houses completed the ruin of the town. During the last year of the monarchy Rennes more than once resisted the imposition of taxes not authorized by the states of Brittany. In 1765 the celebrated procureur-général La Chalotais was imprisoned, and in 1788 the parliament was suspended from May to October. At the commencement of the Revolution Rennes was again the scene of bloodshed caused by the discussion about doubling the third estate for the convocation of the states-general. On January 26, 1789, the students, with Moreau (afterwards general) at their head, broke into the hall where the nobles sat in council in defiance of the decree of suspension issued against them by the Government. During the Reign of Terror Rennes suffered less than Nantes, partly through the courage and uprightness of the mayor Leperdit. It was soon afterwards the centre of the operations of the republican army against La Vendee. After the 10th of Brumaire it was accused of royalism and put to ransom by Brune. Besides La Chalotais, Gerbier the advocate and Admiral De la Motte-Picquet were born at Rennes.

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[1] There is in the *B. M. Catalogue* "Experimental Philosophy, or the Effects of Chemistry; A Play in Three Acts, by William Rennell, Calcutta, 1807–8."

RENNIE, John (1761-1821), engineer and architect, was the son of a farmer, and was born at Phantassie, East Lothian, 7th June 1761. While attending the parish school of East Linton he had to pass the workshop of Andrew Meikle, the inventor of the thrashing machine, and evinced such a strong interest in the operations there in progress that the workmen were in the habit of lending him their tools and teaching him their various uses. In his twelfth year he left school and placed himself under Meikle, but at the end of two years he went to a school at Dunbar, in order to obtain a more thorough knowledge of mathematics and mechanical drawing. Afterwards he occasionally assisted Meikle, but before his eighteenth year he had erected several corn mills on his own account, while in the winter months he visited Edinburgh to attend the classes of physical science at the university. By Prof. Robison of Edinburgh he was introduced to Messrs Boulton & Watt of Soho near Birmingham, for whom in 1786 he superintended the construction of the Albion flour mills near Blackfriars Bridge, London. It is believed that the difficulties which occurred at the Albion mills in regard to the ebb and flow of the tide first led Rennie to the study of that branch of civil engineering connected with hydraulics and hydrodynamics, in which he became so celebrated as to have no rival after the death of Smeaton. Immediately after the completion of the Albion mills Rennie's reputation was so firmly established in everything connected with mill work that he found himself in a very extensive line of business. In the construction of sugar mills in Jamaica and the other West Indian Islands he soon had almost a monopoly, and among other mills constructed by him in England mention may be made of the powder mill at Tunbridge, the great flour mill at Wandsworth, and the rolling and triturating mills at the Mint on Tower Hill. Wherever the machinery of his mills was impelled by steam, the engines of his friends Messrs Boulton & Watt supplied the motive power. It is, however, on his achievements as an architect and civil engineer that the fame of Rennie chiefly rests. Of the bridges connecting the banks of the Thames at London, three have been built from his designs,—Southwark Bridge, in the construction of which he introduced a method of employing cast iron which formed a new epoch in the history of bridge-building; Waterloo Bridge, which then had no parallel for its magnitude, elegance, and solidity; and London Bridge, on the model of Waterloo Bridge. Bridges at Leeds, Musselburgh, Kelso, Newton-Stewart, Boston, New Galloway, and numerous other places bear similar testimony to his skill and taste. His earliest canal project was that of the Crinan Canal, and following it was the Lancaster Canal, which besides other difficulties presented that of an aqueduct over the Lune. His execution of these works so established his reputation that his opinion and assistance were required from all quarters in regard to similar undertakings, among others the construction of the Great Western Canal in Somersetshire, the Polbrook Canal in Cornwall, the Portsmouth Canal, and the Avon and Kennet Canal. But more important than these were his works in connexion with docks and harbours, his designs embracing the London Docks, the East and West India Docks at Blackwall, and docks at Hull, Greenock, Leith, Liverpool, and Dublin. The harbours of Queensferry, Berwick, Howth, Holyhead, Kingstown, Newhaven, and several others owe their security and convenience to his labours. But even these works must yield to what he executed in connexion with the Government dockyards at Portsmouth, Chatham, Sheerness, and Plymouth. One other effort of his genius falls to be mentioned, the drainage of that vast tract of marsh-land bordering upon the rivers Trent, Witham, Welland, and Ouse which for centuries had baffled the skill of some of the ablest men in that department of civil engineering. Rennie's industry was very extraordinary; though fond of the society of his select friends and of rational conversation, he never suffered amusement of any kind to interfere with his business, which seldom engaged him less than twelve hours and frequently fifteen in the day. His conversation was always amusing and instructive. In person he was of great stature and strength; and his noble bust by Chantrey, when exhibited in Somerset House, obtained the name of Jupiter Tonans. He died 16th October 1821.

His son Sir John Rennie (born August 30, 1794, died Sept. 1874) succeeded him as engineer to the Admiralty, and acquired a high reputation in the same line of business as his father. On the completion of the London Bridge from his father's designs in 1831, he received the honour of knighthood. He was the author of *The Theory, Formation, and Construction of British and Foreign Harbours*, 4 vols., 1851-54.

RENT is classed in English law as an incorporeal hereditament, that is, a profit issuing out of a corporeal hereditament (see Real Estate). A rent issuing out of an incorporeal hereditament can only be possessed by the crown, or by a subject under statutory authority. Rent is said to lie in *render*, as distinguished from profits *à prendre* in general, which are said to lie in *prender*. At the present day rent is generally a sum of money paid for the occupation of land. It is important to notice that this conception of rent is attained at a comparatively late period of history. The earliest rent seems to have been a form of personal service, generally labour on the land, and was at the same time fixed by custom. The exaction of a competition or rack rent beyond that limited by custom was, if one may judge from the old Brehon law of Ireland, due to the presence upon the land of strangers in blood, probably at first outcasts from some other group.[1] The strict feudal theory of rent admitted labour on the lord's land as a lower form, and at the same time developed the military service due to the crown or a lord as a higher form. Rent service is at once the oldest and the most dignified kind of existing rent. It is the only one to which the power of distress attaches at common law, giving the landlord a preferential right over other creditors exercisable without judicial authority (see Distress). In course of time the increasing importance of socage tenure, arising in part from the convenience of paying a certain amount, whether in money or kind, rather than comparatively uncertain services, led to the gradual evolution of the modern view of rent as a sum due by contract between two independent persons. At the same time the primitive feeling which regarded the position of landlord and tenant from a social rather than a commercial point of view is still of importance.

Rents as they now exist in England are divided into three great classes—rent service, rent charge, and rent seck. A rent service is so called because by it a tenure by means of service is created between the landlord and the tenant. The service is now represented by fealty, and is nothing more than nominal. Rent service is said to be incident to the reversion, that is, a grant of the reversion carries the rent with it (see Remainder). A power of distress is incident at common law to this form of rent. Copyhold rents and rents reserved on lease fall into this class. A rent charge is a grant of an annual sum payable out of lands in which the grantor has an estate. It may be in fee, in tail, for life, or for years. It must be created by deed or will, and may be either at common law or under the Statute of Uses. The grantor has no reversion, and the grantee has at common law no power of distress

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[1] "The three rents, viz., rack rent from a person of a strange tribe, a fair rent from one of the tribe, and the stipulated rent which is paid equally by the tribe and the strange tribe."—*Senchus Mor*, p. 159, cited by Maine, *Village Communities*, p. 180.

Such power must have been given him by the instrument creating the rent charge. The Statute of Uses, 27 Hen. VIII. c. 10, gave a power of distress for a rent charge created under the statute. The Conveyancing Act, 1881, 44 & 45 Vict. c. 41, § 44, now gives a power of distress for a sum due on any rent charge which is twenty-one days in arrear. By § 45 a power of redemption of certain perpetual rents in the nature of rent charges is given to the owner of the land out of which the rent issues. Rent charges granted since April 26, 1855, otherwise than by marriage settlement or will for a life or lives or for any estate determinable on a life or lives must, in order to bind lands against purchasers, mortgagees, or creditors, be registered in the central office of the Supreme Court (18 & 19 Vict. c. 15). In certain other cases it is also necessary to register rent charges, for instance, under the Improvement of Land Act, 1864, and the Land Transfer Act, 1875. Forms of rent charge of special interest are tithe rent charge (see TITHES), ground rents, and the rent charges for the purpose of conferring votes usually called "faggot votes." Ground rents are rent charges in fee simple issuing out of land sold for building purposes. The lessee erects buildings according to the terms of the lease, making his profit by subletting either at a rack rent or on the terms of a fine on entrance into possession, with an annual rent slightly larger than the ground rent. In the latter case the rent is called an improved ground rent. Ground rents are regarded as particularly eligible investments owing to the extent of the security afforded. Rent charges of the annual value of 40s. for the purpose of creating votes are now rendered ineffective by the Representation of the People Act, 1884, 48 Vict. c. 3, § 4, which enacts (subject to a saving for existing rights and an exception in favour of owners of tithe rent charge) that a man shall not be entitled to be registered as a voter in respect of the ownership of any rent charge. A rent seck (*redditus siccus*) is a rent charge reserved without power of distress. But, as power of distress for rent seck was given by 4 Geo. II. c. 28, the legal effect of such rent has been since the Act the same as that of a rent charge. There are varieties of these main divisions of rent to which special names are given. Rents of assize or quit rents are a relic of the old customary rents. They are presumed to have been established by usage, and cannot be increased or diminished. They are found only in manors. Those paid by the freeholders are also called chief rents. Fee farm rents are rents reserved on grants in fee. According to some authorities they must be at least one-fourth of the value of the lands. They, like quit rents, now occur only in manors, unless existing before the Statute of *Quia Emptores* or created by the crown (see REAL ESTATE). A rent which is equivalent or nearly equivalent in amount to the full annual value of the land is a rack rent. A dead rent is a fixed annual sum paid by a person working a mine or quarry, in addition to royalties varying according to the amount of minerals taken. Rents in kind still exist to a limited extent; thus the corporation of London is tenant of some lands in Shropshire by payment to the crown of an annual rent of a faggot. All pepper-corn or nominal rents seem to fall under this head. Services rendered in lieu of payment by tenants in grand and petit serjeanty may also be regarded as examples of rents in kind. Labour rents are represented by those cases, not unfrequent in agricultural leases, where the tenant is bound to render the landlord a certain amount of team work or other labour as a part of his rent. It was held in the Queen's Bench in 1845 that tenants who occupied houses on the terms of sweeping the parish church and of ringing the church bell paid rent within the meaning of the Limitation Act of 3 & 4 Will. IV., c. 27.

Apportionment.—In regard to estate a rent service is apportionable at common law, as well as under certain Acts of Parliament, such as the Land Clauses Act. A rent charge was formerly not apportionable, for it issued out of every part of the land and was at the same time in contemplation of law against common right as not being incident to tenure. The legal effect of this was that (with some exceptions) a release of part of the land out of which a rent charge issued was a release of the whole. It was provided by 22 & 23 Vict. c. 35, § 10, that the release from a rent charge of part of the hereditaments charged does not extinguish the whole rent charge, but operates only to bar the right to recover any part of the rent charge out of the hereditaments released. In regard to time, at common law no kind of rent was apportionable. The effect of this was that if the person entitled to the rent died between rent days no rent was due to the succeeding reversioner for the intermediate period. This was remedied by 11 Geo. II. c. 19, and other Acts, which are now practically superseded by the Apportionment Act, 1870, 33 & 34 Vict. c. 35. By this Act all rents are, in the absence of stipulation to the contrary, to be considered as accruing from day to day, and apportionable in respect of time accordingly.

Remedies.—Rent is due in the morning of the day appointed for payment, but is not in arrear until after midnight. It should be demanded just before sunset. The landlord has besides distress his ordinary remedy by action. In addition special statutory remedies are given in the case of tenants holding over after the expiration of their tenancy. By 11 Geo. II. c. 19 any tenant giving notice to quit and holding over is liable to pay double rent for such time as he continues in possession. By 1 & 2 Vict. c. 74 a tenant at a rent not exceeding £20 per annum who fails to deliver up possession after his interest has ended may be ejected by summary proceedings before justices. By 19 & 20 Vict. c. 108 a similar remedy is given in the county court where the rent does not exceed £50 per annum. Analogous provisions are contained in Acts dealing with the metropolitan district. It should be noticed that, since the writing of the article DISTRESS, the landlord's power of distress has been considerably limited in the case of agricultural tenancies falling within the Agricultural Holdings Act, 1883, 46 & 47 Vict. c. 61. § 44 confines the right of distress to one year's arrears of rent instead of six years' arrears, which could be distrained for before the Act. An extension of time is allowed in cases where in the ordinary course of dealing between landlord and tenant the payment of rent has been allowed to be deferred for a quarter or half year after the rent became legally due. By § 45 live stock belonging to another person and taken in by a tenant to be fed has a qualified privilege from distress; that is, it is not distrainable where there is other sufficient distress to be found. If so distrained for want of other sufficient distress, it may be redeemed by the owner on payment of any sum due for the feeding. Agricultural or other machinery on the premises of the tenant for hire or use and live stock on the premises solely for breeding purposes are absolutely privileged from distress. The Act further makes appraisement before sale unnecessary, and enacts that bailiffs to levy distress are to be appointed by county court judges. For other provisions of the Act dealing with procedure, see REPLEVIN.

Ireland.—The main differences between Irish and English law have been caused by legislation (see LANDLORD AND TENANT). One of the most noticeable is the power of ejectment for non-payment of rent given by 23 & 24 Vict. c. 154. In England such a power can only be conferred by express agreement.

Scotland.—Rent is properly the payment made by tenant to landlord for the use of lands held under lease. The rent paid by vassal to superior is called feu-duty (see FEU). Its nearest English equivalent is the fee farm rent. Rents are recovered by an action of maills and duties in the Sheriff Court or the Court of Session, and in non-agricultural tenancies by hypothec. The right of hypothec over land exceeding 2 acres in extent let for agriculture or pasture has been abolished as from November 11, 1881 (see HYPOTHEC). The Agricultural Holdings (Scotland) Act, 1883, 46 & 47 Vict. c. 62, provides by § 27 that when six months' rent of the holding is due and unpaid the landlord may raise an action of removing before the sheriff against the tenant, concluding for his removal at the term of Whitsunday or Martinmas next ensuing; and, unless the arrears are paid or caution is found, the sheriff may decern the tenant to remove. The tenant so removed has the rights of an outgoing tenant. Labour or service rents were at one time very frequent in Scotland. The events of 1715 and 1745 showed the vast influence over the tenantry that the great proprietors acquired by such means. Accordingly the Acts of 1 Geo. I., sess. 2, c. 54, and 20 Geo. II. c. 50, provided for the commutation of services into money rents. Such services may still be created by agreement, subject to the summary power of commutation by the sheriff given by the Conveyancing Act, 1874, 37 & 38 Vict. c. 94, §§ 20, 21. "In the more remote parts of Scotland it is understood that there still exist customary returns in produce of various kinds, which being regulated by the usage of the district or of the barony or estate cannot be comprehended under any general rule" (Hunter, *Landlord and Tenant*, vol. ii. 298). Up to within forty years ago existed steelbow leases, by which the landlord stocked the farm with corn, cattle, implements, &c., the tenant returning similar articles at the expiration of his tenancy and paying in addition to the ordinary rent a steelbow rent of 5 per cent. on the value of the stock.

United States.—Agricultural rents are, from the different position of the cultivators of the land, of less importance than in England. The law is in general accordance with that of England. The tendency of modern State legislation is unfavourable to the continuance of distress as a remedy. In some States, such as Ohio and Tennessee, it never existed. Fee farm rents exist in some States, like Pennsylvania, which have not adopted the Statute of *Quia Emptores* as a part of their common law. (J. W†.)

REPLEVIN. Since the article DISTRESS (*q.v.*) was written the Agricultural Holdings Act, 1883, has made some changes in the law of replevin in England. The period of five days during which the tenant or owner of goods may replevy by 2 Will. & Mary c. 5, § 1, is extended in the case of holdings within the Act to fifteen days, on the tenant or owner making a request in writing to that effect and giving security for additional costs. A summary remedy in the nature of replevin is given, a court of summary jurisdiction having a jurisdiction concurrent with that of the county court conferred upon it in the case of distress on a holding within the Act.

REPORTING. The curious among those who seek to trace political developments may, without any great strain on the imagination, find an intimate relation between the growth of newspaper reporting and the growth of democratic institutions; at any rate the two have always been found together. The history of reporting in Great Britain brings out the relationship with much clearness. There was no truly systematic reporting until the beginning of this century, and not until many years afterwards did it grow to be a most important, if not the most important, feature in newspapers. There was parliamentary reporting of a kind almost from the time when parliaments began. Single speeches, and even some consecutive account of particular proceedings in parliament, were prepared. But long after newspapers were commonly published no effort had been made to give reports either of the proceedings of parliament or of those of any other assembly dealing with the public interests. The first attempts at parliamentary reporting, in the sense of seeking to make known to the public what was done and said in parliament, began in a pamphlet published monthly in Queen Anne's time called *The Political State*. Its reports were mere indications of speeches. Later, the *Gentleman's Magazine* began to publish reports of parliamentary debates. Access to the Houses of Parliament was obtained by Cave, the publisher of the magazine, and some of his friends, and they took surreptitiously what notes they could. These were subsequently transcribed and brought into shape for publication by another hand. There was a strict prohibition of all public reporting; but the *Gentleman's Magazine* appears to have continued its reports for some time without attracting the attention or rousing the jealousy of the House of Commons. The publisher, encouraged by immunity from prosecution by parliament, grew bolder, and began in his reports to give the names of the speakers. Then he was called to account. The latest standing order on the subject at that time was one passed in 1728, which declared "that it is an indignity to, and a breach of, the privilege of this House for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that upon discovery of the authors, printers, or publishers of any such newspaper this House will proceed against the offenders with the utmost severity." Under this and other standing orders, Cave's reports were challenged, as were those of other publishers in other magazines. They were denounced by resolution; and threats of prosecution were made, with the result that the reports appeared still, but without the proper names of the speakers, and under the guise of "Debates in the Senate of Lilliput" or some other like title. Long afterwards, in the latter half of the century, the newspapers began to report parliamentary debates more fully, with the result that, in 1771, several printers, including those of the *Morning Chronicle* and the *London Evening Post*, were ordered into custody for publishing debates of the House of Commons. A long and bitter struggle between the House and the public ensued. John Wilkes took part in it. The lord mayor of London and an alderman were sent to the Tower for refusing to recognize the Speaker's warrant for the arrest of certain printers of parliamentary reports. But the House of Commons was beaten. In 1772 the newspapers published the reports as usual; and their right to do so has never since been really questioned. Both Houses of Parliament, indeed, now show as much anxiety to have their debates fully reported as aforetime they showed resentment at the intrusion of the reporter. Provision has been made in the House of Lords and in the House of Commons for reporters. There are galleries in which they may take notes, and writing rooms in which those notes may be extended. In short, reporting is now one of the best marked of parliamentary institutions.

But parliamentary reporting is only a small part of such work in newspapers. The newspapers in the beginning of this century rarely contained more than the barest outline of any speech or public address delivered in or in the neighbourhood of the towns where they were published. As parliamentary reporting began to grow, so did local reporting. After the peace of 1815 a period of much political fermentation set in, and the newspapers began to report the speeches of public men at greater length. All the attempts that were made from time to time to repress public meetings and demonstrations of dissatisfaction with the existing order of things did but increase the demand for reporting. It grew as the fetters were struck off public institutions. With the Reform Act of 1832 it got a great start forward; and the Municipal Reform Acts gave it a still stronger impulse. Then the proceedings of town councils could be reported, and every local newspaper took care that this was done. It was not, however, until well into what may be called the railway era that any frequent effort was made by newspapers to go out of their own district for the work of reporting. The London newspapers had before this led the way. In London alone were there daily newspapers. The proprietors of these papers had been compelled by the requirements of the public to make provision for the systematic reporting of the proceedings of parliament. For many years after the right to report those proceedings had been practically established, the work was done in a dilatory and clumsy fashion. Early in the present century, however, greater freedom of access to both Houses was given, and the manager of the *Morning Chronicle* established a staff of reporters. They began the system which with improvements has continued to this time. Each reporter took his "turn"—that is, he took notes of the proceedings for a certain time, and then gave place to a colleague. The reporter who was relieved at once extended his notes, and thus prompt publication of the debates was made possible. Reporters had been found to supply the demand, and it had become the habit of the proprietors of the London newspapers to employ these men, out of the session of parliament, in reporting the speeches of public men in the country. The practice grew until there was a good deal of competition among the papers as to which should first issue a report of any speech of note. Railways were not; and reporters had frequently to ride long distances in post chaises, doing their best as they jolted along the roads to transcribe their notes, so that they might be ready for the printer on arrival at their destination. Charles Dickens used to tell several stories of his adventures of this kind while he held an engagement on the *Morning Chronicle*. He was, indeed, perhaps the best reporter of his time, and he was most successful in outstripping many of his rivals. One result of the efforts thus made was that the provincial newspapers were stimulated to greater efforts. Reporters were rapidly trained, and in all directions reporting grew. There were none but weekly newspapers; but they devoted much of their space to reporting, and public men became more ready to speak as they found that what they said would be more widely made known. As railways were extended, the newspapers were able to extend the sphere of their work of this kind, and reporting spread apace. Then, with changes in the fiscal policy of the country, daily newspapers sprang up in all directions; the electric telegraph was being improved and developed so that greater facilities were given for reporting; and in a few years the old supremacy of the London journals in this department of newspaper work had well-nigh disappeared. The country newspapers did more reporting of speeches and public meetings than the metropolitan papers. No public man made a speech but it was faithfully reproduced in print. Local governing bodies, charitable institutions, political associations, public companies—all these came in a short time to furnish work for the reporter, and had full attention paid to them. Curiously enough, while the country newspapers have thus cultivated reporting, and have made it one of their chief features, the London newspapers, for reasons into which this article need not enter, have fallen behind, and have for some years past given little attention to the work of which they were the originators. This fact explains a development of reporting which may be more fully described.

When the second half of this century began, parliamentary reporting was a leading feature of the London newspapers. They had a monopoly of it. All the reporting arrangements in the House of Lords and in the House of Commons were made with sole regard to their requirements. There had indeed been a long battle between the *Times* and some of the other London newspapers as to which should have the best parliamentary report, and the *Times* had established its supremacy, which has never been shaken. But, while its reporting was fuller than that of other London daily newspapers, they did not neglect the work, and they gave in shorter compass admirable digests of the proceedings, with full reports of the most important speeches. The provincial newspapers were in the main obliged to copy the reports thus provided, and rarely made any attempt to get reports of their own. When the electric telegraph came into use for commercial purposes a change began. The company which first carried wires from London to the principal towns in the country started a reporting service for the country newspapers. It gathered up scraps of news and sent them to the journals that subscribed for the service. In addition, it procured admission to the parliamentary galleries for reporters in its employment, and began to send short accounts of the debates to the newspapers in the country. These newspapers were thus enabled to publish in the morning some account of the parliamentary proceedings of the previous night, instead of having to take like reports a day later from the London journals. The effect was greatly to stimulate the appetite of the provincial public for parliamentary reporting. The telegraph companies for a long time could or would do no more than they had begun by doing; and they offered no inducements to the provincial newspapers to telegraph speeches. The public meanwhile wanted to know more fully what their representatives were saying in parliament, and gradually the leading provincial newspapers adopted the practice of employing reporters in the service of the London journals to report debates on subjects of special interest in localities; and these reports, forwarded by train or by post, were printed in full, but of course a day late. The London papers paid little attention to such debates, and thus the provincial papers had parliamentary reporting which was not to be found elsewhere. Bit by bit this feature was developed. It was greatly accelerated by a movement which the *Scotsman* was the first to bring about. The telegraph companies had increased in number, but they had not given more facilities for newspaper reporting. About 1865, however, a new company having come into existence, it was agreed that wires from London should be put at the disposal of such newspapers as desired them. Each newspaper was to have the use of a wire—of course on payment of a large subscription—from six o'clock at night till three o'clock in the morning. This was the beginning of the "special wire" which now plays so important a part in the production of almost all newspapers. The arrangement was first made by the *Scotsman* and by other newspapers in Scotland. The immediate result was that the parliamentary reporting in these papers was greatly increased, and was no longer confined to debates on local affairs. The special wires were used to their utmost capacity to convey reports of the speeches of leading statesmen and politicians; and, instead of bare summaries of what had been done, the newspapers contained pretty full reports.

When the telegraphs were taken over by the state, the facilities for reporting were increased in every direction. But now, as to parliamentary reporting, a new difficulty arose. The London papers, with the exception of the *Times*, had given less and less attention to parliamentary debates. There were, indeed, fairly long reports in one or two other newspapers in London, but the tendency was to shorten them, while on the other hand several of the provincial newspapers were giving more space than ever to the debates. These newspapers had to get their reports as best they could. The demand for such reporting had led, on the passing of the telegraphs into the hands of the state, to the formation of news agencies which undertook to supply the provincial papers. These agencies were admitted to the reporters' galleries in the Houses of Parliament, and they provided longer or shorter reports of the debates, to meet the wishes of their clients. But the reports which any agency supplied were identical; that is to say, all the newspapers taking a particular class of report had exactly the same material supplied to them—the reporter producing the number of copies required by means of manifold copying paper. It is easy to see that, though this might serve the purpose of most of them, it could not meet the requirements of all; and accordingly attempts were made to get separate reports by engaging the services of some of the reporters employed by the London papers. Nothing else indeed was possible. The "gallery" was shut to all, save the London papers and the news agencies. The *Scotsman* sought in vain to break through this exclusiveness. The line, it was said, must be drawn somewhere, and the proper place to draw it was at the London press. Once that line was departed from every newspaper in the kingdom must have admission. But in 1880 a select committee of the House of Commons was appointed to consider the question. It took evidence, and it reported in favour of the extension of the gallery and of the admission of provincial papers. The result was that some of the papers entered into combinations to procure reports; that is to say, three or four papers which would be satisfied with the same report joined in providing the necessary reporting staff. In other cases individual newspapers put themselves on the same footing as the London newspapers by engaging separate staffs of reporters. This is the arrangement now. Parliamentary reporting is much fuller in the leading provincial newspapers than it is in most of the London papers, though the reports for the former have in all cases to be telegraphed to them.

The mode in which parliamentary reporting is carried out deserves some description. It has been said that the manager of the *Morning Chronicle* early in the century laid the foundation of the present system when he divided the work of reporting debates among a staff of reporters. That is exactly what is done now. The "gallery," as it is familiarly called, is arranged with boxes for note-takers overlooking the floor of the House, and with seats behind for other note-takers who are waiting to take their turn. The *Times* has three of the front boxes—one for the chief of its staff of reporters, one for a summary writer, and one for the note-taker engaged in the full report. Most of the other London papers have each two boxes—one for a summary writer, the other for a reporter. Each of the press agencies has two boxes. Hansard has one. The rest are occupied by provincial newspapers or by combinations of those newspapers. The staff of reporters attached to each paper or combination of papers numbers from six to sixteen shorthand writers. If, for the purpose of describing the work of parliamentary reporting, a staff of eight be assumed, the process can be made clear. One other preliminary point should be kept in mind: an expert and intelligent reporter can transcribe from his notes as much matter as that contained in a column of the *Times* in rather less than an hour and a half. The staff of eight men may have turns of a quarter of an hour or of half an hour, or of any other length of time that may be agreed upon. The House of Commons begins its ordinary sitting at a quarter to four. At that time reporter No. 1 takes his place in the box and notes all that passes in the House. At four, assuming quarter hour turns, No. 2 relieves him; at a quarter past four No. 3 relieves No. 2, and at half past four No. 4 relieves No. 3. It will thus be seen that the eight reporters will cover a period of two hours, and that each of them has an hour and three quarters in which to extend his notes. If he has had a quarter of an hour's note-taking of an important speaker he will have about three-quarters of a column of matter to write, and this he can do easily and have some time for rest before he has to take another "turn." In the case of an important debate extending far into the night, or into the morning, the "turns" are shortened. Instead of a quarter of an hour, each reporter takes ten minutes, or five, or even three. The reporters go from the box to a writing room and there transcribe their notes, their "copy" being gathered by messengers attached to their paper, and carried by them to the printers. In the case of the provincial newspapers, the "copy" has to be telegraphed over the "special" or other wires, before it can reach the hands of sub-editors or compositors. That, however, is no affair of the reporter's. He has to produce his report with as much rapidity as he can. In the case of the *Times* his efforts are seconded by what is in practice an annihilation of the space between the House of Commons and the office of the paper. The reporter reads out from his notes to an operator on a telephonic wire, who speaks what he hears through that wire to the office of the paper. When it is received there it is spoken off again to a compositor at a composing machine; and thus it is most commonly in type and ready for printing long before the reporter's "copy" could have been received from the House of Parliament. The telephone is also used in a similar way by some of the newspapers which have special wires. The latest parts of the report of a night's sitting are spoken through the telephone to the point from which the special wire starts, and they are promptly telegraphed to the newspaper for which they are intended. Thus it often happens that the finishing passages of a report of a late sitting in the House of Commons are actually in type in a newspaper office 400 miles away, before the members who have taken part in the proceedings have got on their greatcoats for their walk home.

Parliamentary reporting, important as it is, yet forms a small part of the reporting which is done by the newspapers. All the public expositions of our complicated and busy social and national system are reported with a fulness, and on the whole with an amount of accuracy, that are surprising. Every newspaper of importance in the provinces has a more or less numerous staff of reporters at its command. In some cases, papers have separate staffs in different parts of the country. It is the business of these gentlemen to report all that is worth reporting for their journal. In the case of a long and important speech or meeting they will take turns in the reporting of it in the same way as turns are taken in the Houses of Parliament. But no newspaper is able to confine its reporting to events in its own neighbourhood. It must give to the public full accounts of speeches of prominent public men, no matter where they are delivered. Sometimes a reporter is sent far away to do this work. In such a case he usually joins for the occasion the staff of one of the newspapers of the neighbourhood; or he and other reporters from a distance make up a staff to do the work. Again the system of turns comes in. But, for the most part, speeches of statesmen in different parts of the country are reported for newspapers at a distance by one or other of the news agencies, which send down staffs of reporters for the work. In some cases, all these modes of working are seen together—there are representatives of individual newspapers from far and near, and there are the staffs of the news agencies. During Mr Gladstone's Midlothian campaign he had seldom fewer than seventy reporters in his train.

As a rule, reporters are shorthand writers. That became a necessity when the demand for reporting greatly increased, and when the very words of a speaker had to be given. But what is spoken of as verbatim reporting is in no sense the best. It is a necessity, but to a great extent is merely mechanical. The reporter has acquired dexterity in shorthand writing, and he can read his notes fluently. Far more is required for that better reporting which conveys to the public the full sense of what a speaker has said without giving all his superfluous words. This is an art which is not universally acquired by reporters. They have learned to depend so much upon their notes that they do not learn to exercise their brains. There is much reporting which shortens speeches by wholesale excisions rather than by judicious and intelligent compression. It would, however, be unjust to pass over the many proofs of high intelligence which the reporting in our newspapers contains. The task of the reporter is often not easy. He has, to use a familiar adage, to make many silk purses out of sows' ears; and he does it patiently and well—so well that the author of the material operated upon is often inclined to take all the credit to himself.

So far, the reporting which has been spoken of is that by which speeches and debates are produced in print for the public information. But there is another kind of reporting which ought not to be passed over. What is commonly called "descriptive reporting" has in some cases nearly shouldered the reporting of speeches out of newspapers. Is there a royal progress, or a military display, or a pageant of any kind—the descriptive reporter is called into requisition. He has to describe as best he can all that happens.

It is a simple statement of fact to say that newspapers have on many occasions had word pictures from their descriptive reporters which have never been surpassed in prose writing for elegance and vividness and force. The special correspondent is a "descriptive reporter." He goes to war to describe what he sees. The electric telegraph has made a great change in the manner and perhaps in the character of his work; but he is still among those who help in newspaper reporting.

Mention has been made of the connexion of the electric telegraph with reporting; and it has been said that, since the telegraphs have been extended and telegraphing has been cheapened, the sphere of reporting has been widened and the demand for it has increased. No daily newspaper now confines its reporting to the affairs of the part of the country in which it is published. The electric telegraph brings the most distant places within easy reach of every newspaper. It has also made the work of the reporter more arduous and his responsibility greater. He cannot postpone the transcription of his notes to another day. The speech that is not finished in Manchester at midnight must be printed in full in the London newspaper which goes to press before three o'clock in the morning. The meeting which does not finish at Wick till midnight must be reported in the next day's papers in Edinburgh. All this means that the reporter must work under great pressure, and that he must exercise the greatest care in extending his notes. He has no time for revision, no opportunity of amending any doubtful passage. When these drawbacks are considered, it will most likely be felt that the work of reporting is not easy. Yet its importance could not well be overrated. Reporting is the feature in the journalism of to-day which the public could least afford to lose. The editor of a newspaper may influence public opinion, but the reporter furnishes the material for its formation. Fair reporting is indeed a great security for freedom and for moderation. It enables all who can read to see the arguments for and against any proposal; it shows how public [illegible] discharge their duties; it indicates the wants and wishes, the hopes and fears of the public; it puts within easy reach the means of combating wild and foolish propositions, however superficially attractive they may be; in short, it makes the whole country an open council on all questions affecting the souls and bodies, the education and the government, of the people. It is but fair to add that reporting is done as a rule with great ability and fairness. The reporter rarely carries his likes or his dislikes into his work. He is scrupulously just, and as scrupulously impartial, though it may be that this is not always the opinion of some men who make speeches of which little is seen in the shape of reporting. (C. CO.)

REPOUSSÉ. See METAL-WORK and PLATE.

REPRODUCTION

I. ANIMAL REPRODUCTION.

§ 1. ASEXUAL REPRODUCTION.

As a general account of this process has already been given (see BIOLOGY, vol. iii. p. 686), and the details of its occurrence in the various groups are described in the articles devoted to them (see PROTOZOA, HYDROZOA, TAPEWORM, &c.), it suffices here to recall the very broadest aspect of the phenomena,—that asexual reproduction is simply discontinuous growth, and that, as we make an ascending survey of the *Metazoa*, that simple form of discontinuous growth which we term asexual reproduction becomes more and more subordinated to, and at last wholly replaced by, that more differentiated or "sexual" form of reproduction characterized by the union of two heterogeneous cell-elements—never to reappear save in degenerate forms. See SEX.

§ 2. SEXUAL REPRODUCTION.

In the lowest forms of animal life the process of sexual reproduction is found in its simplest imaginable expression unassociated with any of those complexities which arise among the higher animals and plants. All that is to be observed is the growth of the reproductive organs, the maturation of their products, and the passive liberation of these,—the fecundation of the ovum and the fate of the embryo being entirely left to the circumstances of the environment. In higher forms, however, not only does this process of maturation become more complex and of far more marked influence over the other functions of the organism, but the attraction of the sexes becomes distinct and leads to new specializations of function and structure.

Maturation.—The maturation of the sexes acquires, as has been said, increasing definiteness in the higher forms, where it is associated with various characteristic accompaniments. The profound reaction of reproductive maturity upon the whole system is best marked in Birds and Mammals, and perhaps most of all in Man.

Thus in a young male Bird the circulation in the testes is greatly increased, and these organs increase greatly in size and weight and commence to develop spermatozoa. Meanwhile the "secondary sexual characters" of the adult—gayer plumage for alluring the female, or weapons for contest with other males—make their appearance, the voice and note may alter, and a marked increase of strength and courage may appear. Among Mammals the changes are of similar order, the secondary sexual characters of course differing in detail. The minor changes at puberty in Man associated with the commencement of spermatogenesis are (besides the reflex excitation of erection due to distension of the seminal vesicles, and the more or less periodic expulsion of their contents during sleep) the growth of hair on the pubic region and later on the lower part of the face, and the rapid modification of the laryngeal cartilages and the lengthening of the vocal chords, so rendering the voice harsh and broken during the change and ultimately deepening it by about an octave. The marked strengthening of bones and muscles and the profound psychical changes which accompany the whole series of processes are also familiar. See SEX.

The local and cellular activity within the ovary, which is the fundamental part of maturation in the female, is not less remarkable than that in the testes. That even in lower Invertebrates the enlargement and escape of the ova are part of a normal cellular rhythm is interestingly shown by their not unfrequent relapse to the amœboid state, or by the fatty degeneration and death of ova which have not accomplished their destiny. The escape of ripe ova in the Vertebrate ovary is especially remarkable: each Graafian follicle, as it ripens, bursts, expelling its ovum; its cavity contracts; it is filled up by blood, of which the white corpuscles form a framework resembling connective tissue, in which the solids and corpuscles of the serum with colouring matter derived from the hæmoglobin of the latter are retained; and the whole constitutes the "corpus luteum," which, should pregnancy occur, may persist and undergo further retrogressive changes, or otherwise gradually disappear.

The direct causes of this process of ovulation have been sometimes ascribed to the congestion of the blood-vessels of the ovary and to its own internal turgidity, or to the existence of a slight contractility of its stroma; it seems, however, rather to depend upon the growth and turgescence of the individual follicle. The question of the relation of ovulation to the process of copulation in the higher animals has also been much discussed. Though we certainly know that ovulation is of regular occurrence whether fecundation takes place or not, it seems that in many cases copulation is speedily followed by the liberation of an ovum; nor is it difficult to see how the profound nervous and circulatory excitement associated with the former process might accelerate the bursting of a follicle. Leopold has conclusively shown, however, that ovulation may also long precede impregnation.

In many forms it is not easy to see now the ova once liberated into the body-cavity find their way safely into the small opening of the discontinuous oviduct. In the Frog, however, tracts of the peritoneal epithelium become ciliated, so propelling the ova in the right direction. In Reptiles, Birds, and Mammals the open end of the oviduct is widened and fringed, and lies close to or even touching the ovary; muscular fibres too are present, and more or less active movements of this dilated end over the ovarian surface have been alleged to occur. The oviduct once reached, the downward progress of the ovum is ensured by the cilia of the epithelial lining, and probably also by peristaltic movements of its muscular coat. (1)[1]

Menstruation.—The process of menstruation (menses, catamenia), although from the earliest times the subject of medical inquiry, is by no means yet clearly understood. It occurs usually at intervals of a lunar month in all women during their period of potential fertility (fecundity), and, so far from being confined to the human species, has been observed at the period of "heat" in a large number of Mammals. Though thus clearly a normal physiological process, it yet evidently lies on the borders of pathological change, as is evidenced not only by the pain which so frequently accompanies it, and the local and constitutional disorders which so frequently arise in this connexion, but by the general systemic disturbance and local histological changes of which the discharge is merely the outward expression and result. The histological facts are briefly as follows. The mucous lining of the uterus consists of a loose vascular connective tissue covered by ciliated epithelium and containing numerous glands of clear alkaline secretion. This mucous lining before the outset of menstruation becomes loose and œdematous, its lymphatics being greatly distended; it thus thickens considerably, pressing against the cervix of the uterus. An extravasation of blood from the capillaries next takes place over the whole surface of the mucous layer, and the discharge is thus set up. This consists at first of blood largely diluted with the secretion of the uterine glands, but soon becomes mixed with detritus from the disintegration of the mucous coat, of which not only the general epithelial cells but those of the neck of the glands, and even part of the subjacent connective tissue, undergo fatty degeneration and fall off, occasionally even in a mass. After from three to six days the blood ceases to appear, and the lost epithelium is rapidly replaced, apparently by proliferation from the necks of the glands. By the ninth or tenth day the mucous coat is fully healed and the beginnings of the next menstrual process recommence.

The age at which the process commences varies with race and climate, with nutrition and growth, with habit of life (*e.g.*, with differences between town and country life), and with mental and moral characteristics. Of these, however, climate seems most important thus, while in northern Europe the average age is reckoned at the beginning of the fifteenth year, in the tropics it seems to commence in the ninth or tenth. The cessation of menstruation usually takes place between the age of forty-five and fifty, and, somewhat as the secondary characteristics of female puberty coincide with its appearance, a less distinct reduction of these is associated with its close; in many cases secondary resemblances to the masculine type may supervene.

The old theories of menstruation were that it served to rid the system of impure blood, that it simply corresponded to the period of "heat" observed in lower animals, or, later, that it was associated with ovulation,—which indeed seems broadly to correspond with the end of the menstrual period. At present there may be said to be two rival theories. According to the first of these the process is viewed as a kind of surgical "freshening" of the uterus for the reception of the ovum, whereby the latter during the healing process can be attached safely to the uterine wall. The other view is exactly the reverse of this. Its upholders regard the growth of the mucous coat before the commencement of the flow as a preparation for the reception of an ovum, if duly fertilized, and the menstrual process itself as the expression of the failure of these preparations, in short as a consequence of the non-occurrence of pregnancy. A decided majority of gynæcologists appear to incline to the latter view. (1)

Comparative Anatomy of the Reproductive Organs.—The multicellular animals afford a remarkable series of gradations from the simplest imaginable case in which certain cells, independently of accessory organs, and even isolated from each other, develop into ova and spermatozoa. In the vast majority of cases, however, definite groups of cells are set apart as the essential reproductive glands—the ovary and the testis. The contents of these may simply break loose, but definite excretory ducts are very frequently present, and upon these very varied complications may arise. To the male ducts a seminal reservoir may be added. More or less specialized glandular regions may contribute their secretion to the seminal fluid, and a more or less complicated copulatory apparatus may also be superadded.

The female accessory organs are equally simple in principle and complex in detail. Nutritive material may be furnished to the ova by special yolk glands, or by the walls of the oviduct; this too may supply special envelopes, and may exhibit dilatations for the preservation or development of the ova (uterus), for the reception of the male copulatory organ (vagina), or for the temporary storage of the seminal fluid thus introduced (receptaculum seminis). It is necessary therefore briefly to outline the most important facts of the comparative anatomy and physiology of these organs in the various groups.

Passing over the little-understood *Orthonectida* and *Dicyemida* (see PARASITISM, vol. xviii. p. 259), the Sponges present the very simplest case above referred to. Here and there throughout the mesoderm a cell may be observed enlarging to form an ovum, or segmenting to form a mass of spermatozoa, but no definite reproductive glands, much less any duct or accessory organ, are present, and at most the ovum forms for itself a kind of nest among the surrounding cells, an approach towards the epithelial follicle of higher forms being thus presented.

Cœlentera.—In *Anthozoa* the generative organs are developed as ridges on the gastric septa, their products passing out by the mouth; and in the *Ctenophora* each radial canal bears an ovarian ridge on one side and a testicular on the other. Keen controversy has raged over the state of matters in the *Hydromedusæ*. Kleinenberg derived both ovum and sperms in *Hydra* from the ectoderm, while Van Beneden endeavoured to prove the invariable origin of the ovarian tract from the endoderm and that of the testicular from the ectoderm; but subsequent observers, so far from confirming the constancy of this arrangement, have affirmed in many forms the ectodermic and in others the endodermic origin in both cases. Weismann and De Varenne have recently very completely demonstrated the more remarkable fact that in a great number of forms the generative elements do not arise in the so-called generative buds or gonophores at all, but actually migrate thither from the parenchyma (cœnenchyma) of the nutritive polyp or trophosome—the latter observer indeed going so far as to allege the primitive origin by ova and spermatozoa in all cases from the endoderm of the nutritive polyp. These conclusions not only invalidate Van Beneden's attractive theory, but tend to overthrow the ordinary view of the alternation of generations in the *Hydromedusæ*.

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[1] These numbers refer to the bibliography at p. 422.

Vermes.—The incipient ovary and testis are seen in their simplest expression in such a case as that of the hermaphrodite *Bryozoa*, or even better in the low Chætopod Worm *Tomopteris* (fig. 1), in which a patch of cells of the lining membrane of the cœlom proliferate and enlarge into ova, or divide into spermatozoa, fall off, and become extruded. In higher Worms (*e.g.*, *Lumbricus*) the glands become localized in definite segments, and excretory ducts, apparently specialized segmental organs, appear. Among the *Platyhelminthes*, on the other hand, the most extraordinary specializations occur. The generative apparatus reaches a complexity which in some respects even excels that of the higher Vertebrates, and which, since it occurs not only among the parasitic forms but also in their less modified free-living allies (if not ancestors), the Turbellarians, must be regarded, not as any mere adaptation to parasitic life, but as an important factor in explaining (by the peculiar advantage which such increased reproductive efficiency affords; see PARASITISM) the wide prevalence of parasitism in the *Platyhelminthes*.

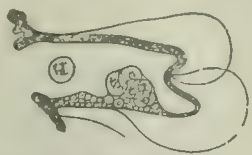

Fig. 1 (from Gegenbaur).—Ova originating from the lining epithelium of a parapodium of *Tomopteris*

Echinodermata.—Here the reproductive organs are of extreme simplicity—mere lobed glands usually provided with a duct or pore, or sometimes merely bursting into the body-cavity.

Arthropoda.—The essential organs never exceed one pair,—a simple median germ-gland being probably, as Gegenbaur suggests, the primitive condition. The accessory organs, however, reach great complexity, especially among the higher *Insecta*.

Mollusca.—The lower Lamellibranchs have paired hermaphrodite glands opening in relation to the excretory organs; in the hermaphrodite *Gasteropoda*, however, high complexity of the accessory organs occurs (*e.g.*, *Helix*). In the diœcious Cephalopoda the oviduct is single, and there are remarkable accessory female glands, while in the male the formation of the spermatophores and the curious modification of an arm for copulatory purposes are noteworthy.

Tunicata.—In this group (so frequently hermaphrodite) the reproductive apparatus is again greatly reduced, the paired or single sexual glands being sometimes even ductless, while accessory organs are absent.

Vertebrata.—Starting again, in the lowest Vertebrates, with organs of an exceedingly simple and primitive kind, we find the series presenting all gradations up to a very high complexity. Thus in *Amphioxus* the reproductive glands are little modified patches of the lining epithelium of the cœlom, and arise in a paired series,—an arrangement recalling that of the simpler segmented Worms. In other Vertebrates, however, the essential organs are most distinctly localized in origin, never exceeding a single pair, and are also much more evolved in structure. In its earliest recognizable state the generative gland is a slight thickening of the peritoneal epithelium and the subjacent connective tissue on each side of the mesentery, lying near and parallel to the incipient renal apparatus.

Leaving the histological details of the process by which this "germinal epithelium," with the subjacent connective tissue of the "genital ridges," develops into ovary and testis with their characteristic products to the sections dealing with oogenesis and spermatogenesis respectively, and confining ourselves to the gross anatomy of these essential organs, we may note their very simple character in the *Marsipobranchii*, where in the Lampreys they extend for a great length along the cœlom, and exhibit a number of tolerably regular lamellar folds, recalling the segmental arrangement of lower forms. In the remaining Vertebrates these organs are usually less elongated and relatively smaller and more compact, though it is interesting to note that some Amphibians (notably many *Cæciliæ*) exhibit traces of a more or less discontinuous, perhaps serial, arrangement

In Plagiostome Fishes the sexual glands arise along only a portion of the genital ridge, the remainder having its stroma mainly enlarged, and forming the so-called epigonal gland. In many of the higher Amphibians accessory organs of unknown function, the so-called fatty bodies or *corpora adiposa*, are attached to the ovaries and testes; and in the Toad and other *Anura* another organ in close relation to the testis, and in histological structure resembling a rudimentary ovary, has also been described.

A considerable tendency towards loss of symmetry appears in the essential organs particularly the ovaries, of many Vertebrates. Thus in *Myxine* neither ovary nor testis is present on the left side, and in many Sharks and Dogfish the left ovary is rudimentary. In Snakes the left ovary is smaller than the right and usually lies behind it, while in Birds the left ovary is alone functional, that of the right side becoming so completely atrophied at an early stage of development that traces of it in the adult are only found surviving in a few forms, especially some of the diurnal birds of prey. Among Mammals symmetrical development is the rule, yet in the curiously Bird-like *Ornithorhynchus* the left ovary is much smaller than the right.

The relative size of the ovaries varies greatly throughout the Vertebrate series, in relation partly to the relative proportion of stroma to germinal tissue in the histological structure of the organ, to the fecundity of the species, and to the number of ova produced, partly also to the presence or absence of a food yolk, and the consequent size of the ova. In many forms a great increase of size takes place at breeding-time.

In the majority of Vertebrates, as in lower forms, the essential organs remain throughout life in the position in which they develop, or at most depend into the cœlom supported by a mesenteric fold. In most Mammals, however, a certain change of position takes place, the ovaries usually shifting more or less backwards towards the pelvis. The testes too in the *Monotremata* leave their embryonic position at the inner edge of the primitive kidneys and travel backwards. In Edentates, Hyrax, Elephants, and Cetaceans they remain near or a little below the kidneys, but they usually reach the abdominal wall, which they may more or less completely pass through in the inguinal region (as in many of the lower Rodents and Carnivores), or even descend into a more or less distinct diverticulum or hernial protrusion of the integuments of the abdominal wall, the scrotum. This protrusion arises usually at the posterior margin of the primitive urinogenital opening, but, by exception, in Marsupials in front of it. The cavity of the scrotal pouch may remain throughout life in continuity with that of the abdomen, so enabling the testes to pass backwards and forwards at each breeding season (Marsupials, Rodents, *Insectivora*, Bats, &c.), while in the higher forms, *e.g.*, Ungulates, *Primates*, &c., the scrotum retains the testes permanently shut off from the abdominal cavity.

The origin and homologies of the genital ducts in Vertebrates, and the accessory organs in relation to them, may now, after a very great amount of anatomical and embryological inquiry, be considered as tolerably settled at least in their main outlines.

In *Myxine* and the Lampreys no ducts are present, but the generative organs void their contents into the cœlom, whence they pass out by the abdominal pore; some Teleosteans too (*Salmonidæ*) and at least one Elasmobranch (*Læmargus*) exhibit the same primeval simplicity of structure and function. Even here the exit of the sexual products is hardly independent of the aid of the excretory system, since there is reason to regard the abdominal pores as the least modified survivals of segmental organs; and in all higher forms the definite efferent ducts which are present in more or less close relation to the essential generative organs develop in the closest relation to, and in fact at the expense of, the renal excretory apparatus. For an account of the complex details of this process in the higher Vertebrates, however, the reader must consult the classical monographs of Balfour and Semper, or the larger manuals. (2)

Copulation.--We have noted above the importance of the copulatory process to secure fertilization of the ovum, and can thus readily understand its occurrence in the higher members of all the more complex animal groups. Though the result is in all cases the same, the process presents curious variations in principle as well as detail. Thus (*e. g.*) the hermaphrodite Earthworms become firmly attached by their characteristic thickened band of fused rings (*clitellum*). Among the higher Crustaceans the spermatozoa are conducted to the ova along the grooves of a modified pair of the appendages of the male, while in Insects the modifications of the posterior abdominal segments and their limbs for copulatory purposes are often extraordinarily complex and varied. In Spiders, again, the spermatic fluid is passed into a receptacle in the chela, and thence pushed into the cloaca. In the higher *Mollusca*, the complex copulatory apparatus of the Common Snail and the process of hectocotylization among the Cephalopods, so curiously analogous to the process in Spiders, are too familiar to need more than mention (see MOLLUSCA, CUTTLE-FISH). In many Fishes no copulatory process exists; thus in any of our Salmon rivers the male fish can be seen voiding the milt upon the ova after their deposition. In many Elasmobranchs a portion of the posterior pair of limbs,[1] presenting very peculiar cartilaginous and glandular structures, though known as "claspers," seems to be introduced into the cloaca during fertilization. But it is among Amphibians that we find the earliest trace of a true penis; a portion of the cloaca is distinctly eversible in Cæcilians; in Snakes and Lizards paired eversible processes arise from the posterior cloacal wall, while in Chelonians, Crocodiles, and most Birds it is the anterior wall which bears these processes. In Monotremes, too, the organ is distinctly double; in higher Mammals it is single; but the function is in all cases essentially the same. The nervous, muscular, and circulatory mechanisms of the process are described in works on human physiology. (3)

Gestation and Birth.—While in the majority of lower forms the offspring leaves the parent as an unfertilized ovum, we have seen even among Sponges the impregnation and development of the embryo in its primitive position, and thus almost from the outset of an ascending zoological survey we can recognize the passage from oviparous to viviparous forms. The Invertebrates, however, are mainly oviparous, despite a few exceptions, of which perhaps the most surprising and aberrant are that of *Entoconcha mirabilis*, which exhibits an ordinary Molluscan development within the body of its Holothurian host, and that in what resembles a special ovarian tube, but is really the body of its utterly degenerate parasitic parent. Among Insects a certain degree of viviparous development may be reached; and this goes curiously far in the Dipterous Insect *Cecidomyia*, in which larvæ develop within the body of their parents (themselves at the larval stage), the cavity of which they destroy and burst in order to become free. Thus within the same species there comes about exactly the state of things in which the ova of a parasite develop at the expense of its host.

Among Fishes viviparous birth occurs more commonly: in some Teleosteans the young develop within the ovaries; in many Sharks and Dogfish the development takes place within the oviduct, and in one case (*Mustelus lævis*) an actual placenta is formed by the interdigitation of folds of the yolk sac with those of the oviduct. Even the terrestrial Amphibians usually lay their eggs in water, yet in some types, notably the Alpine Salamander (*Salamandra atra*), development takes place within the oviduct. That this is a clear case of adaptation to the eminently terrestrial environment has indeed been well shown by experiments in which the young larvæ taken from the parent and transferred to pond water developed like ordinary Newts. To all such forms, viviparous in the sense of bringing forth their young alive, the somewhat confusing term "ovoviviparous" is often applied. Birds, and also Reptiles, with few exceptions, of which the *Ichthyosauria* seem to have presented a striking case, are oviparous; so too, as has been recently established by Caldwell, is the in all respects so curiously Bird-like Mammal *Echidna*. Its congener *Ornithorhynchus* probably agrees in this; but in Marsupials the embryo is not born until it has reached a comparatively advanced state of development, when it is transferred to the brood pouch or marsupium, where the process is completed. In the remaining *Mammalia* intra-uterine development goes much farther, the nutrition of the embryo being, in absence of the abundant food yolk of lower forms, effected by the aid of a placenta analogous but not homologous to that of *Mustelus*, since developed, not from the yolk-sac, but from the allantois (see ANATOMY and MAMMALIA).

The physiological processes of birth show a similar rise in complexity,—due chiefly to the increasing strain upon the parental organization which this progress in the nutrition and protection of the embryo during its development involves; for, while an ovum can be extruded by simple ciliary action, or at most by the gentle contractions of the oviduct, the expulsion of the relatively enormous Mammalian fœtus involves mechanical difficulties of the most serious kind. And, besides these stresses and strains upon the pelvic basin itself or the muscular and connective tissues of the uterus, vagina, and its outlet, the inevitable rending asunder of the large closely interwoven and highly vascular placenta must evidently occasion an additional physiological disturbance. (4)

Parental Care.—Not to mention cases of mere concealment of the ova or construction of egg cases, the lowest forms exhibiting such parental care are probably certain Holothurians and Starfishes described by Sir Wyville Thomson during the voyage of the "Challenger," in which the developing young are borne upon the dorsal surface of the parent. Many Crustaceans carry about their ova during development, and an Amphipod has been described as followed by its newly-hatched young like a hen by its chickens. The female Spider too, though ferocious towards the male, frequently spins a nest and shows some maternal solicitude; but such cases are far commoner among even the lower Vertebrates than the highest Invertebrates. Thus among Fishes the case of the nest-building Stickleback is especially familiar; some Siluroids and Lophobranchs (and usually the males) carry about their young,—the latter in ventral pouches, the former in the mouth.

But the quaintest examples of care of offspring are those presented by some of the Amphibians, notably by the Frog *Alytes obstetricans*, where the male winds the string of ova as laid round his body, sits in concealment until their development is sufficiently advanced, and then takes to the water, or in the grotesque Surinam Toad (*Pipa surinamensis*), where the male places the ova one by one in hollows in the loose skin of the back of the female, where they accomplish their development. Reptiles rarely show any care beyond at most burying their ova, but in Birds the evolution of parental care (no doubt associated with the need of high temperature for development) approaches its highest and most general evolution. The case of *Mammalia* is also too familiar to need any description; but there is evidently good ground for the idea (of late ably popularized by Miss Buckley) that the marked success of Birds and Mammals in the struggle for existence is to be attributed perhaps not less to their peculiar care of offspring than to any advance in organization. (5)

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[1] In the curious Holocephalous Fish *Callorhynchus*, Jeffery Parker has recently adduced arguments for regarding the claspers as the surviving rudiments of a third pair of limbs.

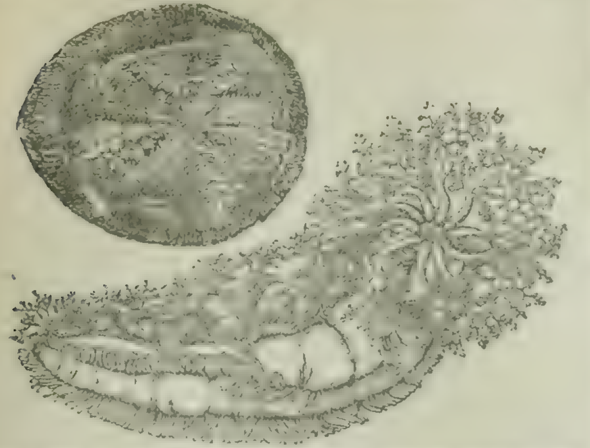

FIG. 2 (after Sir Wyville Thomson, and Murray, "*Challenger" Narrative*).—Sea-urchin (*Hemiaster cavernosus*, Kerguelen Islands) and Sea cucumber (*Cladodactyla rosea*, Falkland Islands), bearing their young.

The Spermatozoon.

History.—In 1677 Leeuwenhoek's attention was drawn by Hamm, one of his pupils, to the active moving constituents of the seminal fluid, and he described these as *animalcula spermatica* or *spermatozoa* (σπέρμα, seed; ζῶον, animal). Although known to be of constant occurrence, they were long regarded as parasites, and classified as *Helminthes* or as *Infusoria* (see also article "Zoophytes," *Encyclopædia Britannica*, 8th ed.), even Von Baer maintaining this view as late as 1835. Soon after this date R. Wagner demonstrated their constant presence in fertile males and their absence in infertile bastards. Von Siebold discovered them in many Vertebrates, while Kölliker recognized them as definite histological elements arising within the testes. The old name, however, has persisted despite various proposals to replace it (*e.g.*, *spermatozoids*, Von Siebold; *fila spermatica*, Kölliker). (6)

Anatomy and Physiology of Spermatozoa.—Without attempting completeness it is necessary to note a few of the best marked forms of spermatozoa. The familiar type, that of a small more or less ovoid "head," with delicate thread-like cilium or "tail," is of the commonest occurrence throughout the animal kingdom; it is seen with specific modifications in 1–4 and 12–16 in fig. 3. Much less differentiated forms, however, occur, especially among the Branchiate Arthropods, of which some exhibit almost amœboid forms, as in the Daphnoid *Moina*, or in Crabs (7 in fig. 3); others are rigid, with radiating processes, as in the Lobster (8 in fig. 3). That of *Ascaris* is a small nucleated cell without tail or process, but bearing a cap of protoplasm: this, like the lateral process in the spermatozoon of the Chætopod *Cleta* (4 in fig. 3), is not, as might at first appear, an additional or accessory portion, but a mere persistent embryonic structure, as will be understood from the outline of the facts of development given below. In a large number the nucleus is more or less drawn out to form either a continuous rod or a series of fine granules, the protoplasm in such cases forming a delicate film with lateral fringes, which may also be produced on one or both ends into a filament. This form is seen in many Planarians (compare 9–11 in fig. 3). In the Newt the head is elongated, and the tail bears a vibratile membrane. In Man a middle piece separates the peculiarly shaped head from the tail, and this seems to end in a still finer filament (14 in fig. 3). Miescher and others describe their minute structure with yet greater detail, distinguishing in the head a wall enclosing peculiarly differentiated contents, in the middle piece a similar structure, and even an axial filament in the tail.

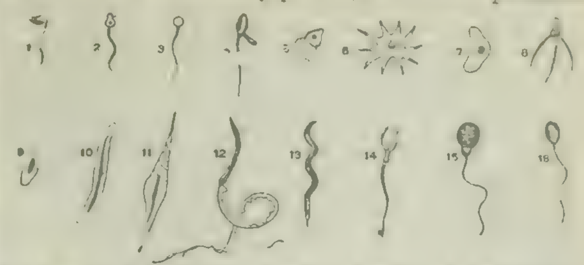

FIG. 3.—Forms of Spermatozoa. 1, Sponge; 2, Medusa; 3, *Echinocephalus*; 4, *Cleta* (Chætopod); 5, *Ascaris*; 6, *Moina* (Daphnid); 7, Crab; 8, Lobster; (9-11), *Planostomum* forms with elongated nucleus; 12, Salamander; 13, Ray; 14, Man; 15, *Cobitis*; 16. Mole.

The movements of spermatozoa have attracted considerable attention, their action being mechanically comparable to that of cilia, and being affected similarly by reagents. Their great activity and prolonged vitality are noteworthy; thus not only do they remain in movement for many hours—indeed until the onset of putrefaction—after their ejaculation from the body, but in many of the higher animals they may remain active in the oviducal passages for weeks. In the Bat the spermatozoa lie in the uterus awaiting the ovum from autumn till spring; while a queen Bee may go on laying the fertilized eggs (from which workers arise) for swarm after swarm for three years after her first and only fertilization, without entirely exhausting the supply of active and mobile spermatozoa in the receptaculum, and such cases forcibly suggest that the spermatozoon has not only a vast intrinsic store of energy, but must also absorb nutritive matter from the environing tissues or secretions, much in fact as would an Infusorian parasite. (6)

The chemical analysis of spermatozoa, though as yet but rude, yields results of interest. Thus, not only is the proportion of solid matter to water extremely high, but the small quantity of ordinary albumens and the high percentage of ethereal extractives are to be noted, the whole composition being more analogous to that of brain and nerve than of any other tissues. In round numbers, nearly 50 per cent. of the Salmon milt is nuclein, more than 25 per cent. is protamin, 10 per cent. is a mixture of ordinary albumens, and less than 5 per cent. is fat; while 7½ per cent. of lecithin, 2¼ per cent. of cholesterin, with traces of other products of metabolism, make up the rest. (7)

Development of Spermatozoa (Spermatogenesis).—Probably no subject within the whole range of histology (at least if we except that of the structure of striped muscular tissue) presents so many difficulties, or has been the subject of more prolonged research and controversy; and it is thus essential to clearness to recapitulate the history of the inquiry in some detail. The modern period of investigation, despite a few observations by Wagner and others, practically opens with Kolliker's fundamental observation (1841) that the head of each spermatozoon arose from the metamorphosis of a seminal cell.

In 1844 Haeckel described in *Helix* the cells destined to become spermatozoa as arising on the surface of an epithelial cell of the germ follicle. In a more elaborate paper (*Z. W. Z.*, 1856) Kölliker compared the process of spermatogenesis in the Bull, Dog, and Rabbit with considerable detail, distinguishing in all cases the lining of the tubule into two kinds of cells,—the outer having large nuclei and nucleoli, and undergoing rapid multiplication, while the thick inner layer of smaller cells was becoming differentiated into the true sperm-cells, which might be either unicellular or multicellular "cysts." He also described the origin of the head of the spermatozoon (and indeed also that of its tail) from the nucleus of this parent cell, and the breaking loose of the spermatozoon from its parent.

Henle (1865) showed that the tail was developed from a portion of the protoplasm, thus preparing for the comparison with ciliated epithelial cells soon afterwards instituted by Schweigger-Seidel. Sertoli (1865) described certain "ramified cells" in the seminal tubules, and Merkel (1871) regarded these as forming a framework (*Stützzellen*) for other cells from which the spermatozoa developed. In the same year, however, appeared the important researches of Von Ebner, whose views will be understood by the aid of fig. 4. He described the large cells just mentioned as provided with a large and well-defined nucleus and nucleolus, and as being confluent at their base with each other, so forming a protoplasmic layer (*Keimnetz*), but stretching forwards into the lumen of the duct as irregular prolongations; these become lobed or fingered, each lobe independently developing a nucleus, the large primitive nucleus remaining unchanged. To the whole prolongation with its lobes he applies the term *spermatoblast*. From each lobe a spermatozoon develops, the nucleus lengthening to form the main portion of the head, while a thin film of the protoplasm elongates into the cilium or tail. The young spermatozoa at first press downwards into the body of the spermatoblast, so as to form bundles, but, when ultimately liberated, curl themselves up to roll down the seminal tubule, the more or less branched stump of the spermatoblast alone remaining along with the smaller cells of the tubules, which, according to him, take no part in the process, but merely perform nutritive or mechanical functions.

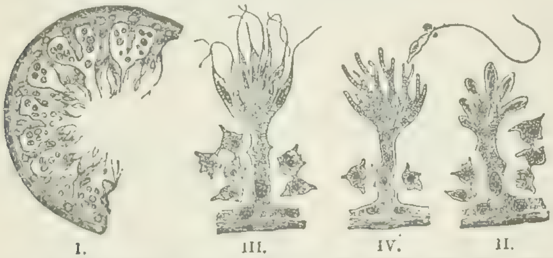

Fig. 4.—Spermatogenesis (after Landois). I., cross section through a seminal tubule; II., unripe spermatoblast, with blunt rounded lappets, the young sperms; III., spermatoblast with ripe ciliated heads; IV., spermatoblast after separation of sperms.

A vigorous controversy at once arose, but Merkel claimed these spermatoblasts as being simply his "Stützzellen," and described the spermatozoa as arising from the small round cells, and as being only secondarily received into cavities of the former, a view which Henle also adopted. Sertoli also regarded Ebner's spermatoblasts as his "ramified cells," and ascribed all spermatogenetic functions to the round cells, which he distinguished in their youngest state as "germinative," and later as "seminiferous" cells, which then divided to form "nematoblasts," these directly developing into spermatozoa. Blumberg (1873) attempted to reconcile the disputants by ascribing spermatogenetic functions both to the spermatoblasts and to the round cells. Neumann, while supporting Von Ebner in the main, describes his spermatoblasts as not processes of the nutritive network ("Keimnetz"), but as modified from the ordinary epithelium of the seminal tubule, and disputed the existence of Merkel's framework altogether; and this essential confirmation of Von Ebner's view was supported by Mihalkovicz, Landois, and others. In a later paper he attempted to show that the lobes of Von Ebner's spermatoblasts might become separated off as the small round cells, and might then either break up or develop into spermatozoa. Krause (1876), while otherwise supporting Von Ebner, graphically described the spermatoblasts as ciliated cells with ramified and even anastomosing processes, so doing away with any connective-tissue system altogether. Sertoli, however, continued to support his own view with greater elaborateness than ever.

Semper's well-known researches (1875) on the urinogenital system of Elasmobranchs included an important contribution on spermatogenesis. He described an invagination of the germinal epithelium or of the primitive ova into the subjacent stroma, where they form a primitive follicle, which again comes into relation with the incipient tubule. The central cell of the follicle undergoes mucous degeneration and becomes absorbed, leaving a cavity lined by a single layer of epithelial cells, which divide rapidly, becoming cylindrical, with large round nuclei. These divide into a "cover-cell" and a "mother-cell"; the nucleus of the latter divides repeatedly until about sixty sperm nuclei are formed, which elongate to form the heads of the spermatozoa. As these develop they come to lie in a bunch, lying into the cavity of the follicle, their expulsion being effected by the swelling of the nucleus of the cover-cell.

An important series of researches by Von La Valette St George on spermatogenesis among Vertebrates was meanwhile in progress. In his final paper (1878) he describes the seminal tubules as containing two distinct types of cell. One kind, resembling young ovules, which he terms primitive seminal cells or *spermatogonia*, divide into a mass or *spermatogemma* of small cells (*spermatocytes*). These spermatocytes may either (*a*) all develop into spermatozoa (Mammals), or (*b*) a single spermatocyte may become modified as a basilar cell (Plagiostome Fishes), or (*c*) a number may form an envelope or cyst around the others (Amphibians and Fishes). The second kind of primitive cells he terms "follicle-cells," and regards as non-essential; these are united into a loose tissue and envelop the spermatogonia and spermatogemma.

In this view we have a marked divergence from both preceding theories, as the author does not hesitate to point out. He regards Von Ebner's "Keimnetz" and "spermatoblasts" as confounding both his follicle cells with their included spermatogemmæ, and interprets Neumann's figures confirmatory of Von Ebner in the same way. Merkel's "Stützzellen" he identifies as his "follicle-cells" altered by reagents.

The subsequent researches of Helman (1880), Krause, and Nussbaum among Vertebrates need only be mentioned as essentially confirmatory of the observations of La Valette. Meyer's careful observations (1880) also led him to the same general view, with the important difference, suggested by one of the preceding authors, that the "follicle cells" of La Valette were not inert as he supposed, but the earliest stages of his spermatogonia and spermatogemmæ. Klein's views (1881) have perhaps most relation to those of Sertoli.

Some important work was meanwhile being done among Invertebrates. In 1877 F. E. Schultze described spermatogenesis in the Sponge *Halisarca*,—a germinal cell, analogous to that which gives rise to an ovum, becoming covered by an epithelium, and dividing into a multitude of segments, each of which becomes drawn out into a spermatozoon. In 1844 Meckel had described the spermatozoa of the Snail as arising superficially from a mother-cell, and this view had been confirmed by various authors. In 1879 Duval described in the same animal the spermatocytes as arising by the endogenous division of a mother-cell, and subsequently coming to its surface, and Hallez described an essentially similar process in some Planarians. Graff, however, found in other species that no remnant survived, but that the whole of the spermatogonia became converted into spermatocytes. In 1880 Blomfield investigated the process in the Earthworm, his results resembling rather those of Von Ebner (fig. 4) than those of La Valette. Strongly emphasizing, however, the importance of the nutritive basal cell or spermatoblast of Von Ebner, he proposed yet another nomenclature. In a subsequent paper (1882) he describes the process in the Snail and the Frog. The former agrees substantially with the Worm, but in the Frog a hollow spermatogemma arises; each of its cells elongates to form a spermatozoon; these while still immature arrange themselves in bundles round one of the more superficial cells, which "become blastophoral corpuscles,"—a view which recalls Merkel's explanation of Von Ebner's spermatoblasts, mentioned above, viz., that the spermatozoa only became temporarily lodged in their recesses after completing their development.

In this respect the view of Renson (1882) is especially interesting. He describes the follicular cells of La Valette as segmenting into "multinuclear cysts" (spermatogemmæ), of which the constituent "nematoblasts" develop into young spermatozoa. These immature

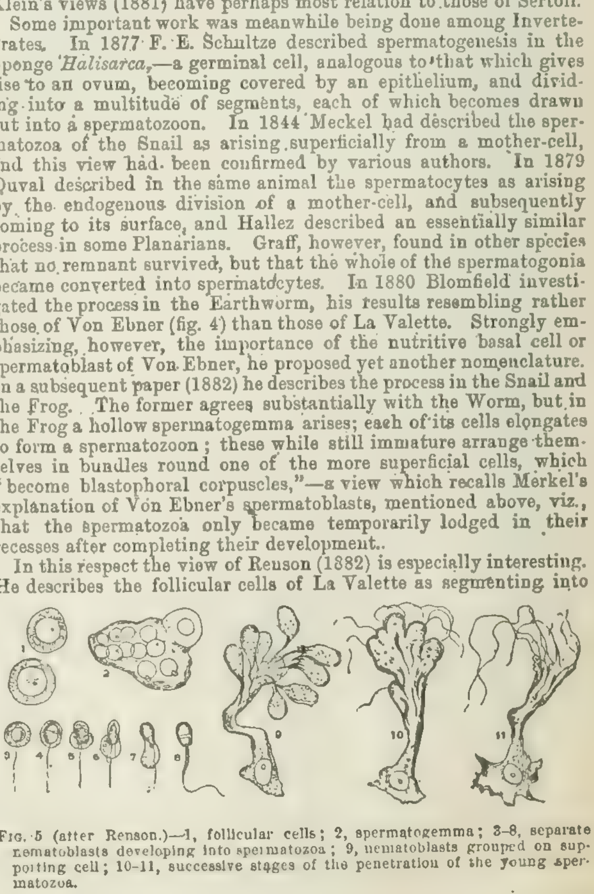

Fig. 5 (after Renson.)—1, follicular cells; 2, spermatogemma; 3–8, separate nematoblasts developing into spermatozoa; 9, nematoblasts grouped on supporting cell; 10-11, successive stages of the penetration of the young spermatozoa.

nematoblasts group themselves round the extremity of certain long projecting epithelial cells, the supporting cells (or "cellules de soutien," obviously the spermatoblasts of Von Ebner), and actually sink into their protoplasm to complete their development. When fully developed, the heads of the young spermatozoa have attained the base of the supporting cell, but this now elongates and bears them anew to the lumen of the duct, where new nematoblasts are by this time waiting to take their place (fig. 5).

The researches of Hermann (1882) in Elasmobranchs are broadly confirmatory of those of Semper, while those of Jensen and of Swaen and Masquelin (1883) are especially corroborative of the views of La Valette. The latter are, however, of importance as tending towards reconciliation. The primitive ampullæ being formed, the "male ovules" and the follicular cells are henceforth distinct: the former segment into spermatogemmæ; the latter (at first forming incomplete envelopes to the male ovule) mostly disappear, save one which travels downwards until it lies between the wall of the ampulla and the spermatogemma, thus constituting its "basilar cell." The spermatogemma meanwhile is developing a central cavity ("loge caudale"), from which the tails of the incipient spermatozoa or "nematoblasts" project into the lumen of the duct. The basilar cell has also been enlarging, and fusing with the intercellular substance of the spermatogemma; the nematoblasts thus come to be plunged into the basilar cell, and sink downwards towards its nucleus; but this again elongates to expel them. In the Salamander these follicular cells form a complete envelope to the male ovules during their whole segmentation and subsequent evolution. In Mammals the male ovule divides into an active and a temporarily inert portion (follicular cell of La Valette, germinative cell of Sertoli and Renson); the former segments into the spermatogemma, of which the resultant nematoblasts plunge into the basilar cells, much as described by Renson. They compare the intercellular substance of the spermatogemma to the blastophor described by Blomfield in Worms, and regard the follicular cells as a secondary addition peculiar to Vertebrates, and homologous with the follicular cells of their ova.

The first step towards any understanding of the process of spermatogenesis amid this maze of controversy is to collate the various observations; hence the present attempt to summarize the main observations on the subject, and afford a key to the nomenclature. But how shall we reconcile the different theories? Each author formulates his own view of spermatogenesis, and sometimes even admits only a single method (*e.g.*, Von Ebner, Blomfield, &c.); yet, unless we attach considerably greater weight to the observations of at least a majority of all these workers than they sometimes incline to grant to those of each other, the literature and iconography of histology become of little worth. Since La Valette, however, most observers have admitted the existence of several methods; the homology—indeed the primordial identity of the primitive germinal cells—of male ovule with female ovule has been often pointed out, and the general resemblance of the process of spermatogenesis to that of segmentation has been noted, and even accented by the use of terms like sperm-morula, sperm-blastula, &c. But it is not enough to make such a comparison in general terms; it must be either susceptible of definite refutation or confirmation by appeal to details; and the present writer has hence elsewhere attempted to compare the various modes of spermatogenesis with the corresponding modes of segmentation of the ovum, and so reconcile the conflict of testimony and opinion upon the subject. (8)

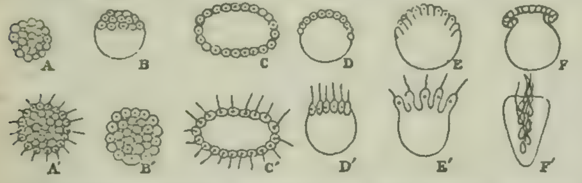

Fig. 6.—Hypothetical comparison of oogenesis and spermatogenesis. The forms of ovum segmentation on the upper line represent in very diagrammatic form —(A) complete equal segmentation, (B) total but unequal segmentation, (C) centrolecithal, (D) partial, with the blastoderm cells distinctly marked off from the yolk, (E) partial, with the blastoderm cells indistinctly marked off, (F) incipient epibolic gastrula form. The lower line of figures represent in similar diagrammatic form different modes of spermatogenesis—(A′) spermatogemma or spermosphere, (B′) spermatogonium of La Valette, with large nutritive sperm-yolk or blastophor, (C′) spermatoblasts round central mass in *Helix*, (D′) spermatoblasts distinctly separated off from supporting cell, (E′) spermatoblast of Von Ebner, (F′) spermatogenesis as described by Semper in Elasmobranch; these may be termed respectively (A′) regular sperm morula, (B′) with large yolk cell, (C′) centrolecithal form, (D′) and (E′) sperm-blastoderm, (F′) sperm-obgastrula (invagination of preceding inverted).

Ontogeny of the Spermatozoon.—The origin of the spermatozoon from the spermatocyte is, as we have seen above, a phenomenon of considerable complexity. It has long been known to arise from the nucleus and the tail from the protoplasm, and Flemming in 1880 gave further precision to our knowledge by tracing the head of the spermatozoon of *Salamandra* from the chromatin of the nucleus. Various observers had also noted, besides the nucleus, the appearance of a small denser mass of protoplasm within the spermatocyte, the "accessory corpuscle" (*Nebenkern, corpuscle précurseur*), but its origin and fate have scarcely yet been settled with complete clearness. It appears, however, to arise from the nucleus, the remaining portion of the nucleus going to form the main portion of the head, while a film of superjacent protoplasm stretches over it, thickens somewhat to form the middle piece, and becomes drawn out into the filamentous tail, which frees itself from the remains of its spermatocyte and swims away (3 to 8 in fig. 5). Von Brunn has recently described in Birds the origin of this accessory corpuscle with especial clearness by the division of the nucleus of the developing spermatozoon. In *Mammalia* the "cap" of the young spermatozoon is described by Renson as nucleus, and by others as protoplasm, and it has been compared by many authors to the polar vesicle of the ovum. In Plagiostome Fishes Semper describes, and others confirm, the existence of an additional nucleus, or "problematic body," which appears to correspond to the sum of the accessory corpuscles of all the spermatozoa, and this, after their escape, has been shown by Swaen and Masquelin to fuse with the nucleus of the basilar cell. The resemblance of this embryonic and transitory structure to the permanent post-nuclear segment of the curious almost amœboid spermatozoon of *Ascaris* is closely suggestive of their homology, and it is also interesting to note, in figures of the developing spermatozoa of Selachians, their considerable resemblance to the fringed adult spermatozoa of many *Platyhelminthes.* (8)

The Ovum.

History.—From the earliest times naturalists have of course been familiar with the form and function of the ova of a great number of animals; the only seriously disputable question (excepting that of spontaneous generation) has been that of the like origin of the embryo in Mammals. The history of the discovery is a curious one. Galen had described the human ovaries as *testes muliebres*, but the term ovary is due to Steno (1664), who like our most modern investigators started in his comparisons from the corresponding organs in Sharks and Rays. In 1672 Regner de Graaf, in a remarkable work upon the structure of the ovary and its accessory organs, not only described in the ovary in Birds and Mammals the follicles which now bear his name, and which he regarded as the ova, but made the generalization of the universal occurrence of ova throughout the animal kingdom, and even observed the ovum in the oviduct of the Rabbit. His opinion, however, was overborne by the authority of his more famous countryman Leeuwenhoek, who regarded not the oviduct but the ovary, and more precisely the *corpus luteum*, as the seat of development of the embryo The observation of De Graaf was repeated at the end of last century by Cruikshank, and again by Prévost and Dumas. The definite establishment of our present knowledge of the Mammalian ovum dates only from 1827, when Von Baer clearly traced the ovum from the uterus back to its earliest appearance in the oviduct, and thence to its origin within the Graafian follicle. Pürkinje had meanwhile (1825) described the "germinal vesicle" in the Chick, Coste showed its occurrence in the Mammalian ovum, and Wagner discovered (1836) the "germinal spot" in Mammalian and other ova. (9)

Mass and Chemical Composition of the Ovum.—The absence of any extensive measurements of the ovum in the various groups, either absolutely or in comparison with the bulk of the parent, renders it impossible to generalize with any great degree of definiteness. While from some comparisons it is at once apparent that the higher the organization the larger the ovum, many independently variable factors affect this, *e.g.*, the size, organization, or maturity of the parent, the duration of stay in the oviduct, and the climate and other surroundings. Examples of such variation are readily seen; it is natural that self-supporting larval forms should start with smaller food-yolk than those which develop before leaving the egg, and among placental Mammals that the continuous supply of nutriment from the parental resources should supersede what would otherwise require to be a gigantic store of yolk.

Our as yet crude analyses of ova of course reveal the presence of numerous highly nutritive substances, both albuminous and fatty—none, however, characteristic of the ovum alone. The general analysis of the Fowl's yolk is quoted by Hensen as follows:—water 47·2 per cent., albumin stuffs 15·6, ethereal extracts 31·4, alcoholic extract 4·8, ash 1 = 100,—these results of course covering an unknown degree of complexity. Thus numerous more or less distinct albuminoid substances have been described by different authors—vitellin, ichthin, ichthidin, emydin, &c., while nuclein seems to be of special importance; the ethereal extract yields very distinct fats, not only non-nitrogenous, but nitrogenous (*e.g.*, lecithin); cholesterin and many other complex products of anabolic and katabolic change are also present; and so on. The subject is at present peculiarly unfit for profitable summarization, and details must be sought from the bibliography. (10)

Oogenesis.—Since the different modes of origin of the ova in the various groups are at once less complicated and in general outline less debateable than the corresponding process of spermatogenesis, in regard to which the state of opinion is so unsettled, a much less detailed account must here suffice, especially since a review of the different processes in any detail would involve an unwieldy compression of the available summaries of Balfour and others. Only a few of the more interesting and suggestive examples can be here mentioned.

The origin of the ova within the mesoderm of the Sponge, which has been already referred to, is obviously one of the simplest cases, recalling the occurrence of reproductive cells in such a sub-Metazoan form as *Volvox*. In regard to the *Cœlentera* the controversy over Van Beneden's hypothesis of the endodermic origin of the ova has been already mentioned; and in connexion with this Weismann's theory may be noted, according to which in most Hydroids the reproductive cells are only differentiated late in life, so that the actual germinal substance or mother-protoplasm is not present from the first in cellular form but in molecule groups, scattered among the somatic cells and spread perhaps over various asexual generations, to be gathered up at some favourable epoch and in the most convenient situation in the definite form of ova.

In the group of *Vermes* the general history is that some favourably situated cells of the epithelial lining of the cœlom proliferate, enlarge, assume the characters of ova, and fall off into the body-cavity. A simple instance of this in *Tomopteris* has been already referred to (fig. 1).

Sagitta furnishes a very suggestive illustration of oogenesis—where one half of the primitive reproductive cell goes to form the ovary and the other half the testis. In *Bonellia* we find a beautiful example of the very frequent subordination of several reproductive cells to the perfecting of one. In each mass of possible ova (which arise from the division of primitive germinal cells situated round the ventral vessel just above the nerve cord) only one—adjoining the stalk and therefore near the source of nutrition—becomes a differentiated ovum, while the others atrophy. In *Platyhelminthes* the later stages of oogenesis are especially interesting, because the nutritive equipment of the ovarian ova is in many cases partially furnished by the direct absorption of some of the cells of the yolk-gland or vitellarium, which is itself probably a degenerate portion of the ovarian tract in which over-nutrition has checked reproduction. Thus the ovum comes to be the result of a number of cells. Weismann's interesting observations on the winter-eggs of some Crustaceans afford beautiful illustration of the subordination of a large number of germinal cells to the nutrition of a few, while in *Mollusca* this nutrition of the ovum is otherwise effected by the direct passage of food-material from the ordinary epithelial cells of the ovarian pouches.

The oogenesis of Insects, which has been the subject of so much discussion, is chiefly characterized by the very frequent presence in the ovarian tube of a large number of germinal cells which are wholly nutritive, and which serve to equip the minority of truly reproductive cells. Such cases inevitably raise the long-standing dispute as to the unicellular character of the ovum,—some authors (*e.g.*, Brandt) describing the ovum as a cell of the second order, formed from a complex of the primitive nuclei or "ooblasts," which are combined in the terminal chamber of the ovarian tube, and which unite to form on the one hand the germinal vesicle of the ovum with enveloping protoplasm, and on the other the surrounding follicular cells. One of the most recent discussions of Insect oogenesis is that of Will, who maintains the origin of the follicular nuclei from a multiple division of the original primitive nucleus or ooblast, the residue forming the germinal vesicle, a mode of origin previously maintained by other investigators both of oogenesis and spermatogenesis (fig. 7). In some *Echinodermata*, and in other groups, it has been repeatedly observed that the undifferentiated germinal cells form the elements of the follicular epithelium round the ova.

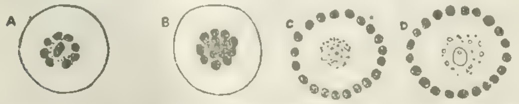

FIG. 7.—Formation of follicular nuclei (after Will). A, B, division of nucleus in morula fashion; C, nuclei have travelled to periphery; D, germinal vesicle formed from residue of division.

A debateable but suggestive theory of oogenesis has been propounded, especially by Nussbaum and Weismann, who maintain that in many cases the reproductive cells do not arise as differentiations of somatic cells, but are marked off from the first, in some cases even before the formation of the germ-layers. According to this ingenious hypothesis,—supported, however, by little direct observation—the reproductive elements would form a continuous immortal chain connecting the highest forms with their Protozoan ancestry, whose direct protoplasmic continuity has been of late also strongly insisted upon (see PROTOZOA).

Dispute has also arisen as to the origin of the follicular cells of the *Tunicata*, some deriving them from external juxtaposition of germinal cells, and others from migration of nuclei from within outwards, as in some *Insecta*; and a similar uncertainty prevails as to the nature and origin of certain cell-like bodies ("test-cells") which appear within the yolk.

In the *Craniata* the ova appear in the germinal epithelium of the ovarian ridge, which is always in contact with the stroma. They differ from the surrounding cells at first mainly in their greater size, being possessed of abundant protoplasm and a large granular nucleus. Increasing in number by division or by continued differentiation of other epithelial cells, the primitive ova usually form into masses, as the result of which some atrophy and others predominate. The permanent ova once formed and defined are surrounded by a special follicle, probably resulting in most cases from superjacent epithelial cells.

None of the disputes above referred to can be said to invalidate the general view of the essentially unicellular nature of the ovum (see below); and a discussion of the numerous speculations on the more fundamental problem of the stages of sexual differentiation is deferred to the article SEX. (11)

Structure of the Ovum.—While the structure of a sufficiently young ovum is simply that of an ordinary embryonic cell, its protoplasm being naked and often amœboid, and provided with a nucleus and nucleolus, the developed ovum has usually a quite characteristic appearance. Not only have its parts usually undergone considerable enlargement in size, but also in details of minute structure; the nucleus and nucleolus are, however, still recognizable as the germinal vesicle and germinal spot, while the protoplasm has usually become modified by the presence of a more or less considerable quantity of food-yolk, and by the development of an external membrane.

The young amœboid phase of so many (perhaps all) ova was first well described in the egg of *Hydra* (fig. 8, *b*), in which the nucleus and nucleolus, the lobed pseudopodial processes of the protoplasm, and the abundant yolk spherules can be well made out. A somewhat later phase of development is well shown in the next figure of the egg of a Sea-Urchin, in which the process of encystment has begun, and the protoplasm is seen with its amœboid processes radiating through the incipient egg-membrane, while in fig. 8, *d* the protoplasm has no longer an amœboid character—the investing membrane or *zona radiata* is regularly perforated by radiating canals, of which the

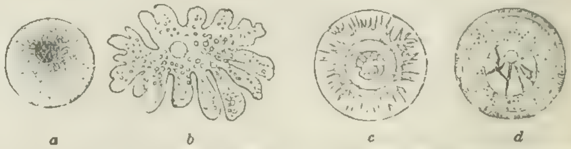

FIG. 8.—*a*, diagram of ovum showing granular protoplasm, nucleus (germinal vesicle). and nucleolus (germinal spot); *b*, amœboid ovum of *Hydra* (from Balfour—after Kleinenberg); *c*, early ovum of *Toxopneustes variegatus*, with pseudopodia-like processes (from Balfour after Selenka); *d*, ovum of *Toxopneustes lividus*, more nearly ripe (from Balfour—after Hertwig.)

pseudopodial origin and the nutritive function are equally obvious. The resemblance of such stages to definite Protozoan types is not a little remarkable; thus, while, in fig. 8, *b* is perfectly amœboid, the resemblance of *c* to a *Heliozoon* or of *d* to a Gregarine is almost equally striking.

The ovum is rarely destitute of egg-membranes, but these may be of very various kinds: thus we may have a vitelline membrane proper, formed by the protoplasm of the ovum, or a chorion formed by the cells of the follicle; or secondary membranes may be present (alone or in addition to the primary membrane) like the shell of a Bird's egg, which is formed by the walls of the oviduct, or the shell of many Trematode ova, which is secreted by a special gland.

Any or all of these membranes may be provided with a special aperture, the micropyle, first discovered by Keber, but this is by no means universally present, as he supposed. This may correspond to the point of attachment of the immature ovum, or may arise elsewhere; in the first case its function is obviously nutritive, though later it may also serve for the entrance of the spermatozoon.

The identification of the ovum as a cell, and of its germinal vesicle and spot as nucleus and nucleolus, although a result only established after prolonged controversy, and of capital importance, is sufficiently familiar. The invaluable labours of the older generation of embryologists from Von Baer to Allen Thomson, and even the still classical monographs of such recent workers as Waldeyer or Ludwig (1874), can only be alluded to; this department of the subject is, however, of peculiarly easy access, thanks to the exceptionally excellent state of its bibliography, and to the recent discussions of Balfour, Hensen, and others. Much, however, remains to be ascertained respecting the finer histology of the ovum, and many investigations are at present in active progress, along the lines of that more general inquiry into the minute structure of cells in general which has of recent years been again becoming of paramount interest in morphological research.

The protoplasm of the ovum may, as has been said, acquire a very varying quantity of food yolk,—may become, that is to say, more or less closely packed with highly refracting spherules of modified protoplasm (see egg of *Hydra*, fig. 8, *b*), which may again present various morphological differentiations, as in *Ascaris* (fig. 11). And, as explained below under segmentation, it is with regard to the presence, amount, and position of the food-yolk that the important varieties of that process are to be understood.

The great differentiation both of protoplasm and of yolk in the animal series, as might be expected, appears to exhibit all gradations from the most simple amœboid state of a more or less granulated or semi-fluid mass to the most problematical complexity. Of this the best known instance is probably that of the egg of *Ascaris*, described by Van Beneden (*vide infra*, pp. 416 *sq.*). Not only has a protoplasmic network been frequently described in both holoblastic and meroblastic ova, but a radiate structure as well,—the former evidently corresponding to the stroma first described by Frommann and Heitzmann and subsequently by so many authors in both animal and vegetable cells, while the latter appearance recalls the striated appearance of the ectoplasm of certain amœboid organisms described by Strasburger. The concentric differentiation of the ovum has also often been described, and is lately well discussed by Flemming, Brass, and others. Thus Pflüger, in the half-ripe ovum of the Cat, describes the central mass as clear, the cortical layer as rich in granules; Van Beneden in the egg of the Bat enumerates two similar layers surrounded by an almost granular cortical layer; while Flemming himself, in the ovum of the Rabbit, describes a coarsely granular region around the nucleus, a clearer central region finely granular and with a reticulated structure, and a coarsely granular cortical region. We have still, however, to learn how far such differentiations in structure—reticulate, radial, and concentric—are constant for individual or general cases, and how far they may be permanent or merely incidental to certain phases of development.

In these regards the recent publications of Carnoy and Brass are of special interest—the former on account of its minuteness of micrographic detail, the latter in its attempt at physiological interpretation. The results of the former will be best understood from his own figures (fig. 9).

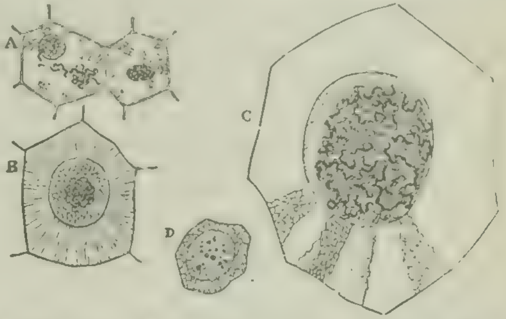

Fig. 9 (after Carnoy).—A, two cells from the leaf parenchyma of *Allium Cepa*, showing on the right the nucleus uninjured, with its nuclear network and two nucleoli, and on the left a nucleus in which the razor has unrolled or dragged away the coiled filament of nuclein, but left a protoplasmic reticulum with nucleolus; B, intestinal epithelium cell of an Insect, showing in the protoplasm a radiating reticulum with granular semifluid contents, and in the nucleus a similar structure, but with a convoluted nuclein filament which has shrunk together; C, cell of the larval genital gland of a parasitic Fly, showing various forms of protoplasmic network formed in different cells, and in the nucleus the same distinctness of its finely granular protoplasmic reticulum and its contained striated nuclein filament; D, young ovum of beetle, in which nuclein filament has broken down into spherules.

Brass, starting from the familiar structure of an amœba, with its clear and granular ectoplasm, from which the pseudopodia are emitted, its semi-fluid and highly granular endoplasm around the nucleus, and the less granular intermediate zone, assigns to these definite physiological functions,—to the first that of contractility (*Bewegungsplasma*), to the second that of nutrition (*Ernährungsplasma*), and to the third that mainly of respiration (*Athmungsplasma*, *Nahrungsschicht*). He holds that some such concentric disposition of the protoplasm is a normal and constant fact of cell-structure, and insists upon it with special reference to the ovum. From his somewhat vague and diffuse development of these views, it must suffice here to note his opinion that the chromatin of the nucleus, as well as the protoplasmic reticulum, and in fact all the former constituents of the cell, are of quite secondary importance to the colourless protoplasm. The former is to him in fact no more than reserve material, while to the latter he assigns all active functions,—thus substantially reviving the view so long and energetically maintained by Beale. The recent observations of Wielowiejski may also be noted in this connexion, as he not only brings his contribution to the ontogeny of the ovum, but to some extent also distinguishes a regional adaptation of its protoplasmic structure to its functions.

From the rapid succession of new contributions to the solution of the problem of egg and cell structure might be gathered many other points of interest, morphological and physiological, empirical and speculative. Thus, for instance, Sabatier describes senile degeneration in Ascidian ova, an observation of wide suggestiveness; while, again, on the important problem of the relation of nucleus to protoplasm there are many recent discussions, *e.g.*, from

Flemming and Strasburger, Pflüger and Hertwig; the solution, however, is not complete. Again, can we recognize in the ovum any indication of the position of the future embryo—any fixed points, anterior and posterior, lateral or even polar—further, of course, than the obvious distinction due to the presence of yolk? After the old theory of "evolution" of the embryo, according to which the egg contained the complete organism in miniature, had been finally replaced by that of epigenesis, the wholly undifferentiated form of the ovum seems to have become tacitly assumed. Recent observers, *e.g.*, Van Beneden (see below), have, however, been so far reviving the old view in that they endeavour to distinguish, even in the unfertilized ovum, the position of the ends and sides of the embryo, others dispute this, and an interesting controversy is in progress. The speculation that a more or less considerable share in the differentiation of the ovum might be due to the separation of its various constituents according to their different specific gravities—at first apparently emitted by Jäger,—has also reappeared in this regard. Pflüger has observed the segmentation of Frogs' ova fixed in various positions, and describes the plane of first segmentation as constantly vertical, whatever might be its angle to the morphological axis of the ovum, uniting black and white poles. Development too was usually normal, save that when the upper hemisphere was entirely white abnormality and death followed, and even if inversion was less complete segmentation often stopped. Further experiments led him to the conclusion that the nervous system, and correspondingly other organs, may develop from any portion of the egg-substance—that the egg in short is "isotropic." Certain limitations, however, appeared: the blastopore never arose on the upper hemisphere, nor (like the nervous system) ever on the black region, but both always at the intersection of the white area with the third equatorial plane of segmentation. This he terms the point of crystallization of the specialized organism, and goes on to speculate as to the molecular structure of the ovum.

These results have, however, been the subject of keen criticism. Thus Roux showed that the specific gravity of the black pole is distinctly less than that of the white, and found that on eliminating the action of gravity by the use of a centrifugal machine the development remained normal, and on repeating Pflüger's own fundamental observations described the axis of segmentation as coinciding with that of the ovum. After similarly eliminating light, heat, and earth-magnetism, he sums up in precisely opposite terms to Pflüger, who had laid all stress on the influence of the forces of the environment, and regards development as purely a process of self-differentiation. O. Hertwig also maintains that the influence of gravity is only a secondary one, the plane of division being for him determined by the position of the axis of the dividing nucleus, and this again having a definite relation to the form and state of differentiation of the surrounding protoplasm. He admits, however, the indirect importance of gravity on eggs having a yolk, and so leaves the question still to a considerable extent open. In another paper he adopts Pflüger's conception of the isotropy of the ovum, holding that the yolk is not so organized that from any definite region of it a definite organ arises, but that the nucleus is the sole centre of activity and control. It is thus evident that a reinvestigation is needed which would embrace the whole question of geotropism. See PHYSIOLOGY (VEGETABLE). (12)

Maturation of the Ovum.—Polar Bodies.—The period of development and nutrition of the ovum may be regarded as complete when the full size and complex structure above described have been reached, and in this state it most frequently leaves the body of the parent. In the majority of cases at least, new changes have still to be gone through before fertilization takes place, still more development; and a series of important structural modifications, doubtless the expression of extensive functional rearrangements, takes place. To this new and obscure phase of the life-history of the ovum the term maturation has conveniently been applied.

Although some of these phenomena have long been familiar to embryologists, the classical investigations are the comparatively recent ones of Bütschli, Oscar Hertwig, and especially Fol (1877); more lately those of Sabatier, of Flemming, and above all of Van Beneden. If we postpone details, the main facts of the process as until recently understood can be most readily grasped from Fol's figures of the ovum of the Starfish, of which the most important are copied in fig. 10. In the new-laid egg the germinal vesicle is at first a clearly defined sphere, with well-marked membrane, reticulum, and germinal spot. It begins, however, to become irregular and changeful in form, its membrane and reticulum meanwhile disappearing, with the apparent dissolution of a portion of its contents in the yolk. The germinal spot also vanishes, and two ill-defined clear spots are alone distinguishable in the yolk. Treatment with reagents shows these clear spots to correspond to two star-like figures like those of a certain stage of the division of nucleus of an ordinary cell, while in a somewhat later stage a nuclear spindle is shown near the surface of the egg. The upper portion of this is segmented off (surrounded by very little of the protoplasm of the ovum) as a polar body, while the lower portion of the body remains as the "female pronucleus," and may be seen surrounded by radial striæ. Two or even more polar bodies may be formed, but they never take any part in the subsequent life-history of the ovum, and sooner or later disappear.

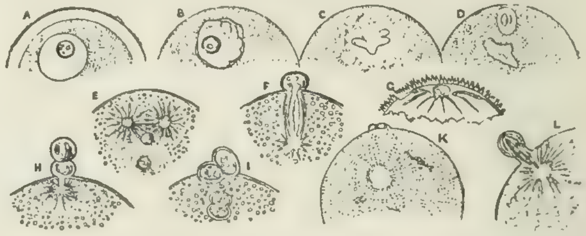

FIG. 10.—A, ripe ovum of *Asterias glacialis*, with excentric germinal vesicle and spot; B–E, gradual metamorphosis of germinal vesicle and spot; F, detachment of first polar body and withdrawal of remaining part of nuclear spindle within the ovum; G, portion of living ovum with first polar body; H, formation of second polar body; I, after formation of do., showing the remaining internal half of the spindle in the form of two clear vesicles; K, ovum with two polar bodies and radial striæ round female pronucleus; L, expulsion of polar body. (A–K after Fol; L after Hertwig.)

In view of the profound theoretic importance of this subject, it is necessary to summarize some of the most important recent observations. Thus Balbiani and Weismann (1882) describe the occurrence of polar vesicles in the ova of Insects, in which they had long been supposed not to occur, and Flemming (1885) represents a nuclear figure which he regards as corresponding to at any rate the first stage of the formation of a polar vesicle, in the ova of Mammals, at the period of bursting of the Graafian follicle. Such researches practically complete the chain of evidence for the generalization that the process of maturation of the ovum is essentially similar in all classes of *Metazoa*, and this not only in its initial stages of internal rearrangement or modification, but even in its later stage of polar vesicle formation. The absence of polar vesicles in parthenogenetic ova (predicted on theoretic grounds) seems, however, possible in some cases, but is by no means certain in all.

Our knowledge of the process of maturation has been much extended and modified by the recent elaborate monograph of E. Van Beneden (1883). He finds the egg of *Ascaris* to show not only two definite poles—a "pole of impregnation" and an opposite "neutral pole"—but some indication of the anterior and posterior regions and consequently of the right and left sides of the embryo. The substance of the ovum is also remarkably differentiated,—that of the "polar disk" alone exhibiting a vertical striation, and differentiating into two layers, superficial and subjacent (termed achromophilous and chromophilous respectively). The subjacent vitellus is distinguished into several layers, (central, intermediate, and cortical), and contains yolk elements of three distinct kinds, while the enveloping protoplasm has a distinctly reticulated and fibrillar structure, like the stroma of so many animal and vegetable cells. The germinal vesicle is practically homogeneous save that the portion surrounding its eccentric germinal spot is distinguished into an investing portion or spherical envelope, the "prothyalosoma," and an "accessory portion," which usually contains one or two "pseudo-nucleoli." In the ripe egg Van Beneden describes new complexities within the germinal spot; this consists of two juxtaposed quadrilateral disks, each containing four chromatin globules, united by a substance having less affinity for colouring matter. Radiating from these two disks, achromatin threads arise in the prothyalosoma, but stress is laid on the fact that no grouping of the chromatin elements into a star-like figure takes place. The spherical shape of the germinal spot is now modified by the intrusion on each side of a large homogeneous droplet from the vitellus into the prothyalosoma, so that in optical section it comes to have a T-shape, the accessory portion being mainly compressed to form the stalk of the T. At this stage the spermatozoon usually commences to work its way into the ovum, but does not yet affect the germinal vesicle or germinal spot, which proceed to the formation of polar globules. The T-shaped gradually passes into the "ypsiliform" figure, so called from its resemblance to the Greek Υ. Its steadily diverging branches, which are formed from the prothyalosoma, move upwards till they reach the surface of the vitellus, their fibrillar structure already noted meanwhile becoming well marked. Each bundle bears one of the two groups of four chromatin globules which compose the germinal spot. Next the vertical branch of the ypsiliform figure swings upwards to the surface, and a new branch is formed as a continuation of the same line; the whole figure is thus cross-shaped, with the prothyalosoma in the centre, but this cross soon disappears, leaving the prothyalosoma with its two chromatin groups. These are now divided, by a plane tangential to the surface of the vitellus, into two equal parts, and the upper of these, containing of course half the prothyalosoma with half of each of the two chromatin disks, becomes the first polar globule. Van Beneden lays great stress on the fact that this plane of division is not transverse to the oblique spindle formed by the diverging branches of the Υ, as was to be expected from the views of all previous observers, but on the contrary is parallel to it.

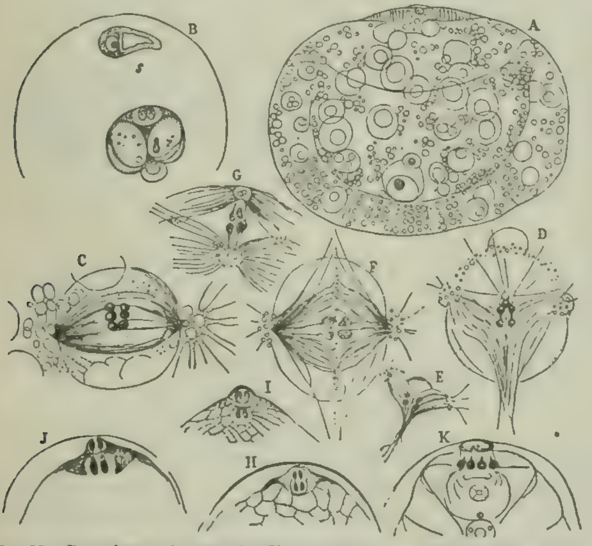

FIG. 11.—Fecundation of ovum (after Van Beneden). A, ovum before entrance of spermatozoon (showing complexity of structure); B. deformation of germinal vesicle on penetration of spermatozoon *s*; C, prothyalosoma with two chromatin disks and axial fibres; D, E, F, later stages of the ypsiliform figure; G, second pseudo-karyokinetic figure; H, I, J, K, expulsion of first polar globule.

The remaining portion of the prothyalosoma with its two chromatin disks, together with the surrounding protoplasm, now proceeds to the separation of the second polar vesicle. Despite differences in detail, the essential facts are the same: a spindle with a star-like figure at each end is formed; this at first lies radially in the vitellus, but afterwards becomes superficial, and its division takes place as before by an axial not an equatorial plane.

A still later and also elaborate discussion is due to Sabatier (1884). While combating the peculiar views suggested by Weismann and others as to the polar globules of Insects (as that they re-enter the ovum to form the rudiments of the future reproductive organs), he admits that they may be emitted at both poles of the ovum, and may either break up, be reabsorbed, or even in some cases form peculiar structures surrounding the ovum (*e.g.*, the follicular cells of Ascidians). He describes in *Buccinum*, &c., the extrusion of somewhat amœboid masses of clear protoplasm at several distinct points and frequently without the appearance of any nuclear spindle; and these may even repeatedly divide. He holds that the centrifugal extrusion of elements from ova is much more general than is usually recognized, and distinguishes these into three kinds:—(1) "globules précoces," which usually go to form the elements of the follicle; (2) "globules tardifs," which appear later; and (3) true polar vesicles, which alone are associated with karyokinetic changes of the nucleus.

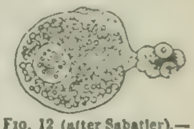
FIG. 12 (after Sabatier).—Ovum of *Buccinum undatum*, showing extrusion of polar globules and the associated elevation of clear protoplasm.

Like Van Beneden, he notes that polar vesicle formation is not strictly comparable to ordinary cell-division in being not transverse but longitudinal to the nuclear spindle.

From this point little advance has been made, though careful reviews of the subject are due to Flemming, J. T. Cunningham, and others. (13)

Fertilization or Impregnation of the Ovum.—The fundamental generalization now so familiar—that the process of fertilization for plant and animal alike lies in the material union of both sexual products—although said to have been propounded by Alcmæon (580 B.C.), and even described by Hartsoeker (1750), is pointed out by Hensen to be essentially due in the first place to the experimental researches on plant hybridization of Kölreuter (1761). Jacobi soon afterwards artificially fertilized the eggs of Trout and Salmon, but the most important and really convincing work was that of Spallanzani (1780), who experimented on the Frog, Tortoise, and Bitch. He unfortunately, however, concluded that spermatozoa might be absent without preventing fertilization, and ascribed all fertilizing powers to their fluid medium, so establishing an error which required for its elimination many successive researches. Prévost and Dumas (1824) showed that filtration really deprived the seminal fluid of its powers. Martin Barry (1843) actually observed spermatozoa within the zona pellucida of the Rabbit's ovum; Leuckart (1849) repeated both preceding observations in the Frog; Nelson (1852) observed the entrance of the spermatozoa into the ovum of *Ascaris*; while Keber (1853) discovered the micropyle in the ovum of the Mussel, and watched the passage of the spermatozoon through it into the yolk. It only remained for these results to be confirmed by the high authority of Bischoff and Allen Thomson (1854); and the knowledge of the subject thus reached its second stage, where it practically remained for nearly twenty years.

Aided by the advance of histological technique, a new plane was reached (1875–76) by the brilliant researches of Van Beneden on the ovum of the Rabbit, and of O. Hertwig and Fol on Echinoderm ova. The spermatozoon[1] was thus shown not to disappear into the yolk, but to form from its head or nucleus the "male pronucleus," which meets and fuses with the "female pronucleus," as the germinal vesicle is termed, after the extrusion of the polar body This new "conjugation-nucleus" soon exhibits karyokinetic changes and divides, and the segmentation of the ovum rapidly progresses.

As a full account of these and other papers up to 1880 is given by Balfour (*Embryology*, vol. i.), it will suffice to note the more important subsequent researches, especially as those, though with one exception confirmatory, penetrate somewhat further into details. The general process can be made out with especial clearness in fig. 13.

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[1] That, though more than one spermatozoon may pass through the vitelline membrane, only one normally enters the vitellus and becomes a male pronucleus has been well made out by Hertwig, Fol, and others. In the rare cases where more spermatozoa than one force an entrance, Fol has observed the monstrous double segmentation of the ovum, and argues forcibly for the hypothesis that we have to look in this process of "polyspermy" for the explanation of numerous teratological and pathological changes.

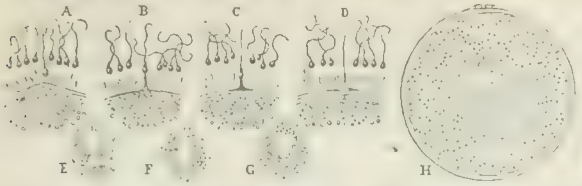

Fig. 13 (after Fol).—A, spermatozoa in mucilaginous coat of ovum of *Asterias glacialis*, a prominence rising from surface of ovum towards a spermatozoon; in B they have all but met, and in C they have met; D, spermatozoon enters ovum through distinct opening; H, ovum showing polar vesicles, and approach of male and female pronuclei; E, F, G, later stages in coalescence of the two nuclei

Oscar Hertwig had clearly enunciated in 1875 that "fertilization depends upon the conjugation of two sexually differentiated nuclei." This view has, however, lately (1883) been controverted by A. Schneider, who regards the radii which are seen in the ovum about the pronuclei as arising from the substance of the germinal vesicle alone, and who maintains the origin of the male pronucleus independently of the spermatozoon, which he believes to disappear. As Van Beneden, Nussbaum, and Flemming have since, however, successively controverted these views, Hertwig's account of the process may safely be retained, at any rate with the slight modification insisted on by Flemming, who prefers to describe the conjugation-nucleus as arising from the union of "the chromatin of a male with that of a female nuclear body."

In Van Beneden's work on the fecundation of *Ascaris* the penetration of a single spermatozoon into the vitellus and its transmutation into the male pronucleus are copiously figured and described. Most important, however, is perhaps his account of the formation and segmentation of the conjugation-nucleus. The female pronucleus undergoes changes resembling those preceding ordinary nuclear division; so also does the male; and the chromatin of each breaks up from the state of a single continuous and convoluted fibril into two V-shaped loops. The two pronuclear membranes now fuse; and the resultant conjugation-nucleus thus contains four loops of chromatin, of which two are male and two female. Each loop now undergoes longitudinal division; a nuclear spindle is meanwhile forming from the achromatin substance of the segmentation-nucleus, and this now proceeds to divide, but in such wise that each of the two daughter nuclei receives two of its four half loops of chromatin from the female and two from the male pronucleus. A circular furrow appears, dividing the ovum equatorially; a cell plate like that of a vegetable cell arises in the same plane; and the two first blastomeres are soon completely formed, and proceed to redivide in the same way.

The results of Nussbaum are essentially similar so far as they go; Strasburger's recent work summarized below contains a thorough confirmation of these accounts of the process of fecundation so far as plants are concerned; while most recently (1885) O. Hertwig has re-stated his original theorem with a discussion of its physiological aspects and consequences. (14)

Segmentation of the Ovum.—The process of segmentation has already been repeatedly mentioned. As with the other histological problems presented by the ovum, our knowledge of its minute details is in a somewhat unsettled yet rapidly advancing state, due to the progress of the wider inquiry into cell structure and cell division in general. The essential correspondence of the changes to be observed in the conjugation-nucleus and yolk with those of ordinary cell-division (see PROTOZOA, vol. xix. p. 833, fig. 1) has been worked out by many observers, and Van Beneden's more minute account of the process is summarized above. Our knowledge of its external features is of much older date, and has been comparatively recently brought together by Balfour (*Embryology*, i., chap. iii.): the present limits permit only the briefest summary.

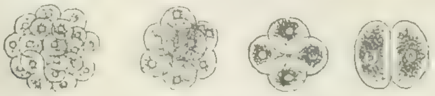

Fig. 14.—Regular segmentation of ovum (after Gegenbaur).

In the simplest case—that of small ova destitute of food-yolk,—the ovum divides by a vertical plane into two segments or blastomeres, each of these again into two, and so on, and a mass of 4, 8, 16, 32, 64, &c., cells is thus formed, but in the resultant mulberry-mass or morula the cells are all equal and similar. Such segmentation is termed regular; commonly, however, the regularity and equality of ordinary cell-division is more or less interfered with by the presence of food-yolk. In this regard Balfour enunciates the valuable general law "that the velocity of segmentation in any part of the ovum is, roughly speaking, proportional to the concentration of the protoplasm there, and that the size of the segments is inversely proportional to the concentration of the protoplasm." Bearing this in mind, the varieties of segmentation are intelligible enough; thus the unequal segmentation of the Frog's ovum (fig. 15) needs no further explanation. These two preceding types, in which segmentation is complete, were distinguished by Remak as "holoblastic," and were long looked upon as wholly distinct from "meroblastic" ova like that of Fowls or most Fishes, in which segmentation is partial, *i.e.*, confined to a small area of the surface of the yolk. Balfour's law, however, explains these cases as only an exaggeration of the preceding case, due to the greater accumulation of food-yolk, and the consequent check to segmentation at the lower or vegetative pole. Another form of partial segmentation is presented by many Arthropods, in which the yolk occupies a central position within the ovum, and three varieties of this "centrolecithal" process are distinguished—equal, unequal, and superficial.

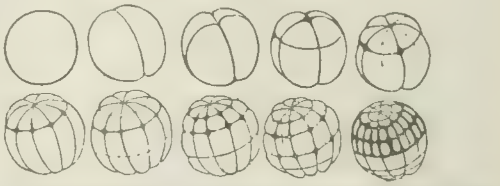

Fig. 15.—Unequal segmentation of Frog's egg. (From Balfour—after Ecker.)

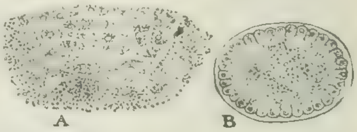

Fig. 16 (after Balfour).—A, section of developing ovum of an Elasmobranch showing meroblastic segmentation; B, optical section of centrolecithal Crustacean ovum.

While the ontogenetic process of segmentation in general and of regular segmentation in particular is usually regarded as being a recapitulation of the phylogenetic development of the primitive *Metazoon* from its Protozoan ancestor, the vast nutritive importance of the food-yolk, and the consequent high variability of its quantity in relation to the habits and circumstances both of parent and offspring, render its wide variations in detail a totally unsafe guide to affinities. A single genus may, in fact exhibit extreme forms. (11)

§ 3. SYSTEMATIC AND GENERAL EMBRYOLOGY.

While it is impossible to compress within the limits of the present article the subject-matter of a full treatise on embryology, an attempt must be made to touch in turn upon (1) the empirical facts, (2) the concrete inductions, and (3) the abstract generalizations of development.

1. A sketch of the history of this branch of the science is given under EMBRYOLOGY (*q.v.*), while for detailed information as to the division and differentiation of the ovum in each group, and as to the more or less marked changes by which the resulting embryonic forms assume the adult organization, the reader must be referred to the separate articles (SPONGES, HYDROZOA, MOLLUSCA, &c.), as well as to the classical work of Balfour. The more important empirical facts need thus only the briefest outline.

Protozoa.—Since the young *Protozoon*, whatever its mode of origin from the parent form may be, rarely differs from the latter except in size and phase of cell-life, there is little to be noted here in regard to the development of the group, except in such cases as *Katallacta* and *Volvocineæ*, where a primitive attempt towards a more or less temporary multicellular form affords us a first hint of the Metazoan segmentation of the ovum.

Dicyemida.—In this degenerate and still somewhat problematical intermediate group the asexually produced ovum segments to form an embryo of great simplicity, where a few outer (ectodermal) cells cluster round a single inner (endodermal) one, and where we thus find the first differentiation of the embryo into the cell-layers constantly exhibited in the succeeding groups, though it is unsettled whether this represent the incipient or the degenerate Metazoan type.

Porifera.—In a calcareous Sponge, such as *Sycandra*, the fertilized amœboid ovum segments within the parent to form a hollow blastosphere, most of the cells of which are clear and ciliated, and partially cover a number of larger granular cells,—the future endoderm and ectoderm respectively. In the free-swimming embryo the latter nutritive cells increase rapidly in size, and, growing ultimately over the locomotor and respiratory ciliated cells, cause them to become invaginated to form the endoderm. This invagination resulting in the obliteration of the "segmentation cavity" and the formation of the "gastrula" stage is perfected as the young Sponge settles down and becomes fixed by processes from the amœboid ectoderm cells. The cilia of the endoderm disappear; the blastopore is obliterated; between ectoderm and endoderm there appears a third germinal layer or mesoderm, and in it the calcareous spicules of the Sponge are developed. A perforation at the top of the inverted gastrula forms the exhalent aperture; peripheral inhalent pores also arise; and this renewed exposure of the endoderm cells to direct contact with the water is followed by their return to the ciliated form. See SPONGES.

Cœlentera.—The generally equal segmentation of the ovum results as usual in a solid or hollow morula. The formation of the two layers, as in some other groups, may occur either by invagination, as above described, or by a process of separation of inner from outer, termed delamination. In most *Cœlentera* the tissues which in higher groups are strictly mesodermal originate from the direct differentiation of the two primary layers. The larval form most constant in the *Cœlentera* is the planula (see HYDROZOA, vol. xii. p. 557). It is ciliated, two-layered, almost cylindrical, with a rudimentary digestive cavity, generally closed. For discussion of the alternation of generations so characteristic of many Cœlenterates see HYDROZOA and SEX.

Vermes.—The development of the unjointed Worms is too varied to admit of general summary. In some we find illustration of that mode of gastrula formation (epibolic), so common in higher groups, where, owing to the large size of the food-packed endoderm cells, an actual invagination is impossible, but the ectoderm cells grow round the others and thus come to enclose them as in the more primitive process. In such a typical higher Worm as *Lumbricus*, the segmentation, which varies in regularity according to the species, results in the formation of a blastosphere with readily distinguishable ectoderm and endoderm; the invagination of the latter results in a somewhat cylindrical gastrula. The blastopore narrows anteriorly to form the permanent mouth, while in some other Chætopods a similar narrowing in the opposite direction forms not the mouth but the anus. The mesoderm appears very early in the form of posteriorly situated cells on each side of the middle line, and soon two mesoblastic bands are formed extending to the mouth. These are subsequently divided into blocks or somites, the anterior and posterior walls of two adjacent blocks uniting to form the cross partitions of the adult Worm, while the outer and inner walls form respectively the somatic and splanchnic layers. The ventral nerve cord results from the sinking in and union of two epiblastic thickenings, developed one on each side of a ventral furrow, while the supra-œsophageal ganglion has a distinct origin from a dorsal thickening. The somewhat isolated *Sagitta* affords good illustration of the formation of the body-cavity from two lateral lobes of the archenteron. The simple enteric cavity normally formed exhibits anteriorly a division into a middle lobe and two side pouches uniting behind in the single cavity. The middle lobe is separated off from lateral and posterior cavities as a blind tube which afterwards forms the alimentary canal; the side pouches form the body-cavity (see TAPEWORMS, PLANARIANS, NEMERTINES, ANNELIDA, &c.).

Echinodermata.—The generally uniform segmentation results in a blastosphere, usually elongated in the direction of the axis of invagination. A gastrula is formed by normal invagination, in the course of which amœboid cells are budded off from the two sides of the advancing depression to form the mesodermic musculature and connective tissue of the adult. The blastopore forms the larval anus, which does not always persist; the larval mouth is permanent, and is the result of an independent ectodermic invagination meeting the archenteron. The cœlom or body-cavity, with its mesodermic lining arises from a paired or single outgrowth of the archenteron, and the water-vascular vesicle which comes to lie round the œsophagus has a similar origin. For an outline of the nature of the larval forms and the passage of the embryonic organs into those of the adult the reader is referred to ECHINODERMATA.

Arthropoda.—The interesting *Peripatus* (see MYRIAPODA, vol. xvii. p. 116) exhibits in its development phenomena, such as that of the elongated blastopore gradually closing from the middle, so as to leave mouth and anus, and that of the surrounding nerve cord, which suggest affinities through the whole animal kingdom from *Cœlentera* on the one hand to *Vertebrata* on the other; but of these discussion is still far from ended. The development of the Insect ovum illustrates what is termed centrolecithal segmentation, where a single uniform layer of superficial cells encloses a nucleated but undivided central yolk mass. The blastoderm becomes thickened ventrally; and along the middle line of the ventral plate there appears a groove which is the seat of the mesoderm formation. The development of the Vertebrate amnion is recalled by the formation of two enveloping membranes from folds of the blastoderm, which arch over and coalesce over the ventral plate, and at the same time spread upwards to cover the dorsal integument from which they are eventually separated. Both disappear through absorption or rupture either before or during hatching. The mesoderm is divided into two lateral bands, and these into hollow somites, which together form the perivisceral cavity. As usual the outer layer of mesoderm follows the ectoderm, the inner the endoderm, which probably arises from a secondary segmentation of the yolk. The ventral plate extends to a slight extent dorsally both before and behind, and on it the appendages appear as hollow outgrowths of ectoderm and endoderm. The ventral nerve cord arises from two sunken thickenings of ectoderm, the tracheæ as invaginations of the same. The middle section of the alimentary tract is formed from endoderm, the anterior and posterior portions from ectodermic invaginations. For an account of larval metamorphosis, &c., see INSECTS.

Crustacea.—In these the segmentation is usually centrolecithal, and results in a uniform blastoderm enclosing a central yolk mass without traces of division. The gastrula stage is represented by an invagination of a patch of the blastoderm, which forms the endoderm, and from which the mesodermic cells seem also to arise. A ventral thickening of ectoderm continuous with the invaginated portion forms the ventral plate on which the embryo is mapped out. Along it the nerve cord appears as a median thickening, and the sense organs have as usual a similar ectodermic origin. The mesoderm appears to form the usual tissues (muscles, heart, &c.), but has apparently less definiteness of arrangement into layers and somites than is usually the case. The original invagination forms the mesenteron, and the lining endoderm cells absorb the yolk The anterior and posterior portions of the alimentary tract are formed as usual by subsequent independent invaginations. Much less proportionally is known of the organogeny than of the very interesting and suggestive larval forms, for which see CRUSTACEA.

Mollusca.—The typical Molluscan segmentation is markedly unequal, the disproportion between ectoderm and endoderm cells varying according to the proportion of food-yolk. The gastrula stage is more frequently reached by the growth of the ectoderm cells over the larger and fewer endoderm cells than by any actual invagination. The blastopore may close apparently towards either the oral or the anal extremity, forming mouth or anus or neither. In *Cephalopoda* the segmentation is confined to a germinal disk of formative material as in partially segmenting Vertebrate ova, though there are besides cells from the yolk which underlie the germinal region of the blastoderm and also accompany it in its growth round the yolk, forming the inner blastodermic layer or yolk membrane. The mesoderm appears at the lips of the blastopore, or in an equivalent position; it forms a complete layer between ectoderm and endoderm, and within it the body cavity is formed usually by a definite splitting into two layers. The invaginated endoderm forms the mesenteron; and the history of the formation of the anterior and posterior portions of the tract varies with the fate of the blastopore. In the *Cephalopoda* at least, the nervous system appears not as usual from the ectoderm but from the mesoderm. The characteristic larval organs, the shell gland and the foot, are ectodermic in origin—the former arising as a thickened invagination on the posterior and dorsal side of the embryo, and the latter as a ventral protuberance. Further details and larval changes are thoroughly treated under MOLLUSCA.

Tunicata.—The complete and generally quite equal segmentation results in the formation of a blastosphere with a large segmentation cavity. The cavity is obliterated by a normal invagination, and a typical gastrula is formed. In the formation of the nerve cord from the closure of a medullary groove and of the notochord from a cord of cells on the dorsal wall of the archenteron, in the appearance of respiratory slits in the anterior portion of the enteric cavity and of a cerebral eye, and in fact in all the essential features of their development they present the amplest evidence of their Vertebrate affinities and degenerate origin (see TUNICATA).

Vertebrata.—The segmentation is total and equal in *Amphioxus*, total and not markedly unequal in *Mammalia*, total and unequal in *Amphibia*, *Acipenser*, *Petromyzon*, partial in Birds and Reptiles, Teleosteans and Elasmobranchs, but the limits between these types are not sharply defined, being mainly determined by the store of food-yolk. In *Amphioxus* there is no interference with the formation of the typical gastrula, and this form is also readily recognizable in the *Amphibia*, *Acipenser*, and *Petromyzon*, where, however, the process of formation is less simple. At a point corresponding to the future hind end of the embryo a true invagination takes place, forming, however, only the dorsal wall of the archenteron, at the same time the ectoderm cells have been growing round the yolk, and the floor of the enteric cavity is formed from yolk-cells. The blastopore is eventually closed, but a communication between the archenteron and the neural canal persists for some time as the neurenteric canal. In the Elasmobranchs and Teleosteans, though there is no true invagination nor recognizable gastrula form, there are not wanting hints of its ancestral occurrence and of homologies with the typical form. The comparison of the different Ichthyopsidan gastrulæ with the typical form and with that of the *Sauropsida*, and such problems as the occurrence of an epibolic gastrula in *Mammalia* are still under discussion. The most important stages in the further Vertebrate development, the formation of the medullary groove and canal, the appearance of the notochord as an axial differentiation of hypoblast, the origin of the body-cavity from paired outgrowths from the archenteron, the occurrence of gill-pouches opening externally from the throat, the expansion of the medullary cord anteriorly to form the vesicles of the brain, the outpushing of a cerebral eye, and so on, are described in all text-books. (11)

2. But it is not enough empirically to record the observed phenomena of reproduction in the various groups, primarily essential though such labours are; it is further necessary to generalize them. We should ascertain, that is to say, from a comprehensive and a comparative survey, what degree of unity of structure is discovered actually to prevail within and among the various groups. Were this knowledge once definitely reached and incorporated with the results of comparative anatomy and palæontology, that complete conspectus of the animal kingdom which is the goal to which all morphological inquiries converge would come clearly into view. Such an exposition of the contributions of the study of development to morphological knowledge may evidently proceed in either of two ways,—either by starting from the later and more superficial similarities which are expressed in the classification of the different groups, and working downwards towards earlier and deeper unities in the various organs and tissues; or by starting from the most primitive homology, and working upwards, so demonstrating the unities which are observed to obtain in the successive stages, from segmentation and layer differentiation onwards. For our present purpose, it is more convenient to follow the latter course, and to note the main concrete generalizations of development in ascending order from the deepest and most general to the more superficial and specific.

1. *Ovum Theory.*—The most fundamental unity upon which all the others really depend is the familiar fact that all organisms, plant and animal alike, develop from a single germinal cell or ovum essentially comparable with any ordinary cell. The importance of these results may be best expressed by a quotation from Agassiz's once famous *Essay on Classification*:—Von Baer "thus showed for the first time that there is no essential difference in the mode of reproduction of the so-called viviparous and oviparous animals, and that Man himself developed in the same manner as animals. It was indeed a gigantic step to demonstrate such an identity in the material basis of the development of all animals, when their anatomical structure was already known to exhibit such radically different forms. The universal presence of eggs in all animals, and the unity of their structure, which was soon afterwards fully ascertained, constitute in my opinion the greatest discovery in the natural science of modern times." The ovum has long ceased to be regarded as a mysterious microorganism, and, while in some cases a number of cells unite to nourish and perfect it, the generalization remains unshaken, that the ovum of every organism is a simple cell. The minute structure of the ovum, its differentiations and variations, its fertilization and development, must be expressible in terms of the morphology and physiology of the ordinary cell. The elucidation will be obviously mutual, for the analysis of the phenomena observed in the case of the highly differentiated reproductive cells, with their consequent greater physiological simplicity, will shed light on analogous phenomena in ordinary cellular and Protistan life where, with less differentiation, there is greater physiological complexity,—while such problems as the origin and import of polar globule extrusion, fertilization, &c., receive some elucidation from suggestive analogies among the *Protozoa*. See SEX. (11)

2. *Segmentation.*—The segmentation of the ovum of the *Metazoa* varies in regularity and completeness throughout the groups, but the different types are not sharply defined from one another and are, as has been already noted, partially at least explicable as mechanically conditioned by the quantity of nutritive as opposed to formative material. Segmentation being only a special case of ordinary cell-multiplication (to which in behaviour of nuclei, &c., it fully corresponds), it awaits whatever elucidation may arise out of the present conflict of speculation as to the physical and physiological causes of division in general. It has further to be compared on the one hand with such cases of multiple division as are observed in spermatogenesis, and on the other hand, and more especially, with the earliest attempts to form cell aggregates and so effect the passage from *Protozoa* to *Metazoa*. (11)

3. *Gastræa Theory.*—We have seen in the development of the various groups how the result of segmentation is not a mere aggregate of cells but an integrated two-layered individual with a distinct enteric cavity. In 1872 Haeckel emphasized the importance of this form, and in 1875 he elaborated his "gastræa" theory, according to which all animals pass through a gastrula stage which, in its typical form, resembles the ancestral *Metazoon*. He showed how the variously modified quasi-gastrula forms of the higher groups might be derived from the normal type, and corroborated his theory by reference to the persistence of the gastrula stage in certain *Porifera*, as well as in those *Cœlentera* and *Vermes* where the adult animal is not far above the level of the gastrula organization. The occurrence of the planula and the delamination process in some cases alongside of the invaginate gastrula is a difficulty in the way of his theory so far as it defines the primitive Metazoan ancestor, and this has given rise to Lankester's rival planula theory. The case on either side is fairly stated in Balfour's *Embryology* (vol. ii. chap. xiii.). (Recent researches on *Hydrozoa* seem to show that delamination is an extreme form of immigration, which is itself a modified invagination.) The passage from *Protozoa* to *Metazoa* was, according to Bütschli, effected neither by planulan nor gastrula but by a disk-like "placula." The ingenious "cœlom theory" of the Hertwigs is an attempt to divide all the *Metazoa* with three germinal layers into two distinct groups characterized by different modes of formation of body-cavity and mesoderm, and by other minor differences. In the *Enterocœla*, which include the *Chætopoda*, *Gephyrea*, *Brachiopoda*, *Nematoda*, *Arthropoda*, *Echinodermata*, *Enteropneusta*, and *Chordata*, the body-cavity is formed in the fashion noted in the case of *Sagitta* by two ingrowths from the archenteron, the bulk of the mesoderm arising from the differentiation of the epithelium of these diverticula, though sometimes partially also from amœboid cells budded off into the gelatinous tissue between ectoderm and endoderm. In the smaller group of *Pseudocœla*, including the *Mollusca*, *Polyzoa*, *Rotifera*, and *Platyhelminthes*, the mesoderm originates in the second of these ways, and the body-cavity is formed by a split in this "mesenchyme." This theory has been criticized by Balfour (*Embr.*, ii. 13), and more recently ably defended by Haeckel and others; further detailed studies are at least needed before it can claim full confirmation. (15)

4. *Unity of Tissues and Homology of Layers.*—Since it is impossible that all the cells resulting from segmentation can continue to occupy the same position, a certain lamination or layer formation with consequent division of labour and structural modification invariably occurs, finding its first expression in the two-layered gastrula stage to which we have referred. Just as in the embryo of the higher plants there arise an outer dermatogen, an inner plerome, and a middle layer or periblem, so in the animal embryo there constantly occur three germ layers, the ectoderm, the endoderm, and the intermediate layer formed from them—the mesoderm. As early as 1768 Wolff seems to have had a definite presentiment of the formation of the different systems from distinct germ layers; in 1817 Pander distinguished in the embryo chick the outer or "serous" from the inner or "mucous" layer, and Von Baer in 1828 yet more definitely distinguished them as animal and vegetative respectively. A great step towards the recognition of the full significance of these germ layers was due to the brilliant insight of Huxley (1859) in comparing them to the ectoderm and endoderm which he had demonstrated in *Cœlentera*. The researches of Remak, Rathke, Kowalevsky, and others led to their general recognition throughout the *Metazoa*. Modern progress is marked by the demonstration of the general homology of all the three germ layers and consequently of the systems of organs which arise from them. While much uncertainty still obtains as to the

origin of the mesoderm, and while the different layers undoubtedly exhibit in some cases the possibility of differentiation into tissues different from those to which they usually give origin, yet the general homology of the layers is now indisputable. The ectoderm, which is indeed the primitive sensory and protective organ, forms the epidermis, sense organs, and nervous system of the adult; the nutritive endoderm lines the enteric cavity, &c.; and from the mesoderm are derived the muscular, vascular, and lymphatic systems and the greater part of the connective tissue, as also the excretory and generally also the generative system. Not only then is the occurrence of these three layers constant, but, with few exceptions, so is the differentiation of each into definite systems of organs. This correspondence, which is of high—in most cases of final—importance in determining homologies, may be termed homodermic. See MORPHOLOGY. (15)

5. *Unity of Anatomical Structure.*—The study of development leads, however, to the recognition of a more detailed and specific unity than the general one of homodermy. For, just as the development of the flower reveals the original resemblance of organs which become subsequently widely differentiated, so organs which in their adult modification seem hardly comparable are seen to be moulded from one pattern when compared in their embryonic simplicity. The same holds good obviously of the comparison of organs in different animals; organogeny is the necessary foundation of comparative anatomy. Thus of late years it has been demonstrated that the nervous system and sense organs, throughout at any rate the vast majority of Metazoan forms, not only constantly arise from the ectoderm—that is to say, are homodermic—but their development exhibits correspondences even in detail. Recent studies of the development of the Vertebrate skeleton, and more especially of the skull, afford vivid instances of that fundamental unity of structure of which, in another department, the final unravelment of the complex problem of the structure of the urinogenital organs of Vertebrates through the researches of Balfour and Semper is one of the most recent and admirable instances. (11)

6. *Unity of Type.*—It has been the general history of classification both of plants and animals that arrangements based on superficial resemblance were superseded by those founded on internal organization, while the latter have been in turn either corroborated or amended by the relationships revealed by the study of development, as from the preceding generalizations must indeed be obvious. Just as the separation of the Monocotyledons and Dicotyledons into two great alliances was anatomically recognized by Ray, and embryologically corroborated by De Jussieu, so the developmental studies of Von Baer led him independently to the establishment of the four great types which had been previously distinguished by the anatomical labours of Cuvier. And, apart from the recognition of the morphological unities of the greater groups, it is familiarly known how in the case of problematical forms, such, for instance, as Cirripedes or Ascidians, where the adult organization is obscured by degeneration, the detection of the true relationship is due to embryology. In proportion, too, as the recapitulation during development of adult structure becomes shortened and effaced, so does the determination of their real affinities become difficult; hence the relatively slow progress of the botanist towards a knowledge of the deeper affinities of his "natural orders." (11)

As the preceding outline of embryological detail is being rapidly filled up, and the resultant concrete generalizations are being more and more clearly defined, and also united with those of comparative anatomy and palæontology, the embryologist is rapidly approximating that tolerably adequate knowledge of the morphological relations of plants and animals alike which finds its graphic expression in the "family tree" of the *Organisata*. While, for instance, the discrepant speculations of Semper, Hubrecht, Sedgwick, and others, as to the ancestral form of the *Chordata*, afford illustration of how far we are from being able to construct a thoroughly definite genealogical tree, on the other hand no better evidence alike of the rapid stages by which our knowledge has advanced and of the utility of such a method of graphic notation can be obtained than by comparing the necessarily vague and hypothetical tree sketched by Haeckel only twenty years ago with any of its numerous and shortlived successors. (16)

3. The result of the study of development is not, however, merely to establish the existence of such concrete structural unities as those just indicated, but leads further to the recognition of certain abstract generalizations, expressive of the most comprehensive conclusions which can be drawn from the observed succession of developmental phenomena.

(*a*) *Heredity.*—It is an every-day observation that the offspring of any organism repeats the organization of the parent; and the very familiarity of the fact is apt to conceal the marvellousness of the process in which every egg cell develops, either directly or indirectly, into a form which not only resembles the parent in general and specific characters, but may even repeat those individual characteristics which arose by so-called spontaneous variation, or which were even impressed upon the parent by the direct influence of the external environment. The difficulty of analysing the factors which give rise to this result,—that is, of understanding how the history of the developing ovum is determined by its constitution—the uncertainty as to the degree in which acquired parental characteristics can be said to be transmitted, the absence in fact of any established causal explanation of the resemblance between offspring and parent, in specific and individual characters, does not of course affect the fact. Although, in analysing the popular generalization that "like begets like," it may eventually be shown how much of that likeness may be due to the hammering of the same environmental forces which formerly played upon the parent, a mysterious transmission of properties has still to be accounted for, and interpreted in terms of the physiological and morphological, the chemical and physical, composition and properties of the germinal matter of parent and offspring. To explain this mystery, various "theories of heredity" have been from time to time propounded; from the present purely morphological point of view it suffices here, however, to note the fact of heredity, leaving the discussion of its rationale to its more natural place at the outset of the article VARIATION AND SELECTION. (6)

(*b*) *Von Baer's Law.*—In comparing the degree of organization attained by different forms, we are accustomed to distinguish the general morphological ground-plan constant throughout the group from the detailed histological differentiation or elaboration of the various organs. Great histological simplicity may co-exist with a high general morphological plan, and *vice versa.* A survey of the animal and vegetable kingdom reveals a branching and ascending series of increasingly complex ground-plans, while, in any of the groups determined by these, similar branching series more and more highly differentiated in detail are to be distinguished. Von Baer (1828) was the first to discern the embryological aspect of this law of progress, and to show that, in the development alike of the organism and of its component parts, there was a progress from the simple to the complex, from the general to the special. Thus, in the development of one of the higher *Mammalia*, those characters which are common to the lowest Vertebrates are at first alone distinguishable. Thence the embryo passes through stages resembling those of successively higher forms, till the general Mammalian type is reached, this again passing through higher and less general stages till the specific characters finally make their appearance; and this progressive differentiation from general to special holds equally of the histological differentiation of the organs. Von Baer guarded against the error involved in many popular versions of his generalization, by maintaining that the developing embryo resembled, not the adults, but merely the embryos of lower forms; and, although he narrowed his proposition to the limits of the great groups, denying, for example, any resemblance between Vertebrate embryos and those of any Invertebrate type, this must be admitted a thoroughly legitimate reserve when we consider the actual state and practical possibilities of embryological research at the time. The real value and import of Von Baer's law, however, could not be appreciated until the parallel between this developmental progress and the advance of anatomical type which had been exposed by Cuvier received its rational explanation at the hands of Darwin. (17)

(c) *Haeckel's "Biogenetic Law."*—While Von Baer was the first to appreciate the value of embryology in its relation to classification and comparative anatomy, we are indebted to Haeckel for the detailed application of the Darwinian theory to the phenomena of embryology and the consequent restatement of Von Baer's law in its developed form. In his *Generelle Morphologie* (1866) he formulates the "fundamental law of development" (*biogenetisches Grundgesetz*). Introducing the term "ontogeny" to denote the development of the individual organism, and "phylogeny" to express the historic evolution of the "phylon" or tribe, he affirms that "ontogeny is an epitome of phylogeny," or, more explicitly, "the organism recapitulates in the short and rapid course of its individual development the most important of those form-modifications undergone by the successive ancestors of the species, in the course of their long and slow historic evolution, and the causal relation of the two histories is to be explained in terms of heredity and adaptation. When these are thoroughly analysed, it will be possible to say that the phylogeny is the mechanical cause of the ontogeny."

Much as Von Baer had distinguished the general morphological ground-plan from the more detailed differentiations of the organs, Haeckel analysed ontogeny into (*a*) the "palingenetic" process, in which the truly ancestral characters conserved by heredity are reproduced in development, and (*b*) the "kenogenetic" process, or modified evolution, to which are due those non-primitive characters which have resulted in consequence of a secondary adaptation of the embryo to the peculiar conditions of its own environment. The true recapitulation is constantly liable to be disguised, not only by the frequent occurrence of that abbreviated and more direct ontogeny which the need for economy tends alike to originate and to conserve, but by the action of these kenogenetic processes. Hence the corollary that "the ontogenetic recapitulation of the phylogeny is the more perfect the more the palingenetic process is conserved by heredity, and the more imperfect in proportion as the later modified evolution (kenogenesis) is introduced by adaptation."

While this distinction between adaptive characters and underlying morphological type is not only legitimate but indispensable, it must not, however, be forgotten that the difference between these is nowhere absolute,—the deepest morphological characters being but the most ancient results of adaptation (*cf.* MORPHOLOGY, vol. xvi. p. 845). Yet it is only by the careful application of this principle that the embryologist can unravel the perplexing entanglement of primitive and adaptive characters presented by so many larval forms, or solve the scarcely less difficult problems of organogeny. In this regard Balfour's dissertation on the origin and affinities of larval forms is especially valuable, while a vivid illustration of the employment of the biogenetic law, in one of the most difficult departments of ontogeny, may be borrowed from Prof. Parker. Reviewing the development of the skull in the Chick, he says—

> "Whilst at work I seemed to myself to have been endeavouring to decipher a *palimpsest*, and that not erased and written upon again just once, but five or six times over.
>
> "Having erased, as it were, the characters of the culminating type—those of the gaudy Indian Bird—I seemed to be amongst the sombre Grouse, and then, towards incubation, the characters of the Sand-Grouse and Hemipod stood out before me. Rubbing these away, in my downward walk, the form of the Tinamou looked me in the face; then the aberrant Ostrich seemed to be described in large archaic characters: a little while and these faded into what could just be read off as pertaining to the Sea Turtle; whilst, underlying the whole, the Fish in its simplest Myxinoid form could be traced in morphological hieroglyphics." (17)

(*d*) *Spencer on Development.*—The most generalized treatment of embryology is that of Spencer, who, after carefully distinguishing mere growth in bulk from development of structure, points out that development takes place primarily around a *central* point, as in the lowest and chiefly unicellular organisms. Central development is either unicentral or multicentral, while, according as the insubordination to a single centre, implied in the latter case, is more or less thorough, the organism is of irregular form (*e.g.*, many Algæ), and so may readily even become discontinuous. From central we pass insensibly to *axial* development, and this may be uniaxial or multiaxial. Here, too, development may be continuous or discontinuous, familiar instances of both being furnished by many animals and plants. The fundamental importance of these simple conceptions to the adequate treatment alike of the problems of individuality (*cf.* MORPHOLOGY) and of the nature of the reproductive process is justly to be insisted upon, for the definition of reproduction as but a discontinuous growth and development finds here its origin and justification.

Spencer, moreover, expresses Von Baer's essential law in yet more general phrase:—"Development is a change from an incoherent indefinite homogeneity to a coherent definite heterogeneity." The relation of ontogeny to phylogeny is not overlooked, and a yet farther parallel advance in differentiation of the organism from its environment is illustrated alike in structure and form, in chemical composition and specific gravity, in temperature and self-mobility. The deductive interpretation of these laws is also cautiously suggested. (17)

Bibliography.—Without any attempt to deal with the very copious literature of the subject, it is sufficient to name some of the more important general and special works, from which full details can in turn be obtained. From the time of Haller perhaps no eminent anatomist or physiologist has omitted a more or less general treatment of the subject, and such discussions as those to be found in the well-known works of Johannes Muller, Milne-Edwards, Owen, or Carpenter are still valuable, especially as embodying the past development of the subject. More recent discussions are to be found in the leading text-books, alike morphological (Huxley, Gegenbauer, Claus) and physiological (Hermann, Foster, Landois, &c.). The embryological movement can be followed by the aid of the article EMBRYOLOGY, and the valuable systematic treatise of Balfour, while the most generalized treatment of the subject must at first be sought in the works of Spencer and Haeckel. For almost all purposes, however, the recent careful monograph of Hensen (*Physiologie d. Zeugung*, forming the second part of vol. vi. of Hermann's *Handbuch d. Physiologie*, Leipsic, 1881), although, of course, by no means completely satisfactory, will be found not merely serviceable but indispensable to the student. The various *Jahresberichte* must be also, of course, constantly appealed to, especially for progress in detail. The present state of the theory of reproduction is discussed in Hensen, *op. cit.*

(1) *cf.* Hensen, *op. cit.*, general manuals, and gynæcological works, *e.g.*, Williams, "On the Structure of the Mucous Membrane of the Uterus," *Obstetr. Journ.*, 1875; Barnes, *System of Midwifery*, 1885; Lusk, *Sci. and Art of Midwifery*, 1882. (2) Huxley, *Anat. of Invert. Animals*, 1879; Gegenbaur, *Comp. Anat.*, London, 1882; Wiedersheim, *Lehrb. d. Comp. Anat. d. Wirbelthiere*, Jena, 1883; Semper, *D. Urinogenital Syst. d. Plagiostomen*, in his *Arbeiten*, vol. ii.; Balfour, *Comp. Embryology*, 1882. (3) Hensen, *op. cit.*; Foster's and Landois's manuals of physiology. (4) Werth, "Physiologie d. Geburt," in chap. xii. of Hensen, *op. cit.*; Spiegelberg, *Lehrb. d. Geburtshülfe*, Lahr, 1878. (5) Milne-Edwards, *Leçons s. la Physiologie*, and later manuals. (6) Hensen, *op. cit.* (7) Gamgee, *Physiol. Chem. of Anim. Body*, 1880, and Hensen, *op. cit.* (8) V. La Valette, "Ueb. d. Genese d. Samenkörper," *Archiv f. Mikr. Anat.*, xv.; Blomfield, *Quart. Journ. Micro. Sci.*, 1880; Jensen, *Arch. d. Biol.*, 1882; Swaen and Masquelin, *Arch. d. Biol.*, 1883; Geddes and Arthur Thomson, "On the History and Theory of Spermatogenesis," *Proc. Roy. Soc. Edin.*, 1885–86. (9) See EMBRYOLOGY, and article "Ovum" (by Allen Thomson), in Todd's *Cyclop. of Anat. and Physiol.* (10) Gamgee, *op. cit.*; Hensen, *op. cit.* (11) Balfour, *op. cit.*, and manuals. (12) Balfour, *op. cit.*; Flemming, *Zellsubstanz*, &c., Leipsic, 1882; Strasburger, *Zellbildung*, &c., Leipsic, 1882, and *Neue Untersuch.*, &c., 1884; Carnoy, *Biologie Cellulaire*, Louvain, 1885; Brass, *Beitr. z. Zellphysiologie*, Leipsic, 1885; Hertwig, *Jena. Zeitschr.*, xviii., Heft 2, 1885. (13) Balfour, *op. cit.*; V. Beneden, *Arch. d. Biol.*, 1883 (also summaries in *Q. J. M. S.*, and *Biol. Central-Blatt* for 1885, by Cunningham and Flemming respectively); Sabatier, *Contrib. à l'étude d. globules polaires*, Montpellier, 1884. (14) Works above cited and Hertwig, *Jena. Zeitschr.*, 1885. (15) Balfour, *op. cit.*; Haeckel, "Ursprung u. Entwick. d. thier. Gewebe," *Jena. Zeitschr.*, xviii., 1885. (16) Haeckel, *Gen. Morphol.*, 1866; Herdman, *Phylogeny of Animal Kingdom*, Liverpool, 1885. (17) Spencer, *Princ. of Biol.* 1880; Haeckel, *Gen. Morphol.*, 1866; Parker, *Morphology of the Skull*, 1877.

II. Reproduction of Plants.

The various modes by which plants are reproduced may be conveniently classified in two groups, namely, vegetative multiplication and true reproduction, the distinction between them being this, that, whereas in the former the production of the new individual may be effected by organs of the most various kinds, in the latter it is always effected by means of a specialized reproductive cell. This distinction will become apparent in the following discussion.

Vegetative Multiplication.—The simplest case of vegetative multiplication is afforded by unicellular plants. When the cell which constitutes the body of the plant has attained its limit of size, it gives rise to two, either by division or gemmation; the two cells then grow, and at the same time become separated from each other, so that eventually two new distinct individuals are produced, each of which precisely resembles the original organism. A good example of this is to be found in the gemmation of the Yeast plant. This mode of multiplication is simply the result of the ordinary processes of growth. All plant-cells thus grow and divide at some time of their life; but, whereas in a multicellular plant the products of division remain coherent, and add to the number of the cells of which the plant consists, in a unicellular plant they separate and constitute new individuals. In more highly organized plants vegetative multiplication may be effected by the separation of the different parts of the body from each other, each such part subsequently developing the missing members and thus constituting a new individual. This takes place spontaneously, and in a marked manner in Mosses. The main stem gradually dies away from behind forwards; the lateral branches thus become isolated, and constitute new individuals.

of higher plants, by separation of members.

Vegetative reproduction by cuttings.

The remarkable regenerative capacity of plant-members is largely made use of for the artificial propagation of plants. A branch removed from a parent-plant will, under appropriate conditions, develop roots, and so constitute a new plant; this is the theory of propagation by "cuttings." A portion of a root will similarly develop one or more shoots, and thus give rise to a new plant. An isolated leaf will, in many cases, produce a shoot and a root, in a word, a new plant; it is in this way that Begonias, for instance, are propagated. The production of new plants from the leaves occurs also in nature, as, for instance, in the so-called "viviparous" plants, of which *Bryophyllum calycinum* (Crassulaceæ) and many Ferns (*Nephrodium* [*Lastræa*] *Filix-mas*, *Asplenium* [*Athyrium*] *Filix-fœmina*, and other species of Asplenium) are examples. An interesting case of the vegetative development of new individuals from other plant-organs is afforded by Strasburger's observations on *Cœlebogyne ilicifolia*, Funkia, *Nothoscordum fragrans*, and Citrus; he found, namely, that in these plants, an adventitious formation of embryos takes place by budding from the tissue of the nucellus bounding the embryo-sac. But it is in the Mosses, of all plants, that the capacity for vegetative propagation is most widely diffused. Any part of a moss, whether it be the stem, the leaves, the rhizoids, or the sporogonium, is capable, under appropriate conditions, of giving rise to filamentous protonema on which new moss-plants are then developed as lateral buds.

Viviparous plants

Embryos formed by budding.

In a large number of plants we find that provision is made for vegetative multiplication by the development of more or less highly specialized organs. In Lichens, for instance, there are the *soredia*, which are minute buds of the thallus containing both algal and fungal elements; these are set free on the surface in large numbers, and each grows into a thallus. In the Characeæ there are the *bulbils* or "starch-stars" of *Chara stelligera*, which are underground nodes, and the *branches with naked base* and the *pro-embryonic branches* found by Pringsheim on old nodes of *Chara fragilis*. In the Mosses small tuberous bulbils frequently occur on the rhizoids, and in many instances (*Bryum annotinum*, *Aulacomnion androgynum*, *Tetraphis pellucida*, &c.) stalked fusiform or lenticular multicellular bodies containing chlorophyll, termed *gemmæ*, are produced on the shoots, either in the axils of the leaves or in special receptacles at the summit of the stem. Gemmæ of this kind are produced in vast numbers in Marchantia and Lunularia among the Liverworts. Similar gemmæ are also produced by the prothallia of Ferns. In some Ferns (*e.g.*, *Nephrolepis tuberosa* and *N. undulata*) the buds borne on the leaves or in their axils become swollen and filled with nutritive materials, constituting bulbils which fall off and give rise to new plants. This conversion of buds into bulbils which subserve vegetative multiplication occurs also occasionally among Phanerogams, as, for instance, in *Lilium bulbiferum*. But many other adaptations of the same kind occur among Phanerogams, notably among annuals. Bulbous plants, for instance, produce each year at least one bulb or corm from which a new plant is produced in the succeeding year. In other cases, as in the case of the Potato, tubers are developed from subterranean shoots, each of which in the following year gives rise to a new individual. In other cases, again, as in Dahlia, *Thladiantha dubia*, &c., tuberous swellings are found on the roots, from each of which a new individual may spring.

Structure of spores

True Reproduction.—It was mentioned above that the true reproduction of plants is effected by specialized cells; these cells may be generally designated *spores*. The structure of a spore is essentially this: it consists of a nucleated mass of protoplasm, enclosing starch or oil as reserve nutritive material, usually enclosed by a cell-wall. In those cases in which the spore is capable of germinating immediately on its development the cell-wall is a single delicate membrane consisting of cellulose; but in those cases in which the spore may or must pass through a period of quiescence before germination the wall becomes thickened and may consist of two layers, an inner, the *endospore*, which is delicate and consists of cellulose, and an outer, the *exospore*, which is thick and rigid, frequently darkly coloured and beset externally with spines or bosses, and which consists of cutin. In some few cases among the Fungi multicellular spores are produced; these approximate somewhat to the gemmæ mentioned above as highly specialized organs for vegetative multiplication. In some cases, particularly among the Algæ and also in some Fungi (Peronosporeæ, Saprolegnieæ, Myxomycetes, Chytridiaceæ), spores are produced which are for a time destitute of any cell-wall, and are further peculiar in that they are motile, and are therefore termed *zoospores*; they move, sometimes in an amœboid manner by the protrusion of pseudopodia, but more frequently they are provided with one, two, or many, delicate vibratile protoplasmic filaments, termed *cilia*, by the lashing of which the spore is propelled through the water. The zoospore eventually comes to rest, withdraws its cilia, surrounds itself with a cell-wall, and then germinates.

Zoospores

Spores are developed in various ways, and a prefix is in many cases added to the word "spore" to indicate the nature of the process of development. Leaving details for subsequent discussion, we will now confine our attention to the main fact that all spores are developed in one or other of two ways, either *asexually* or *sexually*. In the former case a single reproductive organ gives rise to cells which are capable, each by itself, of developing into a new organism; such an organ is an asexual reproductive organ, and such cells are asexually produced spores. In the latter case the reproductive organs are such that they do not singly give rise to cells capable, each by itself, of developing into a new organism. These are sexual reproductive organs. In some instances the sexual organ does not give rise to reproductive cells at all until it has received into itself more or less of the protoplasmic contents of another different, at least physiologically, sexual organ; and the cells which it then produces are capable, each by itself, of developing into a new organism. In others the sexual organ produces reproductive cells without any such previous fusion of protoplasm, but the cells thus produced are incapable, each by itself, of developing into a new organism. Such cells are *sexual reproductive cells.* It is only by the fusion of two such cells, physiologically different, that a reproductive cell is formed which is capable of developing into a new organism. The fusion either of the protoplasmic contents of two different sexual organs or of two different sexual cells constitutes the *sexual process.* It may take place, according to circumstances, either within the organs or, in those cases in which sexual cells are produced and are set free, externally to them. The resulting cells are sexually produced spores.

Apogamy and apospory.

In some exceptional cases the normal production, sexual or asexual, of spores does not take place, but the new organism is developed vegetatively from the parent. When the sexual production of spores is suppressed, the case is one of *apogamy*; when the asexual production of spores is suppressed, the case is one of *apospory.* The following are instances of apogamy: in certain Ferns (*Pteris cretica, Aspidium falcatum*) the prothallium produces no sexual organs, but the fern-plant rises vegetatively as a bud upon it. Apospory has been observed to occur in Mosses and in some Ferns (*Athyrium Filix-fœmina, Polystichum angulare*): in Mosses a new plant may be developed vegetatively from the tissue of the sporogonium; in Athyrium the sporangium, instead of producing spores, develops into a fern-prothallium. In the Characeæ apospory appears to be the rule. Apogamy and apospory will be more fully discussed subsequently in connexion with the subject of alternation of generations.

Asexual Reproduction.—Reproduction by means of asexually produced spores is common to nearly all families of plants. It is wanting, among the Algæ, in the Conjugatæ, the Fucaceæ, and the Characeæ; among the Fungi, in a few Peronsporeæ (*Pythium vexans*, Artotrogus), in *Ancylistes Closterii*, in *Aplanes Braunii*, among the Saprolegnieæ; and, among the Ascomycetes, in Eremascus, Sordaria (Hypocopra), *Ascobolus furfuraceus*, *Pyronema* (*Peziza*) *confluens*, Gymnoascus, the Collemaceæ, and most other Lichen-Fungi.

In the simplest case the spore is developed from a single cell of the plant, which surrounds itself with the characteristic thick wall. This occurs only in plants of low organization; Nostoc and Bacillus are examples of it.

In other cases the contents of the cell undergo division, each portion of the protoplasm constituting a spore. Examples of this are afforded, among unicellular plants, by Yeast and Protococcus, and in multicellular plants by the Confervaceæ, the Ulvaceæ, and some Florideæ.

In this case each cell, the protoplasm of which divides to form spores, may be regarded as a rudimentary reproductive organ of the nature of a *sporangium.* In more highly organized plants special organs are differentiated for the production of spores. In the majority of cases the special organ is a sporangium, that is, a hollow capsule in the interior of which the spores are developed. In the Thallophytes the sporangium is a single cell. In the Muscineæ it is a multicellular capsule; in Riccia, in which the structure of the capsule is simple, the whole of the internal cells give rise by division to spores; in other Liverworts, and in the Mosses, in which the structure of the capsule becomes progressively more and more complex, a portion only of the internal cells give rise to spores. In the Ferns, Equisetaceæ, and Lycopodiaceæ the sporangium is multicellular, but simple in structure. This is true also in the Rhizocarpæ and in the Ligulatæ (Selaginella, Isoetes), but in these plants there is this peculiarity that there are sporangia of two kinds,—some, namely, which produce one, or a few, large spores, *macrospores*, and are hence termed *macrosporangia*, and others which give rise to a large number of small spores, *microspores*, and are hence termed *microsporangia.* The Phanerogams also bear two kinds of sporangia, which have received special names:—the macrosporangium, which produces only one mature spore, is termed the *ovule*; the microsporangium, which produces a large number of microspores, is termed the *pollen-sac.* In some cases among the Fungi the spores are not produced in the interior of a sporangium, but are formed by abstriction. This occurs in some Mucorini, such as Chætocladium, in the Ustilagineæ, the Entomophthoreæ, the Peronosporeæ, the Ascomycetes, the Rusts (Uredineæ), and the Basidiomycetes.

Terminology of spores.

These asexually produced reproductive cells are commonly spoken of simply as spores, but in many cases some addition has been made to the word, or an altogether different name is applied to them, in order to mark some peculiarity in their mode of origin, to indicate their order of development, or to assign them without periphrasis to a particular group of plants. Thus, as has been mentioned, *zoospores* are motile spores unprovided, for a time at least, with a cell-wall; *stylospores* are spores which are developed, not in sporangia, but by abstriction as mentioned above; *tetraspores* is the name given to the spores of the Florideæ to denote the fact that four spores are produced by the division of the mother-cell. The *uredospores* of the Uredineæ are those which are produced during the summer, whereas the *teleutospores* of these plants are those which are formed in the autumn, at the end of the period of growth. It was the custom, at one time, to speak of the spores of Fungi as *conidia*; and at the present time the macrospores and the microspores of Phanerogams are better known as embryo-sacs and pollen-grains respectively.

Pycnidia.

Nature of a flower.

The organs which give rise to the asexually produced spores are usually not confined to a particular part of the plant in the Thallophytes. Instances of this do, however, occur among the Ascomycetous Fungi—namely, in the Pyrenomycetes. Here the production of the stylospores takes place in definite receptacles known as *pycnidia.* In the vascular plants (Pteridophyta, Phanerogams), the development of sporangia, speaking generally, is confined to the leaves. In many of the Pteridophyta the sporangiferous leaves do not differ in appearance from the foliage-leaves; but in other cases they undergo considerable modification, as in the Equisetaceæ, Marsiliaceæ, some species of Lycopodium and Selaginella, and notably in the Phanerogams. In the Phanerogams the modification is so great that the sporangiferous leaves have received special names; those which bear the microsporangia (pollen-sacs) are termed the *stamens*, and those which bear the macrosporangia (ovules) are termed the *carpels.* When the sporangiferous leaves are thus modified they are usually aggregated together, and such an aggregate of sporangiferous leaves constitutes a *flower.*

Sexual Reproduction.—In nearly all classes of plants above the Protophyta spores are formed by a sexual process; and in those in which no such process can be detected its absence is due, not, as in the Protophyta, to the fact that sexuality has not yet been developed, but to its gradual disappearance. The phenomena of sexual reproduction will be most intelligibly stated by tracing them in the different main divisions of the Vegetable Kingdom—the Algæ, the Fungi, the Archegoniatæ, and the Phanerogams.

The protophytic Algæ are reproduced by asexually developed spores, but in some forms an indication is already given of the differentiation of these spores into sexual reproductive cells which takes place in the higher forms of the group. In Protococcus, for instance, zoospores are produced, but the zoospores are not all precisely similar. In some cases the protoplasm of the cell divides only once or twice, the result being the formation of two or four relatively large zoospores, *macrozoospores*; in other cases the protoplasm divides a greater number of times so that a considerable number of relatively small zoospores, *microzoospores*, are produced. Functionally these zoospores are alike; they all come to rest, and form new Protococci. Amongst the Confervoidæ, which are more highly organized plants than the protophytic Algæ, we find forms, of which Ulothrix may be taken as the type, which likewise produce macrozoospores and microzoospores in their cells. The macrozoospores of Ulothrix simply come to rest and germinate; they are distinctly asexual spores. The microzoospores may also do this, but not unfrequently they coalesce in pairs; the product of fusion, the *zygospore*, as it is termed, then develops into a Ulothrix filament. This fusion of two similar reproductive cells—this conjugation, as it is termed—is one of the simplest forms of the sexual process; the zygospore is then a sexually produced spore, and the two cells which conjugate to form it are spoken of as *gametes*,—*planogametes* when they possess cilia, *aplanogametes* when they do not.

Comparing Ulothrix with Protococcus, we see that in both the macrozoospores are asexual reproductive cells, whereas the microzoospores of Ulothrix exhibit an imperfect sexuality, inasmuch as they may germinate without previous conjugation. The planogametes of Ulothrix are, however, to be directly connected with the microzoospores of Protococcus; that is to say, the gametes are to be traced back to asexual spores. This is a point of fundamental importance.

Similarly, in Botrydium, one of the Siphoneæ, there are two kinds of zoospores, some of which are asexual and others sexual; the visible difference between them is, in this case, not one of size, but the gametes have two cilia and the zoospores only one.

In the conjugation which takes place in the above-mentioned plants the gametes are quite similar in form and size, and take an equal part in the formation of the zygospore. The first indication of the differentiation of sexual gametes is afforded by *Ectocarpus siliculosus* and Scytosiphon, belonging to the Phæosporeæ. The zoospores of these plants are produced in well-defined sporangia, some of which are multilocular and others unilocular. Inasmuch as only the zoospores developed in the multilocular sporangia have been observed to conjugate, that is, to be gametes, those developed in the unilocular sporangia are probably asexual. This being so, the multilocular sporangia are to be regarded, not as mere sporangia, but as sexual organs (*Gametangia*) producing sexual reproductive cells. The process of conjugation of the gametes is, according to Berthold, as follows:—the gametes are at first quite similar in every respect; some of them, however, soon withdraw their cilia and come to rest, whereas others remain actively motile; one of the still motile gametes then coalesces with one which has come to rest to form a zygospore. The gametes in this case behave differently in the process of conjugation: the one is passive, the other active; the former is to be regarded as the female, and the latter as the male reproductive cell. But even in this case the gametes, if they fail to conjugate, can germinate independently.

In Cutleria the sexual differentiation of the reproductive cells is more marked; the male and female cells are developed in distinct sporangia, which may be termed respectively *antheridia* and *oogonia*, two male cells being formed in each antheridium, and one female cell in each oogonium; the female cell is considerably larger than the male, but they are both planogametes, that is, conjugating cells which swim by means of cilia; the female cell, however, soon withdraws its cilia and comes to rest, and then conjugation takes place, with the formation of a zygospore, much in the same way as in Ectocarpus described above.

The next stage in the sexual differentiation of the Algæ is to be found in such forms as Volvox, Vaucheria, Œdogonium, Fucus, and the Characeæ. In these plants, as in Cutleria, the reproductive cells are entirely incapable of independent germination; they have lost altogether that characteristic property of spores; as in Cutleria also they are developed in two kinds of sporangia—antheridia and oogonia—and they are very different from each other in their form, size, and behaviour. In most cases the oogonium gives rise to a single relatively large cell, the *oosphere*, which is at no time provided with cilia, and is not set free from the oogonium; in some of the Fucaceæ, there may, however, be two (Pelvetia), four (Ozothallia [Ascophyllum]), or eight (Fucus) oospheres produced in each oogonium, and in all the Fucaceæ the oospheres are set free from the oogonium. The antheridium gives rise to a large number of small ciliated cells, the antherozoids, one of which subsequently fuses with the oosphere. The coalescence of two such highly differentiated sexual cells is termed *fertilization*, to distinguish it from the conjugation of similar sexual cells, and the product of fertilization is termed an *oospore*, to distinguish it from the product of conjugation, the zygospore. In these plants the antherozoids still retain the essential characters of planogametes, whereas the oospheres have lost them.

But it is not in all Algæ that sexual reproduction is effected b the fusion of well-defined sexual cells. In the Florideæ the sexua reproductive organs are well differentiated. The male organ is a antheridium which produces antherozoids; but these antherozoid. are peculiar in that they have no cilia, and are surrounded by a cell-wall; they are frequently, on this account, termed *spermatia*. The female organ is termed a *procarpium* or *carpogonium*; it may consist of one or many cells, but in all cases it consists of a projecting filament, the *trichogyne*, and a more expanded basal portion. It is peculiar in that no well-defined oosphere exists within it. Fertilization is effected by the antherozoid (spermatium) being passively brought into contact with the trichogyne; complete fusion then takes place, the contents of the spermatium passing into the trichogyne; the trichogyne now withers, and changes take place in the basal portion of the procarpium, one or more of the cells termed carpogenous cells divide, and by a process of budding give rise to a cluster of cells which are capable of germinating, and produce new plants; these are termed *carpospores*. At the same time the cluster of spores frequently becomes surrounded by an up growth of tissue; the mature fructification is termed a *cystocarp*. From the female organ of the Florideæ there are, then, formed, in consequence of fertilization, a number of reproductive cells, the carpospores, each of which corresponds to the oospore of plants like Fucus, Vaucheria, &c. A more detailed comparison with Fucus makes this correspondence at once apparent. In Fucus the contents of the female organ (oogonium), which is a single cell, divide into eight oospheres, which are subsequently fertilized; in the Florideæ there is, before fertilization, no differentiated oosphere, but the organ, as a whole, is fertilized by the spermatium, and it is in this case after, and not before, fertilization, as in the case of Fucus, that a process of cell-formation takes place in the female organ; hence the reproductive cells formed by the fertilized female organ of the Florideæ are at once fertile, and correspond to the fertilized oospheres (oospores) of Fucus.

The peculiarities of the sexual reproduction of some of the Florideæ are of sufficient general interest to be mentioned here

In the Corallineæ, according to Solms-Laubach, the procarpia are produced several together in a conceptacle; it is, however, only the central procarpia of the group which are capable of being fertilized, and the peripheral procarpia which produce carpospores After the fertilization of the central procarpia, the carpogenous cells of the whole of the procarpia fuse together to form one large cell from the periphery of which the carpospores are produced by budding.

This physiological division of labour is more marked in Dudresnaya, and a few other Florideæ. In these plants some of the procarpia are destitute of a trichogyne, whereas others possess that organ. The spermatia fertilize those procarpia which possess a trichogyne, but these procarpia do not produce carpospores; but there grow out from them filaments which fertilize the procarpia destitute of a trichogyne, and these then give rise to carpospores.

The development of the carpospores in the Bangiaceæ (Bangia, Porphyra) is peculiar. The carpogenous cell does not in this case, as in other Florideæ, produce spores by budding, but its protoplasm divides into eight portions; these are set free as naked masses of protoplasm, which move about for a time in an amœboid manner and then come to rest and surround themselves with a cell-wall.

In some of the higher Algæ, namely, in the Sphacelarieæ and in the Laminarieæ, families belonging to the Phæosporeæ, no sexual process has been observed as yet; but, as our knowledge of the life-history of these plants is imperfect, it cannot be definitely stated at present that they are entirely asexual.

In the somewhat aberrant group of the Conjugatæ the sexual process is peculiar. In the Desmidieæ and the Mesocarpeæ it is effected in this way, that two adjacent cells, belonging usually to different filaments, throw out corresponding lateral protuberances which meet, and, the intervening walls being absorbed, form a canal placing the cavities of the two cells in direct communication; the protoplasm of each cell contracts, forming an aplanogamete, and travels into the canal, where the two masses meet and fuse This is clearly a process of conjugation, similar to that of planogametes, and the product is likewise a single cell which is termed a zygospore. In the Zygnemeæ, of which Spirogyra is a familiar example, the process is slightly different. Here the protoplasm of one of the two conjugating organs contracts first and passes over into the cavity of the other, there to fuse with its protoplasm.

Turning now to the Fungi, we find that in the simplest forms (Schizomycetes, Saccharomycetes) there is no trace of sexual reproduction, whereas in the higher forms, with some exceptions, sexual reproductive organs are present, though they are in many cases functionless.

The lowest Fungi in which a sexual process has been observed are the Chytridiaceæ (*Polyphagus Euglenæ*), the Mucorini, and the Entomophthoreæ In these, when it occurs, it takes the form of conjugation, with the production of zygospores. Conjugation is here effected in essentially the same manner as that described above for the conjugation among the Algæ, by the fusion of two similar sexual organs. Conjugation of planogametes has been observed by Sorokin in Tetrachytrium and in Haplocystis, probably belonging to the Chytridiaceæ, a fact of some interest as it is the only case of this form of the sexual process known in the Fungi.

In Protomyces and the Ustilagineæ a process takes place which appears to be of a sexual nature, resembling the conjugation of the Mucorini. Certain reproductive cells of an elongated form, termed *sporidia*, are produced, which become connected by a transverse canal so that they then resemble the letter H. No zygospore is formed, but the conjugated sporidia are its equivalent. The question of the sexual nature of this process is still under discussion, but it is made highly probable by the fact that, in all fully investigated cases, the sporidia are incapable of independent germination.

In the allied groups of the Peronosporeæ and Saprolegnieæ two kinds of sexual organs are present, male and female, which correspond to the antheridia and oogonia of the Algæ. The female organ is here also termed an oogonium, and, like that of the Algæ, it may produce one oosphere (Peronosporeæ) or many (most Saprolegnieæ). The male organ is also usually termed an antheridium, but it is sometimes spoken of as a *pollinodium* on account of the mode in which it effects the fertilization of the oosphere. In one of the plants allied to these groups—namely, in *Monoblepharis sphærica*, according to Cornu—the protoplasm of the antheridium becomes differentiated into motile antherozoids; this is the only case of the kind known among the Fungi. In the other members of these groups in which fertilization takes place the antheridium lies in contact with the oogonium, and produces at its apex a delicate tubular outgrowth, which bores its way through the wall of the oogonium and comes into contact with an oosphere; the tube then opens, and protoplasm from the antheridium passes through into the oosphere and fuses with it to form an oospore.

Sexual organs of Ascomycetes.

In the Ascomycetes sexual organs are very commonly present, but it is only in a few cases that a sexual process has been observed actually to take place. The sexual organs differ considerably in their form in the different genera. In some (*e.g.*, Gymnoascus, Eremascus, Eurotium, Penicillium) the sexual organs are similar; they are unicellular or multicellular hyphæ, but in some the female organ, termed in the Ascomycetes the *ascogonium* or *carpogonium*, may be distinguished from the male organ, which is a pollinodial antheridium like that of the Peronosporeæ, in that it is wound into a close spiral. In others (*e.g.*, Erysipheæ, Ascobolus, *Pyronema* [*Peziza*] *confluens*) the sexual organs are readily distinguishable. In the Erysipheæ and in Pyronema the ascogonium is a single relatively large ovoid cell; that of Pyronema produces a delicate tubular outgrowth, the trichogyne; the antheridium also is unicellular, but it is more slender. In Ascobolus the ascogonium consists of a row of five or six relatively large cells; the antheridium is a slender multicellular hypha. In all these cases the sexual organs are developed in such close proximity to each other that they come into contact. In other Ascomycetes belonging to the Discomycetous Lichens (Collema, Synechoblastus, Leptogium, Physma), and to the Pyrenomycetes (Polystigma), the antheridial filaments, termed *sterigmata*, are developed at a distance from the female organ in separate receptacles, *spermogonia*. In this case the formation of male cells is a necessity. Accordingly cells, termed spermatia, are produced from the sterigmata by abstriction, which resemble the male cells of the Florideæ in that they are non-motile and have a cell-wall.

With regard to the process of fertilization, it must be premised that in no Ascomycete is the protoplasm of the ascogonium ever differentiated into an oosphere. When the sexual organs are ascogonia and pollinodial antheridia, fertilization takes place by the fusion of the undifferentiated protoplasmic contents of the two organs, a mode of fertilization which recalls the conjugation in the Mucorini, and in the Conjugatæ among the Algæ. This has only been observed to take place in Eremascus and in Pyronema; in the latter the antheridium applies its apex to the trichogyne of the ascogonium, the intervening walls are absorbed, and the protoplasm of the two organs coalesces. Although this process of fertilization resembles the conjugation occurring in the Mucorini, the product is very different. The product of conjugation in the Mucorini is a single cell, the zygospore; the product of fertilization in the Ascomycetes is a number of cells, termed *ascospores* or *carpospores*. Thus in Eremascus the product of fertilization is a unicellular capsule, the *ascus*, in which eight ascospores are formed. In Pyronema the fertilized ascogonium enlarges and gives rise to a number of outgrowths which produce asci; at the same time a number of hyphæ grow up from below around the developing asci, some of which produce delicate filaments, termed *paraphyses*, which lie amongst the asci, whereas others form an investing wall. The result is the formation of a fructification, termed an *apothecium*. Within each ascus eight spores are formed.

In those Ascomycetes which have spermatia fertilization is effected, as in the Florideæ among the Algæ, by the fusion of a spermatium with the trichogyne The result is the same as in Pyronema: the fertilized ascogonium gives rise to hyphæ which bear asci, and these, together with sterile hyphæ, form a fructification.

It is of interest to note the similarity between the products of fertilization in these Ascomycetes and in the Florideæ. In both cases the female organ produces no differentiated oosphere, and in both cases the product of its fertilization is a many-spored fructification. It was pointed out, in speaking of the Florideæ, that each carpospore is the equivalent of a fertilized oosphere (oospore); this holds good also with regard to the carpospores (ascospores) of the Ascomycetes.

It may be that a similar sexual process takes place in the other forms mentioned above, viz., the Erysipheæ, Penicillium, Sordaria, &c., but it has not been observed; in any case, the ascogonium in all these plants gives rise to asci and ascospores, and a more or less complex fructification is produced. But there is also some ground for believing that in some at least of these cases the sexual organs, though morphologically differentiated, are functionless. For there are clear indications of sexual degeneration in the Ascomycetes. In some cases, for instance (*e.g.*, Chætomium, Melanospora), no antheridium can be distinguished, but the ascogonium eventually produces asci nevertheless. In others (*e.g.*, Xylaria, as far as known at present) no male organ is produced, but there is an ascogonium which does not, however, give rise to asci; the asci, as well as the rest of the fructification, arise from the vegetative hyphæ. In others, again (*e.g.*, Claviceps, Cordiceps, Pleospora), all trace of the sexual organs has disappeared, but a fructification containing ascospores is produced, as in Xylaria, from the vegetative hyphæ. In others, finally, no ascospores are known, the only reproductive cells being the characteristic asexually produced stylospores.

Fungi in which sexual reproduction is unknown.

In the remaining groups of Fungi, the Uredineæ and the Basidiomycetes, no sexual reproduction is known. In the Basidiomycetes no kind of sexual organ has been discovered. In the Uredineæ spermatia are commonly produced, as in the Ascomycetes mentioned above, but no female organ is known; however, fructifications termed *æcidia* are in some cases developed. These resemble somewhat those of the Ascomycetes, but differ in that here the spores (*æcidiospores*) are formed by abstriction, and not in asci as in the Ascomycetes.

It may be suggested that the ascospores of the asexual Ascomycetes and the æcidiospores of the Uredineæ should not be included in an account of the sexual reproduction of the Fungi. It is true that these spores are asexually produced, but their evident homology with the sexually produced spores makes it inconvenient to treat of them apart. They differ from the sexually produced spores in that they are developed apogamously.

Archegoniatæ.

Under the name Archegoniata we may conveniently group together the Muscineæ and the Vascular Cryptogams (Pteridophyta). The sexual organs, as also the process of fertilization, are essentially the same throughout. The female organ produces a single oosphere, and is termed an *archegonium*; it is essentially similar to the oogonium of the Thallophytes, the only difference being that, whereas the archegonium is multicellular, the oogonium is unicellular. The male organ, here also termed the antheridium, is likewise multicellular, and gives rise to a larger or smaller number of motile antherozoids. Fertilization is effected by the fusion of an antherozoid with the oosphere, which then clothes itself with a cell-wall and becomes an oospore.

Phanerogams.

In the Phanerogams the sexual organs are essentially of the nature of archegonia and of antheridia, but they are somewhat modified and are called by other names. The female organ of the Gymnosperms, termed a *corpusculum*, closely resembles the archegonium of the Archegoniata, and produces a single oosphere. In the Angiosperms, the female organ is much reduced, consisting only of three cells, one of which is the oosphere, the other two being the *synergidæ* which assist in the process of fertilization; the organ is termed the egg-apparatus. The male organ in the Phanerogams is a unicellular filament termed the pollen-tube; its protoplasm does not undergo differentiation into antherozoids. The sexual organs of the Phanerogams recall those of the Peronosporeæ and the Saprolegnieæ; in both cases the female organ produces an oosphere, and in neither does the protoplasm of the antheridium produce antherozoids. The process of fertilization will be described subsequently.

Physiology of Reproduction.—From the fact that in even the most highly organized plants an isolated portion of one member is capable of producing, not merely a member like itself, but other members also, so that a new individual is constituted, it is clear that the protoplasm of plants is imperfectly differentiated physiologically. Nevertheless all plants produce cells to which the work of reproduction is especially assigned. It is of interest to recall the fact that a suppression of spore-formation, either asexual or sexual, may occur, and vegetative multiplication be reverted to, as in aposporous and some apogamous plants.

It has been shown above that the reproductive cells of plants are of two kinds—those, namely, which are individually capable, and those which are individually incapable, of giving rise to a new organism; the former are the asexual, the latter the sexual reproductive cells. It has also been indicated that the latter are to be regarded as derivatives of the former, a point which may now be somewhat more fully established. It was pointed out, namely, that the gametes of Ulothrix will, if they fail to conjugate, germinate independently; the sexual differentiation of these gametes is clearly imperfect, and they differ but little from asexual zoospores. The same thing has been observed in Botrydium, and this is a specially interesting case inasmuch as it throws some light upon the conditions which determine sexual differentiation of the reproductive cells in these lowly organized plants. It has been ascertained that the nature of the cells produced from the resting-spore, in the manner described above, depends upon the age of the spore producing them: when the spore is young, the cells produced by it are sexual gametes; if they fail to conjugate they perish; when the spore is old, the cells produced by it are entirely asexual zoospores; they never conjugate, but each by itself gives rise to a new individual. The imperfect sexual differentiation of the gametes has also been observed in Ectocarpus; if they fail to conjugate they germinate independently. The occurrence of this in Ectocarpus is rather surprising when it is remembered that the gametes of this plant are to some extent sexually differentiated as male and female (see above).

Differentiation of male and female cells.

From these cases in which the typically sexual reproductive cells still possess the properties of asexual spores we pass to others, like Acetabularia, in which they have entirely lost these properties. The planogametes of this plant are definitely sexual; but they are quite similar, as far as external appearance goes, to each other; there is no perceptible distinction between male and female cells. This is the case also in the Mesocarpeæ and the Desmidieæ among the Conjugatæ; here the non-ciliated conjugating masses of protoplasm (*aplanogametes*) are externally similar and take an equal part in the sexual process. In Cutleria the planogametes, and in the Zygnemeæ the aplanogametes, give indications of further sexual differentiations; in Cutleria the female gamete is much larger than the male and comes sooner to rest; in the Zyguemeæ the one aplanogamete passes over into the cell producing the other aplanogamete and fuses with it; the former is to be regarded as male, the latter as female. Finally, in the oosporous Algæ, in the Muscineæ, and in the Pteridophyta the two cells are quite distinct in form, size, and behaviour; the male cell (antherozoid) alone retains the character of a planogamete, the female (oosphere) is non-motile and is many times larger than the antherozoid. In this series the gradual differentiation of the highly differentiated sexual cells from asexual cells can be clearly traced.

If the sexual reproductive cells are to be traced back to asexual spores, then the organs which produce the sexual reproductive cells are also to be traced back to those which produce the asexual spores, namely, the sporangia; the most highly differentiated sexual organ—the antheridium, the oogonium, the archegonium, the carpogonium—is derived from the sporangium.

The question now arises as to the nature of the difference between sexual and asexual reproductive cells. It would appear that the former are in some way incomplete, that something is lacking to them which the latter possess, and that this lack is supplied in the sexual process. In many cases facts have been observed in connexion with the development of the sexual cells which indicate that they are thus incomplete. In Acetabularia the whole of the protoplasm of the gametangium is not used up in the formation of the gametes, and in the Peronosporeæ only a portion of the protoplasm of the oogonium forms the oosphere; the remainder is simply the periplasm. In Vaucheria and other Algæ a mass of protoplasm escapes from the oogonium when it opens. In other cases a process of cell-division has been observed to accompany the formation of the oosphere which recalls the production of the "polar bodies" in the developing eggs of animals. In the Archegoniata the central cell of the archegonium does not directly give rise to the egg, but a portion, the ventral canal-cell, is first cut off; this takes place also in the corpusculum of most Gymnosperms. Similarly in the development of antherozoids, the whole of the protoplasm of the mother-cell is never used up in their formation.

In the germinating microspore of most of the Heterosporous Vascular Cryptogams and of the Phanerogams a process of cell-division takes place which Strasburger interprets as the formation of a polar body. The protoplasm of the microspore undergoes division so that two cells are formed, which may be distinguished as the vegetative and the generative, the former being much smaller than the latter in the Vascular Cryptogams and in the Gymnosperms, whereas in the Angiosperms the converse is the case; usually the separation of the two cells is permanent, but in most Angiosperms it is transitory, the only permanent indication of the cell-division being the presence of two nuclei in the pollen-grain: in some Gymnosperms two or three more vegetative cells may be cut off from the generative cell. The antheridium is in all cases formed from the generative cell. These vegetative cells Strasburger regards as of the nature of polar bodies. The nucleus of the generative cell undergoes division, to form in the Heterosporous Vascular Cryptogams the nuclei of the mother-cells of the antherozoids, and in the Phanerogams the nuclei which take part in the sexual process, as will be more fully described below.

The assumption of the incompleteness of the sexual cells may be extended to those sexual reproductive organs which, like the procarpia of the Florideæ, the pollinodial antheridia of the Peronosporeæ, the ascogonium and pollinodial antheridia of the sexual Ascomycetes, do not give rise to differentiated sexual cells.

There is reason to believe that the sexual reproductive cells are spores which, by the loss of certain of their constituents, have undergone sexual differentiation, and that those sexual organs which directly take part in the sexual process without the intervention of reproductive cells are sporangia which have undergone sexual differentiation in the same way. This is finally proved by the fact that in cases in which the normal phenomena of sexual differentiation do not take place the reproductive cells can germinate without fertilization, and the female sexual organ can produce, without fertilization, cells capable of germination. These cases are examples of that form of apogamy which is known as *parthenogenesis.* Parthenogenesis in plants producing differentiated sexual cells has been observed in the Mucorini, the Entomophthoreæ, and the Saprolegnieæ among the Fungi, and in *Chara crinita* among the Algæ. In some Mucorini (occasionally in *Absidia septata*, *A. capillata*, *Mucor fusiger*, Sporodinia, always in *Mucor tenuis*) and in some Entomophthoreæ, namely, the conjugating hyphæ remained closed, and the protoplasmic contents of each surrounds itself with a cell-wall, the cells thus produced being quite similar to the normal zygospore; these cells are termed *azygospores.* In the Saprolegnieæ and in *Chara crinita* the oospheres behave like oospores and germinate in the same manner. The details of the development of these asexual sexual reproductive cells has been fully investigated by De Bary in the case of the oospheres of the Saprolegnieæ. In this case that differentiation of the protoplasm of the oogonium into ooplasm and periplasm which has been described above as occurring in the closely allied and completely sexual Peronosporeæ does not take place, but the whole is used in the formation of the oospheres. It is quite clear also that in the Saprolegnieæ no sexual process takes place. In some species of Saprolegnia the antheridia are altogether absent, in others they are rudimentary, and even in those Saprolegnieæ (some species of Saprolegnia, Achlya, Aphanomyces) in which the antheridia are well-developed they remained closed. No case is known of male parthenogenesis, that is, of the development of an individual from a male reproductive cell, among plants in which the sexual differentiation of the reproductive cells is well-marked, but there are instances of the kind in more lowly organized plants. Thus in the Mucorini, mentioned above, one of the azygospores produced may be regarded as belonging to a male organ; again, in Ectocarpus the male planogamete germinates independently as well as the female. Among plants the sexual organs of which do not produce specialized reproductive cells instances of parthenogenesis also occur. Thus the spores (ascospores) which are produced by the female organ (ascogonium) of those Ascomycetes, such as the Erysipheæ, Penicillium, Melanospora, Xylaria, in which the male organ is functionless or absent can only be regarded as being parthenogenetically produced.

ause of xuality.

Admitting, then, that sexual differ from asexual reproductive cells in the lack of something which the latter possess, and which was thrown off either from the former or from the organs which produce them, we may go on to inquire what this something may be. Our information on this point is very scanty, but Strasburger's views throw some light upon it. He considers, namely, that the formative processes of the cell are regulated by the hyaline plasma of the nucleus—the nucleo-idioplasma, as he terms it; the richer the nucleus is in this substance the more capable is the cell of producing new cells. The asexual reproductive cells are then cells the nuclei of which are especially rich in this substance. He considers that the differences between asexual and sexual reproductive cells is quantitative and not qualitative—that the nuclei of the former are rich in nucleo-idioplasma, those of the latter poor, either originally or by the throwing off of part of their substance in the mode described above. In endeavouring to account for the further differentiation of sexual reproductive cells into male and female, it seems natural to suggest that the respective nuclei have undergone a qualitative differentiation, and that in the sexual process the qualitative, as well as the quantitative, incompleteness of each is made good. Strasburger is, however, strongly of opinion that this is not so, but that the difference is purely quantitative. But it must be pointed out that, according to this view, there is no reason why a sexual process should not take place, either between two male cells or organs, or between two female cells or organs, a possibility which is never realized, nor is it possible to account for the fact to be subsequently discussed that in many cases a sexual process cannot take place between sexual cells or organs of a closely-allied origin.

The nature of the sexual process will be better understood by a detailed description of it in some particular case. The following is a brief account of the results of Strasburger's observations on the process of fertilization in Angiosperms.

At the period of the dehiscence of the anther, the protoplasm of the pollen-grain undergoes division into two cells—a smaller, the generative cell, and a larger, the vegetative cell. At the time of pollination, when the pollen grain is mature, it is usually the case that the only persisting indication of the previous cell-division is the presence of two nuclei in the protoplasm. In many cases the two nuclei were found to differ qualitatively, inasmuch as the generative nucleus stained readily when treated with carmine, picro carmine, methyl-green, &c., whereas the vegetative nucleus stained imperfectly or not at all. On the formation of the pollen-tube, the generative nucleus, and sometimes the vegetative nucleus also, is carried down into it, and the former then undergoes division into two; occasionally one of the new nuclei divides again. The pollen-tube grows down the style, enters the ovary, and is directed to the micropyle of an ovule. In the ovule the egg-apparatus lies at the micropylar end of the embryo-sac, and the delicate wall of the embryo-sac covering it undergoes absorption. In its further growth the pollen-tube comes into contact with the synergidæ; in some cases its growth now stops, and a portion of its protoplasm, with one or both of the generative nuclei, passes through the mucilaginous wall at the apex of the tube, without leaving any opening behind it, and travels to the oosphere; in other cases the pollen-tube grows between the synergidæ to the oosphere, and at once pours a portion of its protoplasm with a generative nucleus into it. This is followed by the appearance of a second nucleus in the oosphere (the *male pronucleus*), which is the generative nucleus derived from the pollen-tube, which now travels towards the nucleus of the oosphere (*female pronucleus*) and fuses with it; when the two pronuclei have each a nucleolus these also eventually fuse. Fertilization is now complete.

The synergidæ take no direct share in the process of fertilization, but become disorganized; their disorganization usually begins when the pollen-tube first comes into contact with them. They serve merely to direct the pollen-tube or its escaped contents to the oosphere and to provide nourishment for them.

The fusion of the male and female pronuclei has been observed also in the oosphere of the Gymnosperms, and in the conjugation of Spirogyra.

Significance of true reproduction.

Since plants are so commonly able to reproduce vegetatively, the question arises as to the necessity of the production, either sexually or asexually, of spores. The biological importance of these cells is very great. They are capable, namely, of retaining their vitality under external conditions, such as long drought, absence of food, extremes of heat and cold, which would prove fatal to the plant, and they therefore are essential to the maintenance of the species. Further they are of importance in the distribution of the species; they are light, readily transportable by wind or water, in some cases themselves actively motile. In this way they serve to prevent that close aggregation of individuals of the same species which would result from a continued vegetative multiplication, and would prove injurious to the species. In the case of Phanerogams, in which the macrospore is not set free from its sporangium, the same ends are obtained by the production of seeds.

The further question now arises as to the importance of the sexual process.

Importance of sexuality.

It appears that, if any given species, at least among the higher plants, is reproduced through a long series of generations in a non-sexual manner, the individuals tend to degenerate, and the original well-developed form can only be reattained by the formation of a sexually produced spore. This result is to some extent realized by the fusion of two sexual cells or organs belonging to the same individual—that is, by self fertilization—but more completely when the fusion takes place between sexual cells or organs belonging to distinct individuals—that is, by cross-fertilization. In some plants, as in the Peronosporeæ and in those sexual Ascomycetes which have pollinodial antheridia, self-fertilization alone is possible; this is also the case in certain Phanerogams in which the arrangements are such (notably in cleistogamous flowers) that only pollen from its own anthers can reach the stigma of the flower. In most cases, however, the conditions under which the sexual process is carried on, such as the formation of free-swimming gametes and antherozoids, and of spermatia and pollen-grains which can be readily conveyed from place to place, are such as to favour the occurrence of cross-fertilization. In some there are special arrangements for the attainment of this end, the most general of which is *diœcism*, that is, the production of the male and female organs by distinct organisms. Thus in certain Fucaceæ (*Fucus vesiculosus*, *F. nodosus*,

Cross fertilization.

F. serratus, *Himanthalia lorea*) some individuals bear only antheridia, and others only oogonia; among the Muscineæ the plants are frequently either male or female; in the Isosporous Vascular Cryptogams the prothallia are usually hermaphrodite; but exclusively male and female prothallia occur not unfrequently in the Filices and as a rule in the Equisetaceæ. In the Heterosporous Vascular Cryptogams diœcism is brought about in a somewhat different manner: these plants have, as mentioned above, two kinds of spores, macrospores and microspores; the former on germination always give rise to a female (archegoniate) prothallium, the latter to a male (antheridial) prothallium; hence the male and female organs are necessarily borne on distinct organisms. In some Phanerogams even the two kinds of spores are produced by separate individuals, the flowers of the one producing pollen-grains (microspores) but no embryo-sacs, those of the other producing embryo-sacs (macrospores) but no pollen-grains. More special arrangements are to be found in the flowers of Phanerogams for ensuring cross-fertilization, and preventing self-fertilization, *e.g.*, the development of highly-coloured perianth-leaves and the secretion of nectar to attract insects, dichogamy, heterostylism, &c.; but it is impossible to do more than mention these here.

But besides these obvious structural arrangements for ensuring cross-fertilization and preventing self-fertilization there are in some cases imperceptible physiological conditions which even more certainly lead to the same results. It appears, namely, that in such cases no sexual process can take place between reproductive cells or organs of closely-allied origin. Thus, among the Algæ, in Ectocarpus and in Acetabularia, conjugation only takes place between planogametes derived from distinct gametangia, and in Dasycladus it only takes place between planogametes derived from gametangia borne by different individuals. Again, in many Phanerogams, as Darwin has shown, the pollen of one flower is quite incapable of fertilizing the oospheres of its own ovules, and the pollen-grains from another flower borne by the same plant is but slightly, if at all, more potent. The pollen from the flower of another individual of the same species is potent, and this the more so the wider the difference between the individuals; the pollen from an individual of a different variety is more potent than that from an individual of the same variety.

The effect of the sexual process is not necessarily confined to the cells or organs which directly take part in it; not infrequently it makes itself felt in adjoining organs, stimulating them to active growth, giving rise to the formation of a fruit or fructification. Thus in the Mucorini an outgrowth of filaments, forming an incomplete or complete (Mortierella) investment to the zygospore, takes place from the sexual organs after conjugation; in Coleochæte the oogonium becomes surrounded, after the fertilization of the oosphere, by an investment formed by outgrowths from the adjacent vegetative cells; a cellular investment is formed in the same way round the fertilized procarpium in most Florideæ, and round the fertilized ascogonium in the Ascomycetes. The most familiar case of fruit-formation is that occurring in the Phanerogams: here in many instances the carpels, in some the floral leaves of the perianth, and in some the floral receptacle (*torus*) grow actively after the fertilization of the oospheres has taken place, giving rise to a mass of succulent parenchymatous tissue. In the Orchideæ the development of the ovules does not take place at all until the flower has been pollinated.

Germination of the Spores and Alternation of Generations.—The spores of plants may either germinate immediately on their production, or they may undergo a longer or shorter period of quiescence; those which are destined for immediate germination have, as described above, a thin cell-wall, whereas those which are capable of undergoing a period of quiescence have a thick cell-wall. In some cases the spores are incapable of immediate germination, notably sexually produced spores; for instance, among the Algæ, immediate germination is only known to take place in the case of the zygospores of Botrydium and Ectocarpus, and of the oospore of Fucus; among the Fungi the zygospores of the Mucorini and the oospores of the Peronosporeæ and Saprolegnieæ pass through a period of quiescence.

Polyembryony.

The mode of germination is not always the same. In most cases the spore gives rise directly to a new organism, either by protruding one or more filamentous outgrowths, or by the division of its protoplasm to form the tissue of the embryo. In some cases the spore behaves like a reproductive organ; from its protoplasm are formed a larger or smaller number of cells, either motile or non-motile, which are set free. In Acetabularia, and under certain circumstances in Botrydium, the asexually produced spore behaves like a sexual reproductive organ (gametangium), giving rise to a number of planogametes; similarly the spore of Protomyces produces within itself a number of conjugating sporidia. In some Peronosporeæ (always in Cystopus; occasionally, according to circumstances, in Pythium, Phytophthora, and Peronospora) the asexually produced spore behaves like a sporangium, and gives rise to a number of zoospores from each of which a new individual is developed. This happens occasionally also in sexually produced spores. Among the Fungi, the formation of zoospores in the oospore occurs in various species of Peronosporeæ and Saprolegnieæ. Among the Algæ, zoospores are formed in the zygospores of Pandorina and Ulothrix, and in the oospores of Œdogonium and Sphæroplea. Cases of a similar kind are known also in the Phanerogams; thus in some Coniferæ, and notably in the Gnetaceous *Ephedra altissima*, a process of cell-formation goes on in the oospore, resulting in the formation of a a larger or smaller number of cells from each of which an embryo plant is developed. These cases, in which, namely, the spore, whether sexually or asexually produced, gives rise to a number of cells, each of which is capable, by itself, of developing into a new individual, are instances of what is known as *polyembryony*.

In some cases the cells formed in the sexually produced spore do not each give rise to a new individual; this obtains in the Hydrodictyeæ. In *Hydrodictyon utriculatum* the protoplasm of the zygospore gives rise to two or four large zoospores which eventually come to rest and remain quiescent for several months: these resting spores are termed, on account of their form, *polyhedra*. On germination, the protoplasm of the polyhedron gives rise to a number of small zoospores, the endospore protruding as a delicate vesicle, within which the zoospores are in active movement: the zoospores eventually come to rest, without escaping from the endospore, and arrange themselves so as to form the meshes of a small sac-like net, which is a young Hydrodictyon; the endospore is then disorganized, and the young net is set free as an independent cœnobium.

Occasionally it happens that a portion only of the spore gives rise to the embryo. This is the case in the sexually produced spores (oospores) of the Characeæ, and in those of the Coniferæ; in Selaginella and in the Angiospermous Phanerogams one-half of the oospore gives rise to a filamentous structure, the suspensor, the other half to the main body of the embryo.

It is very commonly the case that the spore, on germination, gives rise to an organism unlike that by which the spore was produced. In a Moss, for example, the asexually produced spores are developed by an organism, the sporogonium, consisting typically of a longer or shorter stalk, the *seta*, bearing a capsule (*theca*) which produces the spores. When one of these spores germinates, it does not give rise to another sporogonium, but to an inconspicuous, usually filamentous, structure, the *protonema*, upon which are developed, as lateral buds, moss-plants consisting of stem and leaves and bearing the sexual reproductive organs. Similarly, when the oospore has been formed by fertilization in the archegonium, it does not give rise to the sexual moss-plant, but to the asexual sporogonium. There is thus in the life-history of a Moss a regular alternation of a sexual with an asexual generation; the former may be conveniently termed the *oophore*, the latter the *sporophore*; the asexually produced spore always gives rise to the oophore (moss-plant), the sexually produced spore (oospore) of the moss-plant always gives rise to the sporophore (sporogonium).

This kind of life-history is not peculiar to the Muscineæ, but it can be traced, more or less clearly, in all the vascular plants (Pteridophyta, Phanerogams). In the Isosporous Vascular plants, those, namely, which produced spores of one kind only (Filices, Equisetaceæ, Lycopodiaceæ), the asexually produced spore gives rise, on germination, to a small inconspicuous organism consisting entirely of cellular tissue, termed the *prothallium*, on which the sexual reproductive organs, the antheridia and archegonia, are borne; the oospore produced by fertilization in the archegonium gives rise to the well-developed plant, consisting of stem, root, and leaves, which produces the sporangia and spores. The prothallium, derived from the asexually produced spore, is clearly the sexual generation or oophore; the fully-developed plant derived from the sexually produced spore is the asexual generation or sporophore. In the Heterosporous Vascular plants, those, namely, which produce spores of two kinds (Rhizocarpæ, Ligulatæ, Phanerogams), the spores likewise give rise to prothallia, though they may be rudimentary. The microspore gives rise to a prothallium which is reduced to a single antheridium, and which, with the exception of Salvinia among the Rhizocarps, and of the Phanerogams, does not project from the spore; in Salvinia and in the Phanerogams it projects from the spore in the form of a closed tube, which is known in the Phanerogams as the pollen-tube. Similarly the macrospore of these plants gives rise to a small cellular prothallium bearing one or more archegonia, which in the Rhizocarps extends beyond the limits of the spore, but does not become free from it; in the Ligulatæ (Selaginella and Isoetes) the prothallium is only partially exposed by the rupture of the coats of the spore, and in the Phanerogams, where it is termed the *endosperm*, it remains permanently and completely enclosed within the spore (embryo-sac). In the Heterosporous Vascular plants, then, as in the Isosporous, the asexual generation or sporophore is that which is termed the plant, which is highly differentiated morphologically and histologically, and which produces the sporangia and the spores; the sexual generation or oophore is here represented by two prothallia, the one exclusively male, the other exclusively female, derived respectively from the microspores and the macrospores.

Such a life-history can be stated generally in the following manner:—twice in its course the individual consists of a single cell, the spore, which in the one case has been produced asexually, in the other sexually; the sexual generation (oophore) springs from the asexually produced spore, and gives rise to the sexually produced spore (oospore) from which the asexual generation (sporophore) is developed. It is of interest to note that in most cases the organism developed from the sexually produced spore is much more highly organized than that developed from the asexually produced spore.

A peculiarity of the macrospores of the Phanerogams is worthy of mention here, as it leads to the production of that structure, the seed, which is characteristic of Phanerogams; the production of a seed constitutes, in fact, the only real and constant distinction between Phanerogams and Cryptogams.

As a rule the asexually produced spores of plants become free from the sporangium in which they have been formed. In Phanerogams this is true only of the microspores (pollen-grains), the macrospores (embryo-sacs) remaining permanently enclosed in the sporangia (nucellus) producing them. This being the case, their germination, *i.e.*, the formation of endosperm, must take place within them whilst enclosed in the sporangium; and, further, the formation of the female reproductive organs and the development of the embryo must take place under these circumstances also. The result is the production of a seed. In a typical seed three generations of the plant are represented: they are as follows:—

sporangial tissue belonging to the parent sporophore — perisperm;
tissue belonging to the oophore — endosperm;
the new sporophore — embryo.

In the seed the development of the new asexual plant proceeds to a certain limit. When this is reached the development ceases, and it is only when the seed is placed under favourable conditions that the further development of the embryo, *i.e.*, the germination of the seed, can take place.

It has now been shown that in the life-history of the Muscineæ and in plants above them in the vegetable kingdom there is a regular alternation of generations, and the question now arises as to how far this is true of the life-history of plants lower than the Mosses, that is, in the Thallophytes. It is clear that no such alternation can take place in the life-history of those which are known to reproduce only either sexually or asexually, nor in that of those individuals which produce spores both sexually and asexually, either simultaneously or at different times.

The following are instances of the above-mentioned possible cases:—

Thallophytes reproduced only by asexually produced spores:—

Algæ: Cyanophyceæ or Phycochromaceæ; Protococcaceæ; Sphacelariæ and Laminarieæ so far as known at present.

Fungi: Schizomycetes; Saccharomycetes; Myxomycetes; some Chytridieæ; probably many Mucorini; a few Peronosporeæ (probably *Phytophthora infestans* and *Pythium intermedium*); some Ascomycetes and Uredineæ; Basidiomycetes.

Thallophytes reproduced only by sexually produced spores:—

Algæ: Conjugatæ; Fucaceæ; Sphæropleæ. The case of the Characeæ will be subsequently discussed.

Fungi: a few Peronosporeæ (*Pythium vexans*, Artotrogus); *Ancylistes Closterii*; *Aplanes Braunii* among the Saprolegnieæ; some Ascomycetes, Eremascus, Sordaria (Hypocopra), *Ascobolus furfuraceus*, *Pyronema confluens*, Gymnoascus, Collemaceæ and other Lichen-Fungi; some Uredineæ in which only æcidiospores are known.

Thallophytes in which the same form produces spores both asexually and sexually:—

Algæ: Vaucheria, Hydrodictyon, Ulothrix, Œdogonium, some Florideæ (*e.g.*, *Polysiphonia variegata*).

Fungi: Mucorini; most Peronosporeæ and Saprolegnieæ; Monoblepharis; among the Ascomycetes, the Erysipheæ, Eurotium, Penicillium, Nectria; some Uredineæ (*Uromyces appendiculatus, U. Behenis, U. Scrophulariæ, U. Cestri, Puccinia Berberidis*).

In some of the Algæ, as in the Volvocineæ, in the life-history of which distinct sexual and asexual forms occur, no alternation of generations can be traced, since there is no certainty as to the nature of the form arising from any given spore; the form developed from the asexually produced spore is not, as in the typical life-history of the Moss, necessarily sexual, nor is the individual produced from the sexually produced spore necessarily asexual. But in the life-history of some others an alternation of generations is traceable. Thus in the Siphonaceous Acetabularia the plant produces spores; these, as mentioned above, behave on germination as gametangia; the gametes conjugate to form a zygospore, and from the zygospore the asexual Acetabularia springs. Here there is a distinct and regular alternation of generations; the Acetabularia-plant is the asexual generation (sporophore), the gametangia alone representing the sexual generation (oophore). The life-history of Botrydium, another Siphonaceous Alga, is essentially the same as that of Acetabularia, but it is frequently less regular; thus the resting-spores, instead of producing gametes, may directly germinate to form a

Botrydium-plant, a process which is clearly a case of apogamy; and, further, the Botrydium-plant does not necessarily produce resting-spores, but may produce zoospores by which it is directly reproduced. In Coleochæte, too, alternation of generations is indicated. The oospore produces by division a small individual which is always asexual, giving rise to zoospores which likewise produce asexual individuals; this asexual reproduction may continue through a number of generations until eventually a sexual individual is developed. In Coleochæte it is only in the case of the sexually produced spore that the nature of the resulting organism is known; it always gives rise to an asexual form, whereas the asexually produced spores give rise to an individual which may be either sexual or asexual. In the Characeæ the oospore always gives rise to an imperfectly developed form, the *proembryo*, which is to be regarded as the sporophore; however, it never produces spores, but gives rise to the sexual Chara-plant (oophore) vegetatively by budding.

The study of the life-history of the Fungi is attended with considerable difficulty, partly on account of the fact that in many cases the development of the sexual organs is dependent upon a combination of external circumstances which may but rarely present itself, and partly on account of there being frequently a great difference in habit between the sexual and asexual forms of the same plant, a difference which is sometimes accentuated, in parasitic Fungi, by the occurrence of the two forms on different plants as hosts (*heterœcism*). But there are Fungi in the life-history of which alternation of generations has been ascertained. Before entering upon an account of these, it must be stated that the term "sexually produced spore" will be applied not only to those the formation of which is known to be preceded by a sexual process, but also to those which are formed probably or actually without a sexual process—in a word, apogamously—but which may be considered, as pointed out above, to be homologous with those which are actually sexually produced.

In *Mucor Mucedo* and *Phycomyces nitens* among the Mucorini, for instance, the zygospore gives rise on germination to an imperfectly developed individual (promycelium) which is entirely asexual and produces spores; one of these spores, in turn, gives rise to an individual which produces spores asexually but may also bear sexual reproductive organs. Essentially the same life-history may be traced in certain Peronosporeæ (*Phytophthora omnivora*, *Pythium proliferum*). In these cases the form developed from the sexually produced spore is always asexual, whereas that derived from the asexually produced spore may be sexual, but it always produces spores asexually; hence there is not a strict alternation of an asexual and a sexual generation. In others the alternation is complete. In the Ustilagineæ, for instance, the asexually produced spore gives rise to an imperfectly developed mycelium (*promycelium*), which is the sexual generation; it produces the sporidia, which conjugate in pairs, and from the product of conjugation springs the mycelium, which bears asexually produced spores.

Essentially the same life-history has been traced in some Ascomycetes and Uredineæ. In Claviceps (Ascomycete) the sexually produced spore (ascospore) gives rise to an asexual form, long regarded as a distinct genus under the name of Sphacelia, from the spores of which the sexual form is reproduced. In *Sclerotinia* (*Peziza*) *Fuckeliana* (Ascomycete), a similar regular alternation of generations occasionally but not always occurs; the ascospore may give rise to an asexual form, long known as *Botrytis cinerea*, and when it does so the alternation of generations is complete; but it may give rise to another sexual generation, in which case no alternation takes place. In Polystigma (Ascomycete), the ascospore gives rise to a promycelium which bears sporidia, and these sporidia give rise to the sexual form. In Endophyllum (Uredineæ) the life-history is precisely the same as that of Polystigma: the promycelium is the sporophore generation, the mycelium developed from the sporidium the oophore. In other Uredineæ the life-history is slightly modified in that asexually produced spores of at least two kinds make their appearance. The sexually produced spore (æcidiospore) gives rise to a mycelium which, in Gymnosporangium and Hemipuccinia, bears asexually produced spores, teleutospores; in *Puccinia Graminis* the formation of teleutospores is preceded by that of somewhat different spores, the uredospores; in any case the teleutospore gives rise, on germination, to a second asexual generation, the promycelium, which bears sporidia; from these the sexual æcidium-bearing generation is developed.

The rule that, in the alternation of generations, the alternate generations are developed from spores produced either sexually or asexually is not, however, without exceptions, for in some instances the one generation may spring vegetatively from the other without the intervention of a spore. This is brought about by the suppression either of the sexually produced spore or of the asexually produced spore; the former is an instance of apogamy, the latter of apospory.

Thus in the apogamous Ferns mentioned above, the asexual generation (sporophore) is developed as a bud upon the sexual generation (oophore); and in Botrydium the gametangium which is the representative of the sexual generation may, instead of producing gametes, produce zoospores, in which case the new asexual individual is not developed from a sexually produced zygospore, but from an asexually produced zoospore. Similarly, in the aposporous Ferns and Mosses and in the Characeæ the oophore is developed as a bud from the sporophore.

The alternation of generations may be also interfered with by a combination of apogamy and apospory. This is the case, namely, when one generation gives rise to its like by vegetative budding, sporophore to sporophore, oophore to oophore. For instance, when, as in the Phanerogams mentioned above (Cœlebogyne, Funkia, Nothoscordum, Citrus), embryos are produced vegetatively from the tissue of the nucellus, that is, sporophore from sporophore, the typically intervening formation of spores, first, by the asexual method and, secondly, by the sexual method is suppressed. This is necessarily always the case among Phanerogams when one plant is produced vegetatively from another. A striking instance of the same thing has been observed by Goebel in some species of Isoetes, in which an Isoetes plant was produced on the leaf in place of a sporangium. Similarly when oophore springs vegetatively from oophore, the typically intervening formation, first, of the sexually produced spore and, secondly, of the asexually produced spore, is suppressed. This occurs when, as mentioned above, a Moss-plant gives rise by budding or by means of gemmæ to another Moss-plant, and when a Fern-prothallium gives rise to another by means of gemmæ.

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REPSOLD, a family of German instrument makers. JOHANN GEORG REPSOLD (1771–1830), was born at Wremen in Hanover on September 23, 1771, became an engineer and afterwards chief of the fire brigade in Hamburg, where he started business as an instrument maker early in the present century. He was killed by the fall of a wall during a fire on January 14, 1830. The business has been continued by his sons Georg and Adolf and his grandsons Johannes and Oscar

J. G. Repsold introduced essential improvements in the meridian circles by substituting microscopes (on Ramsden's plan) for the verniers to read the circles, and by making the various parts perfectly symmetrical. For a number of years the firm was foremost in this special branch and furnished meridian circles to the observatories at Hamburg, Königsberg, Pulkova, &c.; later on the activity in this direction declined, while Pistor and Martins of Berlin rose to eminence in the manufacturing of transit circles. But after the discontinuance of this firm that of Repsold has again come to the front, not only in the construction of transit circles, but also of equatorial mountings and more especially of heliometers (see MICROMETER).

REPTILES

ANTELINNÆAN writers comprised the animals which popularly are known as Tortoises and Turtles, Crocodiles, Lizards and Snakes, Frogs and Toads, Newts and Salamanders, under the name of Oviparous Quadrupeds or four-limbed animals which lay eggs. Linnæus, desirous of giving expression to the extraordinary fact that many of these animals pass part of their life in the water and part on land,[1] substituted the name of *Amphibia* for the ancient term. Subsequent French naturalists (Lyonnet[2] and Brisson[3]) considered that the creeping mode of locomotion was a more general characteristic of the class than their amphibious habits, and consequently proposed the scarcely more appropriate name of *Reptiles.*

As naturalists gradually comprehended the wide gap existing between Frogs, Toads, &c., on the one hand, and the other Oviparous Quadrupeds on the other, they either adopted the name of *Batrachia* for the former and that of *Amphibia* for the latter, or they restricted the term *Amphibia* to Batrachians, calling the remainder of these creatures Reptiles. Thus the term *Amphibia*, as used by various authors, may apply (1) to all the various animals mentioned, or (2) to Batrachians only—and thus it has been used in the article AMPHIBIA in the present work. The term Reptiles is used (1) by some for all the animals mentioned above, and (2) by others, as in the present article, for the same assemblage of animals after the exclusion of Batrachians. Other terms more or less synonymous with Amphibians and Reptiles in their different senses have been used by the various systematists, as we shall see hereafter.

Equally varying are the limits of the term "Saurians," which occurs so frequently in every herpetological treatise. At first it comprised living Crocodiles and Lizards only, with which a number of fossil forms were gradually associated. As the characters and affinities of the latter became better known, some of them were withdrawn from the Saurians, and at present it is best to abandon the term altogether.

HISTORY AND LITERATURE.

a. The General Subject.

By some feature of their organization or some peculiarity in their economy Reptiles have always forced themselves upon the observation of man or excited his imagination, so that certain kinds are mentioned in the earliest written records or have found a place among the fragments of the oldest relics of human art. Such evidences of a popular knowledge of Reptiles, however, form no part of a succinct review of the literature of the subject such as it is proposed to give here. We distinguish in it five periods:—(1) the Aristotelian; (2) the Linnæan (formation of a class *Amphibia*, in which Reptiles and Batrachians are mixed); (3) the period of the elimination of Batrachians as one of the Reptilian orders (Brongniart); (4) that of the separation of Reptiles and Batrachians as distinct subclasses; (5) that of the recognition of a class *Reptilia* as part of the *Sauropsida* (Huxley).

1. *The Aristotelian Period.*—As in other branches of zoology, we have to start with ARISTOTLE, who was the first to deal with the Reptiles known to him as members of a distinct portion of the animal kingdom, and to point out the characteristics by which they resemble each other and differ from other vertebrate and invertebrate animals. As the plan of his work, however, was rather that of a comparative treatise of the anatomical and physiological characters of animals than their systematic arrangement and definition, his ideas about the various groups of Reptiles are not distinctly expressed, but must be gleaned from the terms which he employs. And even when we make due allowance for the fact that we are in possession of only a part of his writings, we cannot but perceive that he paid less attention to the study of Reptiles than to that of other classes; this is probably due to the limited number of kinds with which he could be acquainted from the fauna of his own country, and to which only very few extra-European forms, like the Crocodile, were added from other sources. And, whilst we find in some respects a most remarkable accuracy of knowledge, there is sufficient evidence that he neglected every-day opportunities of information, as if Reptiles had not been a favourite study. Thus, he has not a single word about the metamorphoses of Batrachians, which he treats of in connexion with Reptiles

Aristotle makes a clear distinction between the scute or scale of a Reptile, which he describes as φολίς, and that of a Fish, which he designates as λεπίς. He mentions Reptiles (1) as oviparous quadrupeds with scutes, viz., Saurians and Chelonians; (2) as oviparous apodals, viz., Snakes; (3) as oviparous quadrupeds without scutes, viz., Batrachians. He considered the first and second of these three groups as much more nearly related to each other than to the third. He says:—

> "The genus of Snakes resembles that of Lizards, nearly all the characters being common to both, if the Lizard be conceived of as prolonged and without legs. They possess scutes, and are similar to Lizards above and below, but they lack testicles; and, like Fishes, they possess two excretory ducts which coalesce, and the uterus is large and bipartite. In other respects their internal parts are like those of Lizards, save that all the intestines are long and narrow. The tongue is narrow, long, black, and very exsertile. It is a peculiarity of Snakes and Lizards that they possess a bifid tongue; but the points of the tongue of Snakes are fine like hairs. All Snakes are "carcharodont" (have acute teeth); they have as many ribs as there are days in the month, viz., 30. Some say that Snakes recover the loss of an eye; the tail is reproduced in Lizards and Snakes when cut off," &c.

Thus accurate statements and descriptions are sadly mixed with errors and stories of, to our eyes, the most absurd and fabulous kind. The most complete accounts are those of the Crocodile (chiefly borrowed from Herodotus) and of the Chamæleon, which Aristotle evidently knew from personal observation, and which he had dissected himself. The other Lizards mentioned by him are the common Lizards (*σαύρα*), the common Seps (*χαλκίς* or *ζιγνίς*), and the Gecko (*ἀσκαλαβώτης* or *κορδύλος*). Of Snakes (of which he generally speaks as *ὄφις*) he knew the Vipers (*ἔχις* or *ἔχιδνα*), the common Snake (*ὕδρος*), and the Blindworm (*τυφλίνης ὄφις*), which he regards as a Snake; he further mentions the Egyptian Cobra and Dragons (*δράκων*)—North-African Serpents of fabulous size. Of Chelonians he describes in a perfectly recognizable manner Land Tortoises (*χελώνη*), Freshwater Turtles (*ἐμύς*), and Marine Turtles (*χελώνη ἡ θαλαττία*).

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[1] "Polymorpha in his amphibiis natura duplicem vitam plerisque concessit."

[2] *Théologie des Insectes de Lesser* (Paris, 1745), i. 91, note 5.

[3] *Règne animal divisé en neuf classes* (Paris, 1756).

Passing over eighteen centuries we find the knowledge of Reptiles to have remained as stationary as other branches of natural history, perhaps even more so. The Reptile fauna of Europe was not extensive enough to attract the energy of a Belon or Rondelet; popular prejudice and the difficulty of preserving these animals deterred from their study; nor was the mind of man sufficiently educated not to give implicit credence to the fabulous tales with which every account of Reptiles in the 15th and 16th centuries was replete. The art of healing, however, was developing into a science based upon rational principles, and consequently not only those Reptiles which formed part of the *materia medica* but also the venomous Snakes became objects of study to the physician. Snakes, and especially the Viper, were treated of in distinct divisions of general works, or in separate monographs. It is true that these treatises were written less with the view of elucidating the natural history of the animals than with that of describing their poisonous nature and indicating the manner in which they should be used as medicaments, the majority of the writers being ignorant of the structure of the venom-apparatus, and of the distinction between non-venomous and venomous Snakes.

Nothing can show more clearly the small advance made by herpetology in this long post-Aristotelian period than a glance at the celebrated work, *De Differentiis Animalium Libri decem* (Paris, 1552), by Edward Wotton (1492–1555). Wotton treats of the Reptiles which he designates as *Quadrupedes oviparæ et Serpentes* in the sixth book of his work. They form the second division of the *Quadrupedes quæ sanguinem habent.* and are subdivided in the following "genera":—

Crocodilus et scincus (cap. cv.); *Testudinum genera* (cvi.); *Ranarum genera* (cvii.); *Lacertæ* (cviii.); *Salamandra et seps quadrupes* (cix.); *Stellio* (cx.); *Chamæleo* (cxi.); *Serpentes* (cxii.), a general account, the following being different kinds of Serpents:—*Hydrus et alii quidam serpentes aquatiles* (cxiii.); *Serpentes terrestres et primo aspidum genera* (cxiv.); *Vipera, dipsas, cerastes, et hammodytes* (cxv.); *Hæmorrhus, sepedon, seps, cenchris, et cenchrites* (cxvi.); *Basiliscus et alii quidam serpentes quorum venenum remedio caret* (cxvii.); *Draco, amphisbæna, et alii quidam serpentes quorum morsus minus offert periculi* (cxviii.).

As regards the treatment of the subject, Wotton's work might with propriety be termed "Aristoteles redivivus." The plan is the same, and the observations of the Greek naturalist are faithfully, sometimes literally, reproduced. It is surprising that even the Reptiles of his native country were most imperfectly known to the author.

A new impetus for the cultivation of the study of natural history was given through the observations and writings of travellers in India, Africa, and America. With the enlargement of geographical knowledge that of Reptiles was also advanced, as is sufficiently apparent from the large encyclopædic works of Gesner, Aldrovandi, and Johnston. The last-named author especially, who published the various portions of his natural history in the middle of the 17th century, was able to embody in his compilations notices of numerous Reptiles observed by Francisco Hernandez in Mexico and by Marcgrave and Piso in Brazil. As the author had no definite idea of the Ray-Linnæan term "species," it is not possible to give the exact number of Reptiles mentioned in his work. But it may be estimated at about fifty, not including some marine fishes and fabulous creatures. He figures (or rather reproduces the figures of) about forty,—some species being represented by several figures.

2. *Linnæan Period: Formation of a Class Amphibia.*—Within the century which succeeded these compilatory works (1650–1750) fall the labours which prepared the way for and exerted the greatest influence on Ray and Linnæus. Although original researches in the field of herpetology were limited in extent and in number, the authors had freed themselves from the purely literary or scholastic tendency. Men were no longer satisfied with reproducing and commenting on the writings of their predecessors; the pen was superseded by the eye, the microscope, and the knife, and statements were tested by experiment. This spirit of the age manifested itself, so far as the Reptiles are concerned, in Chara's and Redi's admirable observations on the Viper, in Major's and Vallisnieri's detailed accounts of the anatomy of the Chamæleon, in the researches of Jacobæus into the metamorphoses of the Batrachians and the structure of Lizards, in Dufay's history of the development of the Salamander (for Batrachians are invariably associated with Reptiles proper); in Tyson's description of the anatomy of the Rattlesnake, &c. The natural history collections formed by institutions and wealthy individuals now contained not merely skins of Crocodiles or Serpents stuffed and transformed into a shape to correspond with the fabulous descriptions of the ancient dragons; but, with the discovery of alcohol as a means of preserving animals, Reptiles entire or dissected were exhibited for study; and no opportunity was lost of obtaining them from travellers or residents in foreign countries. Fossils also were now acknowledged to be remains of animals which had lived before the flood, and some of them were recognized as those of Reptiles.

The contributions to a positive knowledge of the animal kingdom became so numerous as to render the need of a methodical arrangement of the abundance of new facts more and more pressing. Of the two principal systematic attempts made in this period the first ranks as one of the most remarkable steps of the progress of natural history, whilst the second can only be designated as a signal failure, which ought to have been a warning to all those who in after years classified animals in what is called an "artificial system." As the latter attempt, originating with Klein (1685–1759), did not exercise any further influence on herpetology, it will be sufficient to have merely mentioned it. John Ray (1628–1705) had recognized the necessity of introducing exact definitions for the several categories into which the animals had to be divided. and he maintained that these categories ought to be characterized by the structure of animals, and that all zoological knowledge had to start from the "species" as its basis. His definition of Reptiles as "animalia sanguinea pulmone respirantia cor unico tantum ventriculo instructum habentia ovipara" fixed the class in a manner which was adopted by the naturalists of the succeeding hundred and fifty years. Nevertheless, Ray was not a herpetologist; he never made these animals his special study, as is evident from the way in which he subdivides the class, as well as from his imperfect treatment of the species His knowledge of Reptiles is chiefly derived from the researches of others, from whose accounts, however, everything not based upon reliable demonstration is critically excluded. He begins with a chapter treating of Frogs (*Rana*, with two species), Toads (*Bufo*, with one species), and Tortoises[1]

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[1] In associating Tortoises with Toads Ray could not disengage himself from the general popular view as to the nature of these animals, which found expression in the German *Schildkröte* ("Shield-toad").

(*Testudo*, with fourteen species). The second group comprises the *Lacertæ*, twenty-five in number, and includes the Salamander and Newts; and the third the *Serpentes*, nine species, among which the Limbless Lizards are enumerated.

Except in so far as he made known and briefly characterized a number of Reptiles, our knowledge of this class was not advanced by LINNÆUS. His notions as to the relation of the various types among themselves and to the other vertebrates were the same as those of Ray, and the progress made by herpetology in the various editions of the *Systema Naturæ* is therefore of a merely formal character. That Linnæus associated in the 12th edition cartilaginous and other Fishes with the Reptiles under the name of *Amphibia Nantes* was the result of some misunderstanding of an observation by Garden, and is not to be taken as a premonitory token of the recent discoveries of the relation between Batrachians and Fishes. Linnæus places Reptiles, which he calls *Amphibia*, as the third class of the animal kingdom; he divides the genera thus:—

ORDER 1. REPTILES.—*Testudo* (15 species); *Rana* (17 sp.); *Draco* (2 sp.); *Lacerta* (48 sp., including 6 Batrachians).

ORDER 2. SERPENTES.—*Crotalus* (5 species); *Boa* (10 sp.); *Coluber* (96 sp.); *Anguis* (15 sp.); *Amphisbæna* (2 sp.); *Cæcilia* (2 sp.).

None of the naturalists who under the direction or influence of Linnæus visited foreign countries possessed any special knowledge of or predilection for the study of Reptiles; all, however, contributed to our acquaintance with tropical forms, or transmitted well-preserved specimens to the collections at home, so that GMELIN, in the 13th edition of the *Systema Naturæ*, was able to enumerate three hundred and seventy-one species.

The man who, with the advantage of the Linnæan method, first treated of Reptiles monographically, was LAURENTI. In a small book[1] he proposed a new division of these animals, of which some ideas and terms have survived into our times, characterizing the orders, genera, and species in a much more precise manner than Linnæus, giving, for his time, excellent descriptions and figures of the species of his native country. Laurenti might have become for herpetology what Artedi was for ichthyology, but his resources were extremely limited. He himself complains that he had no literary intercourse with foreign naturalists, and access to but a few works (he especially mentions Seba's *Thesaurus*) and one collection only.

The circumstance that Chelonians are entirely omitted from his *Synopsis* seems due rather to the main object with which he engaged in the study of herpetology, viz., that of examining and distinguishing Reptiles reputed to be poisonous, and to want of material, than to his conviction that Tortoises should be relegated to another class. He divides then the class into three orders:—

1. SALIENTIA, with the genera *Pipa*, *Bufo*, *Rana*, *Hyla*, and one species of "*Proteus*," viz., the larva of *Pseudis paradoxa*.

GRADIENTIA, the three first genera of which are Tailed Batrachians, viz., two species of *Proteus* (one being the *P. anguinus*), *Triton*, and *Salamandra*; followed by true Saurians—*Caudiverbera*, *Gecko*, *Chamæleo*, *Iguana*, *Basiliscus*, *Draco*, *Cordylus*, *Crocodilus*, *Scincus*, *Stellio*, *Seps*.

3. SERPENTIA, among which he continues to keep *Amphisbæna*, *Cæcilia*, and *Anguis*, but the large Linnæan genus *Coluber* is divided into twelve, chiefly from the scutellation of the head and form of the body.

The work concludes with an account of the experiments made by Laurenti to prove the poisonous or innocuous nature of those Reptiles of which he could obtain living specimens.

The next general work on Reptiles is by LACÉPÈDE. It appeared in the years 1788 and 1790 under the title *Histoire Naturelle des Quadrupèdes Ovipares et des Serpens* (Paris, 2 vols. 4to). Although as regards treatment of details and amount of information this work far surpasses the modest attempt of Laurenti, it shows no advance towards a more natural division and arrangement of the genera. The author depends entirely on conspicuous external characters, and classifies the Reptiles into (1) oviparous quadrupeds with a tail, (2) oviparous quadrupeds without a tail, (3) oviparous bipeds (*Chirotes* and *Pseudopus*), (4) Serpents,—an arrangement in which the old confusion of Batrachians and Reptiles and the imperfect definition of Lizards and Snakes are continued, and which it is worthy of remark we find also adopted in Cuvier's *Tableau Élémentaire de l'Histoire Naturelle des Animaux* (1798), and nearly so by LATREILLE in his *Histoire Naturelle des Reptiles* (Paris, 1801, 4 vols. 12mo). Lacépède's monograph, however, remained for many years deservedly the standard work on Reptiles, on account of the ability with which the author collected all reliable information on the various species, and on account of the facilities which it afforded for determining them. The numerous plates with which the work is illustrated are, for the time, well drawn, and the majority readily recognizable.

3. *The Period of Elimination of Batrachians as one of the Reptilian Orders.*—A new period for herpetology commences with ALEX. BRONGNIART,[2] who in 1799 first recognized the characters by which Batrachians differ from the other Reptiles, and by which they form a natural passage to the class of Fishes. *Cæcilia* (as also *Langaha* and *Acrochordus*) is left by Brongniart with hesitation in the order of Snakes, but Newts and Salamanders henceforth are no more classed with Lizards. He leaves the Batrachians, however, in the class of Reptiles as the fourth order. The first order comprises the Chelonians, the second the Saurians (including Crocodiles and Lizards), the third the Ophidians—terms which have been adopted by all succeeding naturalists. Here, however, Brongniart's merit on the classification of Reptiles ends, the definition and disposition of the genera remaining much the same as in the works of his predecessors.

The activity in France in the field of natural science was at this period, in spite of the political disturbances, so great that only a few years after Lacépède's work another, almost identical in scope and of the same extent, appeared, viz., the *Histoire Naturelle Générale et Particulière des Reptiles* of F. M. DAUDIN (Paris, 1802–3, 8 vols. 8vo). Written and illustrated with less care than that by Lacépède, it is of greater importance to the herpetologists of the present day, as it contains a considerable number of generic and specific forms described for the first time. Indeed, at the end of the work, the author states that he has examined more than eleven hundred specimens, belonging to five hundred and seventeen species, all of which he has described from nature. The system adopted is that of Brongniart, giving to the work a character by which the modern herpetologist is most favourably impressed. The genera are well defined, but ill arranged; it is, however, noteworthy that *Cæcilia* takes now its place at the end of the Ophidians, and nearest to the succeeding order of Batrachians.

The next step in the development of the herpetological system was the natural arrangement of the genera. This involved a stupendous amount of labour; by a careful thorough examination of all the types of Reptiles then known, reliable characters had to be discovered, and by means of the principle of the subordination of characters the genera had to be grouped into families within Brongniart's orders. Although many isolated contributions were made by various workers, this task could be successfully undertaken and completed in the Paris Museum only, in which, besides Seba's and Lacépède's collections, many other herpetological treasures from other museums had been deposited by the victorious generals of the empire, and to which through Cuvier's reputation objects from every part of the world were attracted in a more peaceful and voluntary manner. The men who devoted themselves to this task were A. M. C. DUMÉRIL, OPPEL, and CUVIER himself. It is the duty of the biographer rather than the historian to ascertain what share of the merit in building up the new system should be allotted to each of these three. Oppel was a German who, during his visit to Paris (1807–8), attended the lectures of Duméril and Cuvier, and at the same time studied the materials to which access was given to him by the latter in the most liberal manner. Duméril[1] maintains that Oppel's ideas and information were entirely derived from his lectures, and that Oppel himself avows this to be the case. The passage,[2] however, to which he refers is somewhat ambiguous; and it is certain that there is the greatest possible difference between the arrangement published by Duméril in 1806 (*Zoologie Analytique*, Paris, 8vo) and that proposed by Oppel in his *Ordnungen, Familien, und Gattungen der Reptilien* (Munich, 1811, 4to). There is no doubt that Oppel profited largely by the teaching of Duméril; but, on the other hand, there is sufficient internal evidence in the works of both authors, not only that Oppel worked independently, but also that Duméril and Cuvier owed much to their younger fellow-labourer, as Cuvier himself indeed acknowledges more than once.

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[1] *Specimen medicum exhibens Synopsin Reptilium emendatam cum experimentis circa venena et antidota Reptilium Austriacorum*, Vienna, 1768 (8vo, pp. 214, with 5 plates).

[2] *Bull. Acad. Sci.*, 1800, Nos. 35, 36.

Oppel's classification may be shortly indicated thus:—

ORDER 1. TESTUDINATA OR CHÉLONIENS.
Fam. 1. CHEBONII (gen. *Mydas*, *Coriacea*).
Fam. 2. AMYDÆ (gen. *Trionyx*, *Chelys*, *Testudo*, *Emys*).

ORDER 2. SQUAMATA.
Sect. A. SAURII.
Fam. 1. CROCODILINI (gen. *Crocodilus*, *Gavialis*, *Alligator*).
Fam. 2. GECKOIDES (gen. *Gecko*, *Stellio*, *Agama*).
Fam. 3. IGUANOIDES (gen. *Camæleo*, *Draco*, *Iguana*, *Basiliscus*, *Lophyrus*, *Anolis*).
Fam. 4. LACERTINI (gen. *Tupinambis*, *Dracæna*, *Lacerta*, *Tachydromus*).
Fam. 5. SCINCOIDES (gen. *Scincus*, *Seps*, *Scheltopusik*, *Anguis*).
Fam. 6. CHALCIDICI (gen. *Chalcides*, *Bimanus*, *Bipes*, *Ophisaurus*).
Sect. B. OPHIDII.
Fam. 1. ANGUIFORMES (gen. *Tortrix*, *Amphisbæna*, *Typhlops*).
Fam. 2. CONSTRICTORES (gen. *Boa*, *Eryx*).
Fam. 3. HYDRI (gen. *Platurus*, *Hydrophis*).
Fam. 4. PSEUDO-VIPERÆ (gen. *Acrochordus*, *Erpeton*).
Fam. 5. CROTALINI (gen. *Crotalus*, *Trigonocephalus*).
Fam. 6. VIPERINI (gen. *Vipera*, *Pseudoboa*).
Fam. 7. COLUBRINI (gen. *Coluber*, *Bungarus*).

ORDER 3. NUDA OR BATRACII.

In this classification we notice three points, which indicate a decided progress towards a natural system. (1) The four orders proposed by Brongniart are no more considered cosubordinate in the class, but the Saurians and Ophidians are associated as sections of the same order, a view held by Aristotle but abandoned by all following naturalists. The distinction between Lizards and Snakes is carried out in so precise a manner that one genus only, *Amphisbæna*, is wrongly placed. (2) The true Reptiles have now been entirely divested of all heterogeneous elements by relegating positively *Cæcilia* to the Batrachians, a view for which Oppel had been fully prepared by Duméril, who pointed out in 1807 that "les cécilies se rapprochent considérablement des batraciens auxquels elles semblent lier l'ordre entier des serpens."[3] (3) An attempt is made at arranging the genera into families, some of which are still retained at the present day.

In thus giving a well-merited prominence to Oppel's labours, we are far from wishing to detract from the influence exercised by the master spirit of this period, Cuvier. Without his guidance Oppel probably never would have found a place among the promoters of herpetological science. But Cuvier's principal researches on Reptiles were incidental or formed part of some more general plan; Oppel concentrated his on this class only. The latter acquired a more correct view as regards the higher divisions, while Cuvier was enabled by a more detailed study of the genera to define certain families more precisely and arrange them in a more natural manner, and to add not a few to the generic forms. Cuvier adopts the four orders of Reptiles proposed by Brongniart as equivalent elements of the class, and restores the Blind-worms and allied Lizards, and, what is worse, also the Cæcilias, to the Ophidians. The Chamæleons and Geckos are placed in separate groups, and the mode of dividing the latter has been retained to the present day. Also a natural division of the Snakes, although the foreign elements mentioned are admitted into the order, is sufficiently indicated by his arrangement of the "vrais serpens proprement dits" as (1) non-venomous Snakes, (2) venomous Snakes with several maxillary teeth, and (3) venomous Snakes with isolated poison-fangs. Without entering into those long descriptions of the species which continue to be the bane of modern zoology, he distinguishes the species of Reptiles with a precision not attained in any previous work, critically examining the literature and adding the principal references.

Cuvier's researches into the osteology of Reptiles had not only the object of forming the basis for their arrangement, but also of discovering the means of understanding the fossil remains which now claimed the attention of French, English, and German naturalists. Extinct Chelonian and Crocodilian remains, *Pterodactylus*, *Mosasaurus*, *Iguanodon*, *Ichthyosaurus*, *Teleosaurus*, became the subjects of Cuvier's classical treatises which form the contents of the 5th volume (part 2) of his *Recherches sur les Ossemens Fossiles, où l'on rétablit les caractères des plusieurs animaux dont les révolutions du globe ont détruit les espèces* (new ed., Paris, 1824, 4to).

All the succeeding herpetologists adopted either Oppel's or Cuvier's view as to the number of orders of Reptiles, or as to the position Batrachians ought to take in their relation to Reptiles proper, with the single exception of D. DE BLAINVILLE. He divided the "oviparous subtype" of Vertebrates into four classes, Birds, Reptiles, Amphibians, and Fishes,[4] a modification of the system which is all the more significant as he designates the Reptiles "*Squammifères Ornithoides, écailleux*," and the Amphibians "*Nudipellifères, Ichthyoides nus.*" In these terms we perceive clear indications of the relations which exist to the class of Birds on the one hand, and to that of Fishes on the other; they are signs which cast their shadow before them, but, unfortunately, Blainville himself did not follow up the ideas thus expressed, and abandoned even the terms in a later edition of his systematic tables.

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[1] *Erpét. génér.*, i. p. 259.

[2] "Wäre es nicht die Ermunterung . . . dieser Freunde gewesen, so würde ich überzeugt von den Mängeln, denen eine solche Arbeit bei aller möglichen Vorsicht doch unterworfen ist, es nie gewagt haben, *meine* Eintheilung bekannt zu machen, obwohl *selbe* Herr Duméril in seinen Lectionen vom Jahre 1809 schon vorgetragen, und die Thiere im Cabinet darnach bezeichnet hat" (preface, p. viii). A few lines further on he emphatically declares that the classification is based upon his own researches.

[3] *Mémoires de Zoologie et d'Anatomie Comparée*, Paris, 1807, 8vo p. 45.

[4] *Bull. Sci. Soc. Philomat.*, July 1816.

The direct or indirect influence of the work of French anatomists manifested itself in the systems of the other herpetologists of this period. The Crocodiles, especially, which hitherto (strange to say, even in Cuvier's classification) had been placed as one of the families of Saurians, now commence to be separated from them. MERREM (*Versuch eines Systems der Amphibien*, Marburg, 1820, 8vo) distinguishes two classes of "Amphibians," *Pholidota* and *Batrachia*.

The *Pholidota* (or Reptiles) are divided into three orders, distinguished chiefly by osteological and splanchnological characters:—

1. TESTUDINATA;
2. LORICATA (= Crocodiles);
3. SQUAMATA (= Oppel's *Squamata*, excluding Crocodiles).

Merrem's subdivision of the *Squamata* into (1) *Gradientia* (= limbed *Lacertilia*), (2) *Repentia* (= limbless *Lacertilia*), (3) *Serpentia* (= Snakes and *Amphisbæna*), (4) *Incedentia* (= *Chirotes*), and (5) *Prehendentia* (= Chamæleons) was based chiefly on the modifications of the limbs, and not adopted by his successors. The greater part of his work is occupied with a synopsis of all the species of Reptiles known, each being shortly characterized by a diagnosis; but, as only a small proportion (about one hundred and seventy) were known to him from autopsy, this synopsis has all the faults of a compilation.

LATREILLE, who commenced the study of Reptiles as early as 1801, had kept pace with the progress of science when he published, in 1825, his *Familles Naturelles du Règne Animal* (Paris, 1825, 8vo). He separated the Batrachians as a *class* from the Reptiles, and the latter he divides into two sections only, *Cataphracta* and *Squamosa*,—in the former Crocodiles being associated with the Chelonians. He bases this view on the development of a carapace in both, on the structure of the feet, on the fixed quadrate bone, on the single organ of copulation. None of the succeeding herpetologists adopted a combination founded on such important characters except J. E. GRAY, who, however, destroyed Latreille's idea of *Cataphracta* by adding the Amphisbænians[1] as a third order.

Cuvier's account of the genera and species of Reptiles in the *Règne Animal* was too succinct, and Merrem's bore too much the character of a compilatory list, to furnish efficient aid in the arrangement of the mass of new materials which began to accumulate from all parts of the world in European museums. Among others, Spix had brought from his travels in Brazil a rich spoil to the Munich Museum, and the Bavarian Academy charged JOH. WAGLER, who was engaged in working out these materials, to prepare a general system of Reptiles and Batrachians. His work,[2] the result of ten years' labour, is a simple but lasting monument to a young naturalist,[3] who, endowed with an ardent imagination, only too frequently misinterpreted the evidence of facts, or forced it into the service of preconceived ideas. Cuvier had drawn attention to certain resemblances in some parts of the osseous structure of *Ichthyosaurus* and *Pterodactylus* to Dolphins, Birds, Crocodiles, &c. Wagler, seizing upon such analogical resemblances, separated those extinct Saurians from the class of Reptiles, and formed of them and the Monotremes a distinct class of Vertebrates, intermediate between Mammals and Birds, which he called *Gryphi*. When we consider that the discovery of the mode of propagation of the Monotremes is probably reserved for the present decennium, and that the propagation of those extinct Reptiles may remain an unsolved mystery, we must admit that Wagler has made free use of his imagination by defining his class of *Gryphi* as "vertebrates with lungs lying free in the pectoral cavity; oviparous, development of the embryo (within or) without the parent; the young fed (or suckled?) by the parents." By the last character this Waglerian class is distinguished from the Reptiles.

Reptiles (in which Wagler includes Batrachians) are divided into eight orders:—*Testudines*, *Crocodili*, *Lacertæ*, *Serpentes*, *Angues*, *Cæciliæ*, *Ranæ*, and *Ichthyodi*. He has great merit in having employed, for the subdivision of the families of Lizards, the structure of the tongue and the mode of insertion of the teeth in the jaws. On the other hand, however well the genera of Snakes are defined by him—and their number has been increased to ninety-six—Wagler has entirely failed in arranging them in natural families, venomous and non-venomous types being mixed in the majority of his groups.

L. FITZINGER was Wagler's contemporary; his first work[4] preceded Wagler's system by four years. As he says in the preface, his object was to arrange the Reptiles in "a natural system, a system in which the objects are arranged in accordance with their greatest similarity, with their natural affinities. Such a system is a faithful image of the gradual progress of nature, expressed in words." Unfortunately, in order to attain this object, Fitzinger paid regard to the most superficial points of resemblance; and in the *tabula affinitatum generum* which he constructed to demonstrate "the progress of nature" he has been much more successful in placing closely allied generic forms in contiguity than in tracing the relationships of the higher groups. That table is prepared in the form of a genealogical tree, but Fitzinger wished to express thereby merely the amount of morphological resemblance, and there is no evidence whatever in the text that he had a clear idea of genetic affinity. The Batrachians are placed at the bottom of the scheme, leading through *Hyla* to the Geckos (clearly on account of the digital dilatations) and through *Cæcilia* to *Amphisbæna*. At the top *Draco* leads through *Pterodactylus* to the Bats (*Pteropus*), *Ichthyosaurus* to the Cetaceans (*Delphinus*), *Emys* to the Monotremes, *Testudo* to *Manis*, and the Marine Turtles to the Divers and Penguins.

In Fitzinger's system the higher groups are, in fact, identical with those proposed by Merrem, while greater originality is shown in the subdivision of the orders. He differed also widely from Wagler in his views as to the relations of the extinct forms. The order of *Loricata* consists of two families, the *Ichthyosauroidea* and *Crocodiloidea*, the former comprising *Iguanodon*, *Plesiosaurus*, *Saurocephalus*, and *Ichthyosaurus*. In the order *Squamata* Lacertilians and Ophidians are combined and divided into twenty-two families, almost all based on the most conspicuous external characters: the first two, viz., the Geckos and Chamæleons, are natural enough, but in the three following Iguanoids and Agamoids are sadly mixed, Pterodactyles and *Draco* forming one family; *Megalosaurus*, *Mosasaurus*, *Varanus*, *Tejus*, &c., are associated in another named *Ameivoidea*; the *Amphisbænidæ* are correctly defined; the *Colubroidea* are a heterogenous assemblage of thirty genera; but with his family of *Bungaroidea* Fitzinger makes an attempt to separate at least a part of the venomous Colubrine Snakes from the Viperines, which again are differentiated from the last family, that of *Crotaloidea*.

There is sufficient evidence in this early publication that Fitzinger had at that time a good eye for seizing upon those characters by which the creation of small groups, such as genera, is regulated, and if this little work had been his only performance in the field of herpetology his name would have been honourably mentioned among his fellow-workers. But the promise of his early labours was not justified by his later work, and if we take notice of the latter here it is only because his name has become attached to many a Reptile through the pedantic rules of zoological nomenclature. The labours of Wiegmann, Müller, Duméril, and Bibron exercised no influence on him, and when he commenced to publish a new system of Reptiles in 1843,[1] of which fortunately one fasciculus only appeared, he exhibited a classification in which morphological facts are entirely superseded by fanciful ideas of the vaguest kind of physiosophy, each class of vertebrates being divided into five "sense" series, and each series into three orders, one comprising forms of superior, the second of medium, and the third of inferior development. In the generic arrangement of the species, to which Fitzinger devoted himself especially in this work, he equally failed to advance science From a superficial study of such species as were accessible to him, but chiefly from the descriptions of other authors, he selected any characters for the establishment of genera, and, abandoning entirely the value of a genus as a systematic category, he introduced a number of names, under the cloak of which he hid the superficiality of his work; many were adopted by his successors, who, however, had to substantiate their validity by a deeper study of the taxonomic characters.

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[1] *Catalogue of the Tortoises, Crocodiles, and Amphisbænians' in the Collection of the British Museum*, London, 1844, 16mo, p. 2.

[2] *Natürliches System der Amphibien mit vorangehender Classification der Säugethiere und Vögel,—ein Beitrag zur vergleichenden Zoologie*, Munich, 1830, 8vo.

[3] Wagler was accidentally killed three years after the publication of his *System*.

[4] *Neue Classification der Reptilien nach ihren natürlichen Verwandtschaften*, Vienna, 1826, 4to.

We have now arrived at a period distinguished by the appearance of a work which, by the ability of its authors, by the comprehensiveness of its scope, by the treatment of the general subject as well as of the details, superseded all its predecessors, which formed the basis for the labours of many succeeding years, and which will always remain one of the classical monuments of descriptive zoology,—the *Erpétologie Générale ou Histoire Naturelle complète des Reptiles* of A. M. C. DUMÉRIL and G. BIBRON (Paris, 8vo). The first volume appeared in 1834, and the ninth and last in 1854. No naturalist of that time could have been better qualified for the tremendous undertaking than C. Duméril, who almost from the first year of half a century's connexion with the then largest collection of *Reptilia* had chiefly devoted himself to their study. The task would have been too great for the energy of a single man; it was, therefore, fortunate for Duméril that he found a most devoted fellow-labourer in one of his assistants, G. Bibron, whose abilities equalled those of the master, but who, to the great loss of science, died (in 1848) before the completion of the work. Duméril had the full benefit of Bibron's knowledge for the volumes containing the Snakes, but the last volume, which treats of the Tailed Batrachians, had to be prepared by Duméril alone.

The work is the first which gives a comprehensive scientific account of Reptiles generally, their structure, physiology, and literature. Nearly the whole of the first volume is devoted to these chapters. And again each of the four orders admitted by the authors is introduced by a similar general account. In the body of the work 121 Chelonians, 468 Saurians, 586 Ophidians, and 218 Batrachians are described in detail and with the greatest precision. On the principles of arrangement of the various orders we shall have to speak subsequently, and we mention here only that, singularly enough, the authors revert to Brongniart's arrangement, in which the Batrachians are co-ordinate with the other three orders of Reptiles.[2] This must appear all the more strange as Von Baer[3] in 1828, and J. Müller[4] in 1831, had urged, besides other essential differences, the important fact that no Batrachian embryo possesses either an amnion or an allantois, like a Reptile.

4. *Period of the Separation of Reptiles and Batrachians as Distinct Classes or Subclasses.*—In the chronological order which we have adopted for these historical notes, we had to refer in their proper places to two herpetologists, Blainville and Latreille, who advocated a deeper than merely ordinal separation of Reptiles from Batrachians, and who were followed by F S. Leuckart. But thi view only now began to find more general acceptance. J. MÜLLER and STANNIUS were guided in their classification entirely by anatomical characters, and consequently recognized the wide gap which separates the Batrachians from the Reptiles; yet they considered them merely as subclasses of the class *Amphibia*. The former directed his attention particularly to those forms which seemed to occupy an intermediate position between Lacertilians and Ophidians, and definitely relegated *Anguis*, *Pseudopus*, *Acontias* to the former, and *Typhlops*, *Rhinophis*, *Tortrix*, but also the Amphisbænoids to the latter. Stannius interpreted the characteristics of the Amphisbænoids differently, as will be seen from the following abstract of his classification[5]:—

SUBCLASSIS: **AMPHIBIA MONOPNOA** (Leuckart).
SECT. 1. *STREPTOSTYLICA* (Stann.). Quadrate bone articulated to the skull; copulatory organs paired, placed outside the cloacal cavity.
ORDO 1. OPHIDIA.
Subordo 1. EURYSTOMATA or MACROSTOMATA (Müll.). The facial bones are loosely connected to admit of great extension of the wide mouth.
Subordo 2. ANGIOSTOMATA or MICROSTOMATA (Müll.). Mouth narrow, not extensile; quadrate bone attached to the skull and not to a mastoid.
ORDO 2. SAURIA.
Subordo 1. AMPHISBÆNOIDEA.
Subordo 2. KIONOCRANIA (Stann.) = Lizards.
Subordo 3. CHAMÆLEONIDEA.
SECT. 2. *MONIMOSTYLICA* (Stann.). Quadrate bone suturally united with the skull; copulatory organ simple, placed within the cloaca.
ORDO 1. CHELONIA.
ORDO 2. CROCODILIA.

This classification received the addition of a fifth Reptilian order which with many Lacertilian characters combined important Crocodilian affinities, and in certain other respects differed from both, viz., the New Zealand *Hatteria*, which by its first describers had been placed to the Agamoid Lizards. GÜNTHER,[6] who pointed out the characteristics of this Reptile, considered it to be coordinate with the other four orders of Reptiles, and characterizes it thus:—

Rhynchocephalia.—Quadrate bone suturally and immovably united with the skull and pterygoid; columella present. Rami of the mandible united as in Lacertilians. Temporal region with two horizontal bars. Vertebræ amphicœlian. Copulatory organs none.

5. *Period of the Recognition of a Class of Reptilia as part of the Sauropsida.*—Although so far the discovery of every new morphological and developmental fact had prepared naturalists for a class separation of Reptiles and Batrachians, it was left to T. H. Huxley to demonstrate, not merely that the weight of facts demanded such a class separation, but that the Reptiles hold the same relation to Birds as the Batrachians to Fishes. In his Hunterian Lectures (1863) he divided the vertebrates into Mammals, Sauroids, and Ichthyoids, subsequently substituting for the last two the terms *Sauropsida* and *Ichthyopsida*.[7] The

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[1] *Systema Reptilium*, Vienna, 1843, 8vo.

[2] The author of the article AMPHIBIA in the present work (vol. i. p. 750) states that Günther, like Duméril and Bibron, in his *Catalogue*, in substance, adopts Brongniart's "arrangement." There is no foundation whatever for this statement, the relation of the Batrachians to the class of Reptiles not being even alluded to in that work. In a later division of the *Reptilia* by Günther (*Phil. Trans.*, 1867) the Batrachians are likewise excluded.

[3] *Entwicklungsgeschichte der Thiere*, p. 262.

[4] Tiedemann's *Zeitschrift für Physiologie*, vol. iv. p. 200.

[5] Siebold and Stannius, *Handbuch der Zootomie—Zootomie der Amphibien*, 2d ed. Berlin, 1856, 8vo.

[6] "Contribution to the Anatomy of *Hatteria* (*Rhynchocephalus*, Owen)," in *Phil. Trans.*, 1867, part ii.

[7] *An Introduction to the Classification of Animals*, London, 1869, 8vo, pp. 104 *sq.*

Sauropsida contain the two classes of Birds and Reptiles, the *Ichthyopsida* those of Batrachians and Fishes. The position thus assigned to Reptiles in the system is now adopted by the majority of zoologists.

R. OWEN, while fully appreciating the value of the osteological characters on which Huxley based his division, yet admitted into his consideration those taken from the organs of circulation and respiration, and reverted to Latreille's division of warm- and cold-blooded (hæmatothermal and hæmatocryal) vertebrates, thus approximating the Batrachians to Reptiles, and separating them from Birds. He says[1]—

> "Although the *Aves* and *Mammalia* agree as hot-blooded vertebrates in their higher cerebral development and in the more complex heart and lungs, Birds, by genetic and developmental characters as well as by the general plan of their organization, are more intimately and naturally allied to the Oviparous Saurians than to the Viviparous Mammals. In their generation and development modern Batrachians differ from other cold-blooded air-breathers, and agree with Fishes. Present knowledge of extinct forms more clearly exposes the artificial nature of the primary groups of the oviparous vertebrates An important link, the *Pterosauria*, or Flying Reptiles, with wings and air-sacs, more closely connecting Birds with the actual remnant of the Reptilian class, has passed away. Other extinct orders (*Ganocephala* and *Labyrinthodontia*) have demonstrated the artificial nature of the distinction between Fishes and Reptiles, and the close transitions that connect together all the cold-blooded Vertebrates."

The Reptiles (or *Monopnoa*, Leuck.), then, form the highest of the five sub-classes into which, after several previous classifications, Owen[2] finally divides the *Hæmatocrya*. The sub-class is composed of the following nine orders :—

- *a.* ICHTHYOPTERYGIA (extinct)—*Ichthyosaurus.*
- *b.* SAUROPTERYGIA (extinct)—*Plesiosaurus, Pliosaurus, Nothosaurus, Placodus.*
- *c.* ANOMODONTIA (extinct)—*Dicynodon, Rhynchosaurus, Oudenodon.*
- *d.* CHELONIA.
- *e.* LACERTILIA (with the extinct *Mosasaurus*).
- *f.* OPHIDIA.
- *g.* CROCODILIA (with the extinct *Teleosaurus* and *Streptospondylus*).
- *h.* DINOSAURIA (extinct)—*Iguanodon, Scelidosaurus*, and *Megalosaurus.*
- *i.* PTEROSAURIA (extinct)—*Dimorphodon, Rhamphorhynchus*, and *Pterodactylus.*

As this ordinal arrangement deals in a uniform measure with extinct as well as living Reptiles, it is more complete than, and marks as great a progress in the history of herpetology as, any of the classifications recorded hitherto.

The study of fossil Reptiles had been continued after Cuvier by many workers, as Goldfuss, E. Geoffroy St Hilaire, Harlan, Mantell, G. F. Jäger, Phillips, Leidy, Falconer, Cautley, Alton, Bronn, Kaup, Quenstedt, and especially H. von Meyer, who devoted the whole of his extra-official time to drawing with his own hand numerous treasures preserved in Continental collections. But none contributed more to the knowledge of fossil Reptiles than Owen himself. Indefatigable in collecting materials, and able to bring to bear upon the subject an unsurpassed knowledge ranging over the whole field of comparative anatomy, he was unrivalled in elucidating the affinities of fossil remains as well as in the production of graphic descriptions. He showed that the number of living Reptilian types bears but a small proportion to that of extinct forms, and, therefore, that a systematic arrangement of the entire class must be chiefly based upon dental and osteological characters.

In this he was followed by HUXLEY and COPE who, however, have restricted still more the selection of classificatory characters by relying for the purposes of arrangement on a few parts of the skeleton only. This is a matter of necessity in dealing with fossil remains, but a tendency has thereby been fostered in our times of applying the same principles in the subdivision of living Reptiles to the greater or less exclusion of the consideration of other parts of their organization.

Huxley and Cope attempted a further grouping of the orders which in Owen's system were merely serially enumerated as cosubordinate groups. Huxley used for this purpose almost exclusively the position and character of the rib-articulations to the vertebral centre, the orders themselves being the same as in Owen's system :—

- A. *PLEUROSPONDYLIA.* Dorsal vertebræ devoid of transverse processes and not movable upon one another, nor are the ribs movable upon the vertebræ. A plastron. Order 1, CHELONIA.
- B. The dorsal vertebræ (which have either complete or rudimentary transverse processes) are movable upon one another, and the ribs upon them. No plastron.
  - *a.* The dorsal vertebræ have transverse processes which are either entire or very imperfectly divided into terminal facets (*ERPETOSPONDYLIA*).
    - *α.* Transverse processes long; limbs well developed, paddles; sternum and sternal ribs absent or rudimentary. Order 2, PLESIOSAURIA (= *Sauropterygia*, Ow.).
    - *β.* Transverse processes short.
      - *aa.* A pectoral arch and urinary bladder. Order 3, LACERTILIA.
      - *bb.* No pectoral arch and no urinary bladder. Order 4, OPHIDIA.
  - *b.* The dorsal vertebræ have double tubercles in place of transverse processes (*PEROSPONDYLIA*). Limbs paddle-shaped. Order 5, ICHTHYOSAURIA (= *Ichthyopterygia*, Ow.)
  - *c.* The anterior dorsal vertebræ have elongated and divided transverse processes, the tubercular being longer than the capitular division (*SUCHOSPONDYLIA*).
    - *α.* Only two vertebræ in the sacrum. Order 6, CROCODILIA.
    - *β.* More than two vertebræ in the sacrum.
      - *aa.* Manus without a prolonged ulnar digit.
        - *αα.* Hind-limb Saurian. Order 7, DICYNODONTIA (= *Anomodontia*, Ow.).
        - *ββ.* Hind-limb Ornithic. Order 8, ORNITHOSCELIDA (= *Dinosauria*, Ow.).
      - *bb.* Manus with an extremely long ulnar digit. Order 9, PTEROSAURIA.

Finally, Cope,[3] by combining the modifications of the quadrate and supporting bones with the characters used by Huxley further developed Owen's classification, separating the *Pythonomorpha* and *Rhynchocephalia* as distinct orders from the Lacertilia. Whenever practicable he was guided in his nomenclature by priority. The following is an abstract of his classification :—

- I. Extremities beyond proximal segment not differentiated to form.
  - Order 1. ICHTHYOPTERYGIA (Ow.).
- II. Extremities differentiated.
  - A. *STREPTOSTYLICA* (Stann.).
    - Order 2. LACERTILIA.
    - Order 3. PYTHONOMORPHA (Cope).
    - Order 4. OPHIDIA.
  - B. *SYNAPTOSAURIA* (Cope).
    - Order 5. RHYNCHOCEPHALIA (Gthr.).
    - Order 6. TESTUDINATA.
    - Order 7. SAUROPTERYGIA (Ow.).
  - C. *ARCHOSAURIA* (Cope).
    - Order 8. ANOMODONTIA (Ow.).
    - Order 9. DINOSAURIA (Ow.).
    - Order 10. CROCODILIA (Ow.).
    - Order 11. ORNITHOSAURIA (Fitz.).

The most recent general work on Reptiles is from the pen of Dr C. K. HOFFMANN, and appears since the year 1879 in Brown's *Klassen und Ordnungen des Thierreichs.* The author treats with predilection the parts which relate to the anatomy of Reptiles, and which will prove to be of the greatest help to the student; each chapter is preceded by a list of the most important publications. The systematic part is composed with less critical discernment, and its usefulness for scientific purposes will scarcely be commensurate with the amount of labour bestowed on its compilation.

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[1] *Anatomy of Vertebrates*, London, 1866, 8vo, vol i p 6.

[2] *Op. cit.*, p. 16.

[3] *Proc Amer Assoc for the Advancement of Science*, 19th meeting, Cambridge, 1871, 8vo, pp 230 *sq.*

b. Special Systematic Works.

After having followed the general history of herpetology to the present period, we have to mention the works by which our knowledge of certain orders or of the various Reptilian faunæ has been specially advanced.

Crocodilia and Lacertilia.—We have already shown that the animals of these two orders were by the earlier authors thrown together in one group, of which a natural subdivision into families was attempted by Oppel and Cuvier, that Merrem (1820) was the first to recognize in the Crocodiles a separate group for which he proposed the name of *Loricata*, being followed therein by Blainville, who named the group *Emydo-sauriens*, and that Latreille actually recognized their affinities to the Chelonians, uniting them under the name of *Cataphracta*. In Wagler's and Fitzinger's systems a distinct advance is manifested by the employment of the tongue and also of the dentition as important characters. These, combined with the scutellation, the form of the toes, and the entire habitus, were also the characters on which the subsequent classifications by Wiegmann, Duméril and Bibron, Gray, and Stannius were based, the classifications varying according to the manner in which those characters are subordinated to one another. But, while the German and English herpetologists assign to the Amphisbænians, Chamæleons, and Crocodiles a rank more or less above, and distant from, the Lacertilian families, Duméril and Bibron take a singularly retrograde step in dividing Lizards into eight equivalent families, of which the first comprises the Crocodiles, and the second the Chamæleons, the Amphisbænians forming part of the family *Chalcididæ*. Gray was the last who dared to place the narrow-mouthed Snakes such as *Typhlops* and *Rhinophis* among Lizards.

In the two most recent classifications of the families of Lizards osteological (or rather craniological) characters supersede almost entirely those previously employed. COPE,[1] who had led the way in this direction, still allows subordinal value to the dentition as well as to the form of the tongue, as may be seen from the following scheme:—

Suborder 1. RHIPTOGLOSSA.
  Fam. 1. *Chamæleontidæ.*
Suborder 2. PACHYGLOSSA.
  Fam. 2. *Agamidæ.*
Suborder 3. NYCTISAURA.
  Fam. 3. *Gecconidæ.*
Suborder 4. PLEURODONTA.
    a. Iguania.
  Fam. 4, *Anolidæ*; 5, *Iguanidæ.*
    b. Diploglossa.
  Fam. 6, *Anguidæ*; 7, *Gerrhonotidæ*, 8, *Xenosauridæ*; 9, *Helodermidæ.*
    c. Thecaglossa.
  Fam. 10. *Varanidæ.*
    d. Leptoglossa.
  Fam. 11, *Teiidæ*; 12, *Lacertidæ*; 13, *Zonuridæ*; 14, *Chalcididæ*; 15, *Scincidæ*; 16, *Sepsidæ.*
    e. Typhlophthalmi.
  Fam. 17, *Anelytropidæ*: 18, *Acontiidæ*; 19, *Aniellidæ.*
Suborder 5. OPHIOSAURI.
  Fam. 20, *Amphisbænidæ*; 21, *Trogonophidæ.*

Finally, whilst adopting in principle Cope's classification, G. A. BOULENGER,[2] partly by extending his examination on types not seen by Cope, partly by differently valuing the various craniological characters, introduced considerable modifications:—

Suborder 1. LACERTILIA VERA.
  A. Tongue smooth or with villose papillæ; clavicle dilated, loop-shaped proximally; no postorbital or postfronto-squamosal arches.
    Fam. 1, *Geckonidæ*; 2, *Eublepharidæ.*
  B. Tongue smooth or with villose papillæ; clavicle not dilated proximally.
    Fam. 3, *Uroplatidæ*; 4, *Pygopodidæ*; 5, *Agamidæ*; 6, *Iguanidæ*; 7, *Xenosauridæ*; 8, *Zonuridæ*; 9, *Anguidæ*; 10, *Aniellidæ*; 11, *Helodermatidæ*; 12, *Varanidæ.*
  C. Tongue covered with imbricate, scale-like papillæ or with oblique plicæ; clavicle dilated proximally, frequently loop-shaped.
    Fam. 13, *Xantusiidæ*; 14, *Teiidæ*; 15, *Amphisbænidæ*; 16, *Lacertidæ*; 17, *Gerrhosauridæ*; 18, *Scincidæ*; 19, *Anelytropidæ*; 20, *Dibamidæ.*
Suborder 2. RHIPTOGLOSSA.
    Fam. 21. *Chamæleontidæ.*

The principal works to be consulted by the student of recent Crocodilians are the following:—

Cuvier, *Ossemens fossiles*, vol. v. part 2 (1824); Geoffroy St Hilaire, "Descriptions des Crocodiles du Nil," in *Mém. de l'Institut d'Égypte* (1813); Duméril and Bibron, *Erpétologie générale*, Paris, 8vo, vols. ii., iii. (1835-36); Huxley, "On the dermal armour of Jacare and Caiman, with notes on the generic and specific characters of recent *Crocodilia*," in *Jour. Proc. Linn. Soc.*, Zoology, vol. iv. pp 1-28 (1860); Bruhl, *Das Skelett der Krokodiliner, dargestellt in 20 Tafeln* (1862); Strauch, "Synopsis der gegenwärtig lebenden Crocodiliden," in *Mém. Acad. St Pétersburg*, vol. x. (1866); Rathke, *Untersuchungen über die Entwickelung und den Korperbau der Crocodile*, Brunswick, 4to (1866); Gray, *Catalogue of Shield-Reptiles in the Collection of the British Museum*,—part ii., Emydosaurians, Rhynchocephalia, and Amphisbænians, London, 4to (1872); Parker, *On the Structure and Development of the Skull in the Crocodiles*, London, 4to (1883).

The principal special works to be consulted by the student of recent Lacertilians are the following:—

Wiegmann, *Herpetologia mexicana,—Pars 1, Saurorum species amplectens*, Berlin, fol. (1834); Duméril and Bibron, *Erpétologie générale*, Paris, 8vo, vols. 2-5 (1836-39); Gray, *Catalogue of the Specimens of Lizards in the Collection of the British Museum*, London, 16mo (1845); Brucke, *Beiträge zur vergleichenden Anatomie und Physiologie des Gefäss-Systems der Amphibien*, Vienna, 4to (1852); Rathke, *Ueber den Bau und die Entwicklung des Brustbeins der Saurier* (1854); Fritsch, *Zur vergleichenden Anatomie des Amphibien-Herzens*, Berlin, 8vo (1869); Fürbringer, *Die Knochen und Muskeln der Extremitäten bei den schlangenähnlichen Sauriern*, Leipsic, 4to (1870); Braun, *Das Urogenitalsystem der einheimischen Reptilien*, Würzburg, 8vo (1877); Parker, *On the Structure and Development of the Skull in the Lacertilia*, (1879); Boulenger, *Catalogue of the Lizards in the British Museum*, 2d edition, London, 8vo (vol. i. in progress, 1885).

In a short sketch like the present it would be impossible to refer even to a small part only of the immense number of contributions by which our knowledge of Lizards has been advanced within the last forty years, either by adding to that of species previously imperfectly known, or by describing new generic and specific forms. But an idea of this increase may be formed by a comparison of Gray's and Boulenger's catalogues; whilst the former enumerated 186 species out of the families *Geckonidæ* and *Agamidæ*, Boulenger describes not less than 490 belonging to the same groups.

Ophidia.—We have already mentioned that in Oppel's system (1811) the first step is taken towards a natural classification of Snakes. Neither C. Duméril nor Merrem, Fitzinger nor Wagler, indicated the way towards a more natural arrangement; it seemed almost as if with the increase of the number of distinct genera their arrangement became more and more hopeless. In the meantime the Rijks Museum of Leyden had enriched itself under the able direction of Temminck, through the efforts of traveller-naturalists like Reinwardt, Kuhl, Van Hasselt, Boie, and Siebold from the Dutch colonies in the East and West Indies, with materials fairly rivalling those accumulated in Paris. They were at first studied by the brothers Friederich Boie and Heinrich Boie, who well characterized a number of genera but failed in the attempt to arrange them in a natural or logical system. All the more remarkable, therefore, is the production by H. SCHLEGEL of an *Essai sur la Physionomie des Serpens* (Leyden, 1837; 2 vols. 8vo, with atlas in fol.). In this classical work the whole of the subject is treated throughout in a scientific manner; the species are described with a clear discernment of really distinctive characters, the description being generally accompanied with a faithful outline figure of the head, and with a critical examination of the literature. Schlegel, besides, has the merit of having recognized the great importance of exactness with regard to localities, and of giving a general account of the geographical distribution of Snakes. The principle of classification adopted by Schlegel, indeed, is not one which will be recognized as final or even as legitimate at the present time, but it is one which is preferable to that employed by Müller, Duméril, and Bibron, which led, as we shall see presently, to the most artificial grouping of species. He divided the Snakes into families according to their "physiognomy," that is "l'impression totale que fait sur nous l'ensemble d'un être quelconque, impression que l'on peut sentir, mais qu'il est impossible de rendre au moyen de paroles; elle est le résultat de l'harmonie de toutes les parties isolées, dont on embrasse la confirmation d'un coup d'oeil, et dans leurs rapports mutuels." Schlegel had no training in, or knowledge of, anatomy; he, therefore, ignored Müller's researches which appeared a few years before his work; yet it is noteworthy that his classification stands in the main, and has not yet been superseded. He divides Snakes as follows

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[1] *Proc. Acad. Nat. Sci. Philadelphia*, 1864, pp. 224 *sq.*, and *Proc. Amer. Assoc. for the Advancement of Science*, 1870 (1871), pp. 236 *sq.*

[2] For an outline of his classification consult *Ann. and Mag. Nat. Hist.*, Aug. 1884, or *Catalogue of Lizards*, vol. i., 1885, p. 1.

I Non-venomous Snakes.
  Fam. 1. Burrowing.
    Gen. *Tortrix.*
  Fam. 2. Worm-like.
    Gen. *Calamaria.*
  Fam. 3. Terrestrial.
    Gen. *Coronella, Xenodon, Heterodon. Lycodon, Coluber, Herpetodryas, Psammophis.*
  Fam. 4. Arboreal.
    Gen. *Dendrophis, Dryophis, Dipsas.*
  Fam. 5. Freshwater.
    Gen. *Tropidonotus. Homalopsis.*
  Fam. 6. Boas.
    Gen. *Boa, Python, Acrochordus.*
II. Venomous Snakes.
  Fam. 7. Colubriform.
    Gen. *Elaps, Bungarus, Naja.*
  Fam. 8. Marine.
    Gen. *Hydrophis.*
  Fam. 9. Venomous Snakes proper.
    Gen. *Trigonocephalus, Crotalus, Vipera.*

Already in 1832 J. MÜLLER had proposed "a natural classification of Snakes on anatomical principles,"[1] in which he paid particular attention to the osteology of the hitherto dubious forms of Ophidians, but in the end based his arrangement entirely on the structure of the jaws and on the dentition. As he did not extend his examination into other parts of the organization of the various genera, it may suffice here to state that he divided all Snakes into two sections, the first of which (*Ophidia microstomata*) comprised the four families *Amphisbænoidea, Typhlopina, Uropeltacea,* and *Tortricina,* and the second (*Ophidia macrostomata*) all the other Snakes, which he referred to seven families.

The direction thus indicated by Müller was followed by DUMÉRIL and BIBRON, who, however, by their much more detailed knowledge of Snakes, were enabled to subdivide the unwieldy categories formed by Müller; also the genera which in Schlegel's system comprised Snakes with very different dentition had to be subdivided, and were defined with greater precision than had been done by any previous herpetologist. They divide Snakes into five equivalent sections[2]:—

1. OPOTÉRODONTES. Teeth in one of the jaws only: 2 families and 8 genera.
2 AGLYPHODONTES. Teeth in both jaws, none grooved: 12 families and 86 genera.
3. OPISTHOGLYPHES. Posterior maxillary teeth grooved: 6 families and 37 genera.
4. PROTÉROGLYPHES. Anterior maxillary tooth grooved and followed by other smooth teeth · 2 families and 16 genera.
5. SOLÉNOGLYPHES. Anterior maxillary teeth perforated and isolated: 2 families and 13 genera.

The progress made in ophiology from the time of the appearance of this work down to the present period consists rather in the increase of our knowledge of the great variety of species and genera than in the further development of the system. Gray, Reinhardt, Peters, Günther, Cope, Bocage, Jan, Krefft, and others described a large number of forms, so that the number of those known to Duméril and Bibron has now been perhaps trebled or quadrupled. Unfortunately, no general work corresponding to the present state of science exists. But two works published subsequently to the *Érpétologie générale* are indispensable to the student.

The first is the *Catalogue of the Specimens of Snakes in the Collection of the British Museum,* of which the first part, containing the Viperine Snakes, Water-Snakes, and Boas, by J. E. GRAY, appeared in 1849, and the second, containing the Colubrines, by A. GÜNTHER in 1858. The classification, which was much behind its time, was fixed by the former of the two authors, so that the latter had to accommodate the arrangement of his part to that of his predecessor. However, he strongly opposed the application of the character of grooved posterior teeth to the formation of large sections, and generally adopted the principle advocated by Schlegel, whose generic groups were raised into families. A great number of Snakes unknown to Duméril are described in these catalogues, whilst others which happened not to be represented in the British Museum are omitted.

G. JAN in his *Elenco sistematico degli Ofidi descritti e disegnati per l'Iconografia generale* (Milan, 1863, 8vo) generally adopts the families created by Günther, but institutes under each two divisions, *Aglyphodonta* and *Glyphodonta.* Jan's great merit is the publication of his *Iconographie générale des Ophidiens* (Milan, 1860–76[3]), in which he figures all species which were in the Milan Museum or lent to him by other institutions, and which thus forms an invaluable aid in the determination of species. The author died during the progress of the work, but it was continued by his artist, Sordelli. No descriptive letterpress worthy of the name accompanies this work.

The anatomy of Ophidians has hitherto received less attention than that of the other Reptilian orders. Besides the information contained in general works, we refer here only to two important special treatises:—

Rathke, *Entwicklungsgeschichte der Natter,* Königsberg, 1839, 4to, and Parker, *On the Structure and Development of the Skull in the Common Snake* (*Tropidonotus natrix*), London, 1879, 4to.

Chelonians.—Of ante-Cuvierian authors who paid special attention to this suborder the following deserve special mention:—J. G. WALBAUM,[4] J. G. SCHNEIDER,[5] J. D. SCHOEPF,[6] and A. F. SCHWEIGGER.[7] Five or six distinct types of Chelonians were soon recognized, and appear also in Cuvier's *Règne Animal*, viz., *Testudo*, *Emys*, *Chelys*, *Trionyx*, *Chelonia* with *Sphargis*. These types were at first recognized as genera, and raised by the subsequent authors to the rank of families, in which many more genera were distinguished, the arrangements merely differing in the various methods of subordination of the different families.

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[1] Tiedemann's *Zeitschr. f Physiologie,* vol. iv. p. 263 *sq.*

[2] Duméril changed the nomenclature adopted in his sixth volume when, eight years afterwards, he published the seventh after the death of Bibron. We give here the revised nomenclature.

[3] The latest parts were issued without date between 1876 and 1882.

[4] *Chelonographia, oder Beschreibung einiger Schildkröten,* Lübeck, 1782, 4to.

[5] *Allgemeine Naturgeschichte der Schildkröten,* Leipsic, 1783, 8vo.

[6] *Historia Testudinum iconibus illustrata,* Erlangen, 1792–1801, 4to (left incomplete by the death of the author).

[7] *Prodromi Monographiæ Cheloniorum sect. 1a et 2a,* Königsberg, 1814, 8vo.

The anatomy of Tortoises was investigated chiefly by C. Perrault, who gave a detailed description of one of the Gigantic Land Tortoises in *Mém. Ac. Sc. Paris*, iii. (1666–69); by Cuvier in the *Ossemens fossiles*; by Wiedemann in *Arch. f. Zool. und Zoot.*, 1802; by Geoffroy St Hilaire in *Ann. Mus.*, xiv.; and especially by L. H. Bojanus,[1] who published an anatomical monograph of *Emys europæa*, in which all parts are illustrated in detail, the plates being accompanied by an explanatory text. H. Rathke[2] studied their development, and L. Agassiz[3] and W. K. Parker[4] that of the Turtles.

The most complete systematic and descriptive work is that by J. E. GRAY. He engaged in the study of Tortoises at various times, subdividing the principal groups, as the materials grew under his hands, at first principally on the ground of external characters, and afterwards of such craniological features as seemed to him of generic value.[5] ALEXANDER STRAUCH contributed two painstaking memoirs,[6] the second of which is especially valuable as it contains a collection of all the published facts concerning the distribution of Tortoises over the globe. The authors mentioned associated *Sphargis* with *Chelonia*, the later ones generally as the type of a distinct family, all the marine Turtles being comprised in a section *Pinnata* or *Euereta* (Stannius); and it was only COPE who recognized in the want of specialization of the skeleton of the Leathery Turtle sufficient grounds for separating it into a distinct section, *Athecæ*.

c. Faunistic Works.

In noticing the principal faunistic works, we omit the majority of the older and antiquated publications, and almost all treatises which appeared in periodicals, as their existence can be readily ascertained by reference to works of more modern date or of a more general scope.

Europe.—(1) T. Bell, *A History of British Reptiles*; 2d ed., London, 1849, 8vo. (2) S. Nilsson, *Skandinavisk Fauna*, pt. iii.; *Amfibierne*, 2d ed., London, 1860, 8vo. (3) A. Strauch, "Die Schlangen des Russischen Reichs," *Mém. Ac. Sc. St Pétersbourg*, xxi. 1873, 4to. (4) H. Schlegel, *De Dieren van Nederland: Kruipende Dieren*, Haarlem, 1862, 8vo. (5) F. Leydig, *Die in Deutschland lebenden Arten der Saurier*, Tubingen, 1872, 4to; and *Ueber die einheimischen Schlangen*, Frankfort, 1883, 8vo. (6) E. Schreiber, *Herpetologia Europæa*, Brunswick, 1875, 8vo. (7) V. Fatio, *Faune des Vertébres de la Suisse*, vol. iii. of *Hist. nat. des Reptiles et des Batraciens*, Geneva, 1872, 8vo. (8) C. L. Bonaparte, *Iconografia della Fauna italica*, vol. ii., "Amfibi." Rome, 1832-41, fol. (9) E. de Betta, *Erpetologia delle provincie Venete e del Tirolo meridionale*, Verona, 1857, 8vo. (10) A. Strauch, "Essai d'une Erpetologie de l'Algérie," *Mém. Acad. Sci. St Pétersburg*, 1862, 4to. (11) F. Lataste, *Essai d'une Faune Herpétologique de la Gironde*, Bordeaux, 1876, 8vo. (12) J. von Bedriaga, *Die Amphibien und Reptilien Griechenlands*, Moscow, 1882, 8vo.

Persia.—W. T. Blanford, *Eastern Persia*, vol. ii., London, 1876, 8vo.

Japan.—H. Schlegel, *Fauna Japonica—Reptiles*, Leyden, fol.

East Indies.—(1) P. Russel, *Account of Indian Serpents, collected on the coast of Coromandel, containing Descriptions and Drawings of each Species*, London, 1796, fol., and *A Continuation of an Account of Indian Serpents*, London, 1801-9, fol. (2) H. Schlegel, *Abbildungen neuer oder unvollständig bekannter Amphibien*, Düsseldorf, 1837-44, text 8vo, atlas fol. (3) J. E. Gray and Hardwicke, *Illustrations of Indian Zoology*, London, 1830-32, fol. (4) T. Cantor, *Catalogue of Reptiles inhabiting the Malayan Peninsula and Islands*, Calcutta, 1847, 8vo. (5) A. Günther, *Reptiles of British India*, London, 1864, fol. (6) W. Theobald, *Catalogue of the Reptiles of British India*, Calcutta, 1876, 8vo. (7) J. Fayrer, *The Thanatophidia of India*, London, 1874, fol. (8) J. Anderson, *Anatomical and Zoological Researches, comprising an account of the Zoological Results of the two Expeditions to Western Yunnan*, London, 1878, 4to.

Africa.—(1) *Description de l'Égypte—Histoire naturelle—Reptiles*, Paris, fol., 1809, &c. (2) A. Smith, *Illustrations of the Zoology of South Africa*, London, 8vo, 1849. (3) W. Peters, *Naturwissenschaftliche Reise nach Mossambique—Zoologie*, iii., "Amphibien," Berlin, 1882, 4to.

North America.—(1) R. Harlan, *American Herpetology, or Genera of the North American Reptilia with a Synopsis of the Species*, Philadelphia, 1827, 8vo. (2) J. E. Holbrook, *North American Herpetology, or a Description of the Reptiles inhabiting the United States*, 5 vols., with numerous col. plates, Philadelphia, 1836-43, 4to. (3) D. H. Storer, "Report on the Reptiles of Massachusetts," in *Boston Jour. Nat. Hist.*, iii., 1841, pp. 1-65. (4) J. E. De Kay, *Zoology of New York*, vol. iii., "Reptiles and Amphibia," Albany, 1842, 4to. (5) S. F. Baird and S. Girard, *Catalogue of North American Reptiles in the Museum of the Smithsonian Institution*, pt. i. "Serpents," Washington, 1853, 8vo. (6) Id., Reports upon Reptiles in *Reports of Explorations for a Railroad from the Mississippi to the Pacific Ocean*, Washington, 1859, 4to. (7) L. Agassiz, *Contributions to the Natural History of the United States of America*, vol. ii., "North American *Testudinata*," Boston, 1857, 4to. (8) S. Garman, "On the Reptiles and Batrachians," *Mem. Mus. Comp. Zool.*, Cambridge, 1883, 4to. (9) H. C. Yarrow, *Check-List of the North American Reptiles and Batrachians, with Catalogue of the Specimens in the U. S. National Museum*, Washington, 1883, 8vo. (10) E. D. Cope is the author of numerous memoirs and papers in the various North American periodicals.

Tropical America.—(1) Prince Maximilian von Wied, *Abbildungen zur Naturgeschichte Brasiliens*, Weimar, 1822-31, fol., and *Beiträge zur Naturgeschichte von Brasilien*, i. "Amphibien," Weimar, 1825, 8vo. (2) J. B. Spix, *Serpentum Brasiliensium species novæ*, Munich, 1824, fol.; Id., *Ranæ et Testudinis Brasiliensis species novæ*, Munich, 1825, fol.; Id., *Animalia nova sive species novæ Lacertarum quas in itinere per Brasiliam annis 1817-20, jussu et auspiciis Maximiliani Josephi I., Bavariæ regis, suscepto collegit et descripsit, &c.*, Munich, 1825, fol. (3) A. F. A. Wiegmann, *Herpetologia mexicana*, pars i., Saurorum species amplectens, Berlin, 1834, fol. (4) J. J. v. Tschudi, *Untersuchungen über die Fauna peruana auf einer Reise in Peru während der Jahre 1838-42*, St Gall, 1846, fol. (5) Guichenot, in C. Gay's *Historia fisica y politica de Chile*, ii., "Reptiles," Paris, 1848, 8vo, atlas fol. (6) Cocteau and Bibron, in Ramon de la Sagra's *Histoire physique, politique, et naturelle de l'île de Cuba—Reptiles*, Paris, text 8vo, atlas fol. (7) F. de Castelnau's *Expédition dans les parties centrales de l'Amérique du Sud—Zoologie—Reptiles*, by A. Guichenot, Paris, 1855, 4to. (8) C. Girard, *Reptiles* (from Chili) *in U. S. Naval Astronomical Expedition to the Southern Hemisphere*, vol. ii., Washington, 1855, 4to. (9) S. F. Baird, *U. S. Exploring Expedition*, vol. xx., "Herpetology," Philadelphia, 1858, atlas fol. (10) Duméril and Bocourt, *Mission scientifique au Mexique et dans l'Amerique Centrale—Études sur les Reptiles et les Batraciens*, Paris, 1870, 4to (in progress). (11) A. Günther, in Salvin and Godman's *Biologia Centrali-Americana—Reptiles*, London, 1885, 4to (in progress). (12) E. D. Cope, numerous papers in the various North American periodicals.

Australia.—(1) J. E. Gray and A. Günther treat of the Lizards in *Zoology of the Voyage of H.M.S. "Erebus" and "Terror,"* London, 1844, 1875, 4to. (2) G. Krefft, *The Snakes of Australia*, Sydney, 1869, 4to. (3) W. Peters and J. Doria, in *Ann. Mus. Genov.*, xiii., 1878, 8vo.

GENERAL CHARACTERS OF THE CLASS *REPTILIA*.

Reptiles are vertebrate animals, the skin of which is covered with horny or bony plates (scales or scutes). The heart has two auricles, but with the ventricular chamber generally incompletely divided; two arterial trunks emerge from the right portion of the ventricle; the blood of the arterial and venous systems mixes either in the heart or at the origin of the aortic arches. Respiration takes place by lungs, never by branchiæ; portions of the lungs are simple without minute subdivision of the cavity; and the respiratory movements are slow and irregular. In consequence, Reptiles are cold-blooded animals. Their blood-corpuscles are red and nucleated. The thoracic and abdominal viscera are never separated by a complete diaphragm. The intestinal tract and the urogenital organs open into a common cloaca; the oviducts are developed from the Müllerian ducts, and dilated in their lower course for the reception of the ova; all Reptiles are oviparous or ovoviviparous.

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[1] *Anatome Testudinis europææ*, Vilna, 1819-21, fol.

[2] *Ueber die Entwicklung der Schildkröten*, Brunswick, 1848, 4to.

[3] "Embryology of the Turtle," in *Contributions to the Natural History of the United States of America*, vol. ii., Boston, 1857, 4to.

[4] "The Development of the Green Turtle," in *Voy. "Challenger," Zoology*, vol. i., London, 1880, 4to.

[5] *Catalogue of Shield-Reptiles in the Collection of the British Museum.*—part 1, *Testudinata*, London, 1855, 4to; followed by *Supplement to the Catalogue, &c.*, 1870, and by *Appendix to the Catalogue, &c.*, 1872.

[6] "Chelonologische Studien" and "Die Verbreitung der Schildkröten über den Erdball," in *Mémoires de l'Acad. de St Pétersb.*, 1862 and 1865.

The vertebral column articulates with the skull almost invariably by means of a single convex occipital condyle. The mandible consists of several distinct pieces, of which the articular bone articulates with a quadrate bone, interposed between skull and mandible. When the appendicular parts of the skeleton are present, the sternum is never replaced by membrane bone, and the posterior sternal ribs are attached to a median prolongation of the sternum. The ilia are prolonged farther behind the acetabulum than in front of it; the pubic bones directed downward and forward, and, like the ischia, forming a median symphysis. The metatarsal bones are not anchylosed among themselves or with the distal tarsal bones.

As in Birds and Mammals, the fœtus of Reptiles is enclosed in an amnion and allantois (*Amniota*), and nourished from the vitellus of the egg.

In some of the most important characters mentioned above Reptiles agree with Birds, as in the presence of a single occipital condyle, a complex lower jaw articulated to the skull by a quadrate bone, and nucleated blood-corpuscles. The majority of naturalists, therefore, consider the two classes to constitute one of the main divisions of Vertebrates, the *Sauropsida*. At the present epoch, indeed, Birds are strikingly differentiated from Reptiles, but the discoveries within recent years of a number of extinct Birds with Reptilian characters offer ample evidence that Birds are the descendants of some branch or branches of the Reptilian type, in which the power of flight was developed, and with it other anatomical peculiarities by which Birds are now distinguished from living Reptiles.

THE DIVISION OF *REPTILIA* INTO ORDERS.

Of the various modifications that have been proposed in the classification of Reptiles the more important are mentioned in the historical part of this article. We adopt here a serial arrangement of those orders which seem to be well established, having already referred to the attempts that have been made to arrange these orders into higher groups.

Order 1. ICHTHYOPTERYGIA (extinct). Marine Reptiles with a Cetacean-like naked body and with four limbs formed into paddles, the parts of which after the humerus are not differentiated as to form or function. Tail long. Vertebræ numerous, biconcave; no sacrum. Dorsal vertebræ with double tubercles; ribs movable, the anterior with bifurcate heads. Head large, with long powerful snout, joined to the trunk without neck. Quadrate bone immovably articulated to squamosal. A foramen parietale is present. Orbits very large with a circle of sclerotic plates. A pair of clavicles rest upon an interclavicle and pass laterally to the scapulæ; a pair of broad not overlapping coracoids form the posterior part of the pectoral arch. A sternum is replaced by a series of abdominal splints.

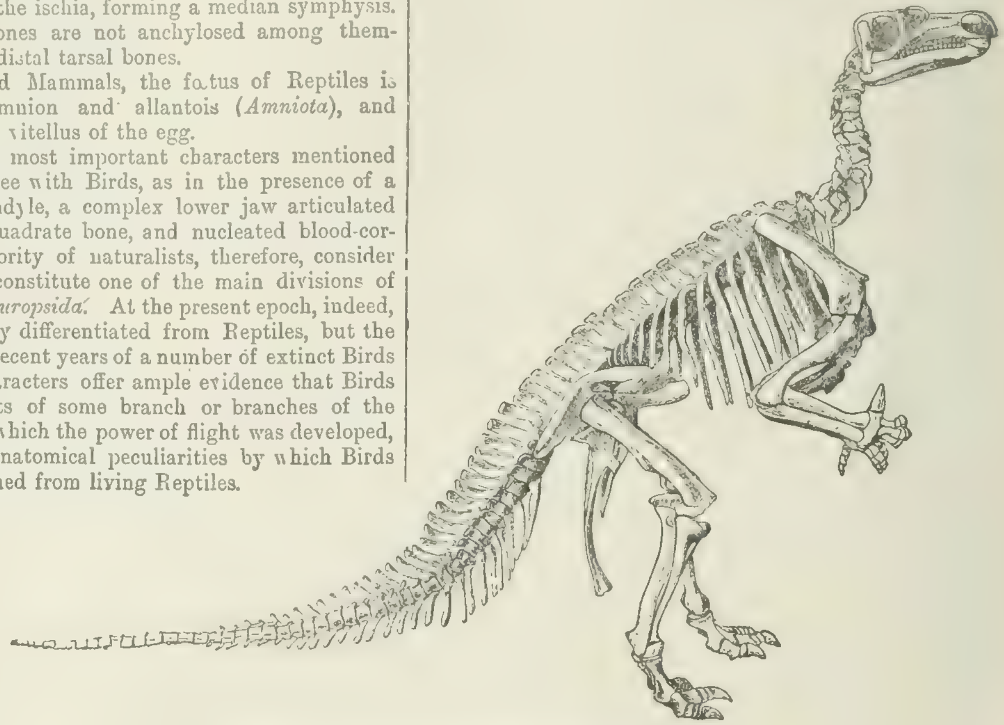

FIG. 1.—Skeleton of *Iguanodon bernissartensis* (after Dollo).

Fam. *a. Sauranodontidæ.* Edentulous. Genus: *Sauranodon*, from the Jurassic formations of the Rocky Mountain region.

Fam. *b. Ichthyosauridæ.* Teeth numerous, implanted in a common alveolar groove. Genus: *Ichthyosaurus*, from Mesozoic strata up to the Chalk.

Order 2. ANOMODONTIA (extinct). Lacertiform Reptiles, the skull and four limbs of which are Lacertilian in most of their characters. Vertebræ biconcave, four or five of them anchylosed together and forming a sacrum. The tubercular and capitular articulations are separated, the former and longer being on the diapophysis, the latter and shorter on the centrum; ribs movable, the anterior with a bifurcate head. Os quadratum suturally connected with the skull. A foramen parietale is present. Jaws Chelonian and probably cased in horny sheaths; either edentulous or each maxillary bone was armed with a long evergrowing tusk, which sometimes was accompanied by other smaller teeth. The pectoral arch consisted of scapula and coracoid, but a clavicle seems to have been absent. Pelvis very strong, with continuous ischio-pubic symphysis.

Genera: *Dicynodon*, *Galesaurus*.

Order 3. DINOSAURIA (extinct). This comprises Reptiles of a great diversity of form and size, some adapted for a terrestrial, others for an aquatic life, some carnivorous, the majority herbivorous, but all distinguished by characters leading more or less closely from the Reptilian up to the Avian type. The majority of trunk vertebræ have flat or slightly concave articular ends, sometimes a few of the anterior are convex in front; cervical vertebræ numerous; a sacrum is formed by more than two coalesced vertebræ. Neural arches united to the centra by sutures. Thoracic ribs movable, with a bifurcate head; cervical ribs united to the vertebræ either by suture or anchylosed.

Os quadratum suturally connected with the skull. The premaxillary bones are separate, and the rami of the lower jaw united in front by cartilage only. Form of the teeth variable; they are not anchylosed to the bone. Two pairs of limbs are present, of which the hinder pair is the longer and larger, and generally ambulatory. The structure of the pelvis and hind limbs partly Ornithic; the pelvic bones are not coalesced with each other or with the sacrum; the pubis enters into the formation of the acetabulum, and the ilium is prolonged forwards in front of the acetabulum; ischia united in a median ventral symphysis. The head of the femur is placed at a right angle to the condyles; tibia with a procnemial crest, and a ridge for the fibula, which is complete. The proximal row of tarsals is formed by the astragalus and calcaneum only, and the former sometimes anchylosed with the tibia, thus forming the upper portion of the ankle-joint.[1]

All the Dinosaurian remains known at present belong to the Mesozoic age; they appear first in the Triassic, but the majority from these formations are so fragmentary that their classification is subject to much uncertainty. Some at least of the celebrated three-toed footprints which were discovered some fifty years ago in the United States, and about the origin of which much uncertainty existed, are evidently those of Dinosaurs. In the Jurassic these Reptiles attained their greatest development, Marsh distinguishing among the fossils of this period four orders with numerous families. The largest exceeded any other land animal in size, and measured from 50 to 80 feet. Dinosaurs continued to the end of the Cretaceous period, and some genera became highly specialized, although none attained to the same large size as some of the Jurassic forms.

The disproportion in length and strength between the fore and hind limbs clearly shows that the mode of progression differed widely from that of ordinary Reptiles, and was bipedal at least in some of the genera. In assuming an erect position, their long tail assisted them in balancing the body. Some possessed a dermal armour, the scutes being sometimes produced into enormous spines; others were provided with defensive weapons in the shape of spines attached to the fore-feet. The teeth vary exceedingly: in some of the carnivorous genera they are sharp, pointed, serrated, and recurved, in others flat, in others broad and molar-like; in some the premaxillæ are toothed, in others toothless and beak-like.

Marsh compares the Dinosaurs, as regards diversity of form, with the Marsupials, and thinks that, like these latter, they should take the rank of a subclass rather than order. The following is an abstract of his latest classification of the proposed subclass *Dinosauria*:—

Order 1. SAUROPODA. Feet plantigrade, ungulate; five digits in manus and pes; second row of tarsals and carpals unossified. Pubes united distally by cartilage; no post-pubis. Anterior vertebræ opisthocœlian. Presacral vertebræ hollow. Fore and hind limbs nearly equal; limb bones solid. Sternal bones paired. Premaxillaries with teeth. Anterior nares at top of the skull.—Herbivorous.

Fam. *a. Atlantosauridæ.* Ischia directed downwards, with expanded extremities meeting on median line. Anterior caudal vertebræ with lateral cavities. Genera: *Atlantosaurus, Apatosaurus, Brontosaurus.* Gigantic Dinosaurians from Upper Jurassic deposits of Colorado, species of the first genus having attained to the enormous length of 80 feet. They are the least specialized forms of the subclass, and approach in some respects Mesozoic Crocodilians.

Fam. *b. Diplodocidæ.* Ischia with a straight shaft, not expanded distally, directed downward and backward, with the ends meeting in the median line. Caudal vertebræ deeply excavated below.—One genus: *Diplodocus*, from the same formation as the preceding, with very weak dentition, limited to the fore part of the jaws.

Order 4. ORNITHOSAURIA (extinct). Reptiles with the fore limb adapted to support a flying membrane, and

Fam. *c. Morosauridæ.* Ischia slender, with twisted shaft, directed backward, and with the sides meeting in the median line. Anterior caudal vertebræ solid. Genera, occurring in Europe as well as America: *Bothriospondylus, Cetiosaurus, Chondrosteosaurus, Eucamerotus, Ornithopsis, Pelorosaurus.*

Order 2. STEGOSAURIA. Feet plantigrade, ungulate; five digits in manus and pes; second row of carpals unossified. Post-pubis present. Fore limbs very small; locomotion mainly on hind limbs. Vertebræ and limb bones solid. An osseous dermal armour.—Herbivorous.

Fam. *a. Stegosauridæ.* Vertebræ biconcave. Ischia directed backward, with the sides meeting in the median line. Astragalus coalesced with tibia. Metatarsal short. Genera: *Stegosaurus* (*Hypsirhophus*), some 30 feet long, from the Jurassic beds of the Rocky Mountain region, well armed with enormous bucklers, some of which bore spines; *Diracodon*; *Amosaurus*, from British formations (Kimmeridge Clay).

Fam. *b. Scelidosauridæ.* Astragalus not coalesced with tibia; metatarsals elongate. Genera European: *Scelidosaurus*, from the Lias; *Acanthopholis*, from the Chalk; *Cratæomus*; *Hylæosaurus*, from the Wealden; and *Polacanthus.*

Order 3. ORNITHOPODA. Feet digitigrade with five functional digits in manus and three or four in pes. Post-pubis present. Vertebræ solid. Fore limbs small; hind-limbs hollow. Premaxillaries edentulous in front.—Herbivorous.

Fam. *a. Hadrosauridæ.* Several series of teeth, forming with use a tessellated grinding surface. Anterior vertebræ opisthocœlous. Genera American. *Hadrosaurus, Agathaumas* (?), *Cionodon.*

Fam. *b. Hypsilophodontidæ.* A single series of teeth. Four functional digits in pes. A single rhomboidal sternal ossification. Genus: *Hypsilophodon*, from the Wealden of the Isle of Wight.

Fam. *c. Iguanodontidæ.* A single row of teeth. Three functional digits in pes. Two symmetrical sternal ossifications. Two genera from Europe: *Iguanodon* and *Vectisaurus*; and three comparatively small forms from the Dinosaurian deposits in North America: *Camptonotus, Laosaurus, Nanosaurus.* Of these *Iguanodon* is the one which was first discovered (1825), and of which skeletons have been obtained as complete as we can ever hope to see of these creatures. The remains occur in formations from the Kimmeridge Clay to the Upper Greensand, and have been referred to three species, varying in size from 10 to 35 feet in length. They most probably were aquatic in their habits, using their powerful tail as a propelling organ, like the Crocodiles; but they differed from them in their mode of locomotion on shore, walking on their hind legs like a Struthious Bird. (See fig. 1.)

Order 4. THEROPODA. Feet digitigrade; digits with prehensile claws. Pubes distally coalesced. Vertebræ more or less cavernous. Fore limbs very small; limb bones hollow. Premaxillaries with teeth.—Carnivorous. This order, although on the whole comprising less gigantic fossils than the preceding, includes some very large forms which are believed to have preyed upon the weaker herbivorous members of Dinosaurians.

Fam. *a. Megalosauridæ.* Vertebræ biconcave. Pubes slender and united distally. Astragalus with ascending process. Five digits in manus and four in pes. Genera: *Megalosaurus* (European), *Allosaurus, Cœlosaurus, Creosaurus, Dryptosaurus* (*Lælaps*) (American).

Fam. *b. Zanclodontidæ.* Vertebræ biconcave. Pubes broad, elongate plates with anterior margins united. Astragalus without ascending process. Five digits in manus and pes. Genera: *Zanclodon Teratosaurus* (?) from the European Trias.

Fam. *c. Amphisauridæ.* Vertebræ biconcave. Pubes rod-like; five digits in manus and three in pes. Genera: *Amphisaurus* (*Megadactylus*), *Bathygnathus* (?), *Clepsysaurus* (?) (American); *Palæosaurus* and *Thecodontosaurus*, European Trias.

Fam. *d. Labrosauridæ.* Anterior vertebræ opisthocœlous and cavernous. Metatarsals much elongated. Pubes slender, with anterior margins united. Genus: *Labrosaurus*, from America.

Fam. *e.* (or suborder) *Cœluria.* Bones pneumatic or hollow. Anterior cervical vertebræ opisthocœlous, the other biconcave. Metatarsals very long and slender. Genus: *Cœlurus*, from America. Very imperfectly known; the remains indicate animals not larger than a wolf, and possibly of arboreal habits.

Fam. *f.* (or suborder) *Compsognatha.* Anterior vertebræ opisthocœlous. Three functional digits in manus and pes. Ischia with a long symphysis in the median line. One genus: *Compsognathus*, from Solenhofen; a small form, with long neck, lightly built head, strongly toothed jaws, small fore and very long hind limbs; its femur was shorter than the tibia.

Order 5. HALLOPODA. Feet digitigrade, unguiculate; three digits in pes; metatarsals much elongate; calcaneum much produced backwards. Fore limbs very small; vertebræ and limb bones hollow; vertebræ biconcave. Genus: *Hallopus.* Its pertinence to the Dinosaurians is doubtful. The hind feet were adapted for leaping with the remainder of the skeleton secondarily modified for aerial progression. Vertebræ not numerous, procœlous; from three to six forming a sacrum; cervical vertebræ exceeding in size the others. No neuro-central suture. Anterior ribs with bifurcate heads. Skull large, bird-like, with long jaws. Os quadratum suturally connected with the skull. Orbits very large, with a ring of sclerotic plates. Sternum broad, completely ossified, with a median crest anteriorly. Scapula and coracoid slender, Bird-like; no clavicle. Phalanges of the ulnar digit exceedingly elongate. Pelvis weak; hind limb smaller than fore limb. Bones generally hollow, many with pneumatic foramina.

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[1] In the case of no other group of Reptiles has knowledge, within the last few years, advanced so much as in that of Dinosaurians. It has supplied, on the part of the Reptilian type, the remarkable forms by which the chasm between living Birds and Reptiles is bridged over. Huxley's interpretation as to the affinities of these fossils, which was at first based on very imperfect materials, but on sufficient evidence to lead him to substitute the name of *Ornithoscelida* for the older one of *Dinosauria*, has been fully verified by the astonishing discoveries of most perfect remains at Bernissart in Belgium and in Jurassic formations of the United States. Compared with these recent discoveries, the materials upon which Von Meyer, Owen, Leidy, Hulke, and Seeley based their researches must appear very fragmentary. The specimens found in the Wealden of Bernissart were those of different species of *Iguanodon*, the skeletons of which were almost complete, the bones being preserved in their natural position and connexion; they have formed the subject of a series of memoirs by L. Dollo (*Bull. Mus. R. d'Hist. Nat. Belg.*, 1882–84). But these materials are far surpassed, as regards number and diversity of forms, by the discoveries in America, which have been made known by Cope and especially by O. C. Marsh.

Fam. *a. Pterosauria.* Jaws toothed; scapula and coracoid separate. Genera: *Pterodactylus, Rhamphorhynchus, Dimorphodon,* from Jurassic formations of Europe; of smaller or medium size.

Fam. *b. Pteranodontia.* Edentulous; scapula and coracoid solidly united, the former articulating with the [illegible] neural spine of the vertebræ. Genus: *Pteranodon,* from Cretaceous strata of Kansas; specimens with a spread of wing of some 20 feet.

Order 5. CROCODILIA. Reptiles with Lizard-like body, and long powerful tail adapted for swimming. Limbs short, especially the anterior; five digits in manus and four in pes; only three of the digits are clawed. A dermal armour, consisting of flattened bony scutes, covers the back, and in some genera the abdomen. Teeth in a single row, implanted in distinct sockets. Nostrils generally at or near the end of the snout. Vertebræ with the neuro-central suture persistent. Two sacral vertebræ only. The majority of the cervical and trunk ribs double-headed, attached to the diapophysis and centrum of the vertebra. From seven to nine of the anterior dorsal ribs are united with the sternum by sternal ribs. Bones of the skull very solid, firmly united by sutures, as is also the quadrate bone. Heart with a double ventricle. Copulatory organ single, situated in the cloaca.

Fam. *a.* (or suborder, *Procœlia*). With procœlous vertebræ. All living genera and the extinct forms down to the Chalk belong to this division.

Fam. *b.* (or suborder) *Amphicœlia.* With amphicœlous vertebræ. All the genera are pre-Cretaceous: *Teleosaurus, Goniopholis, Streptospondylus, Stagonolepis,* [illegible] (?), *Belodon.*

Order 6. SAUROPTERYGIA (extinct). Marine Reptiles with long neck, small head, long tail, natatory limbs, and a naked skin. Hind and fore limbs identical in structure and form, transformed into Cetacean-like paddles with five digits, which were composed of numerous phalanges and enclosed in a common skin. Teeth in a single row in both jaws, implanted in distinct sockets. Vertebræ amphicœlous, with the neuro-central suture persistent; single-headed ribs are attached to the long diapophyses of the dorsal vertebræ. Sacral vertebræ two. Quadrate bone suturally united with the skull. A parietal foramen. No sclerotic ring. Neither sternal ribs nor sternum are present but a system of free abdominal ribs is developed. The pectoral arch consists of a pair of large coracoids, meeting in the median line, and clavicular elements extending from one scapula to the other. Pelvis large, with the ilia, pubes, and ischia not coalesced, and all sharing in the formation of the acetabulum.

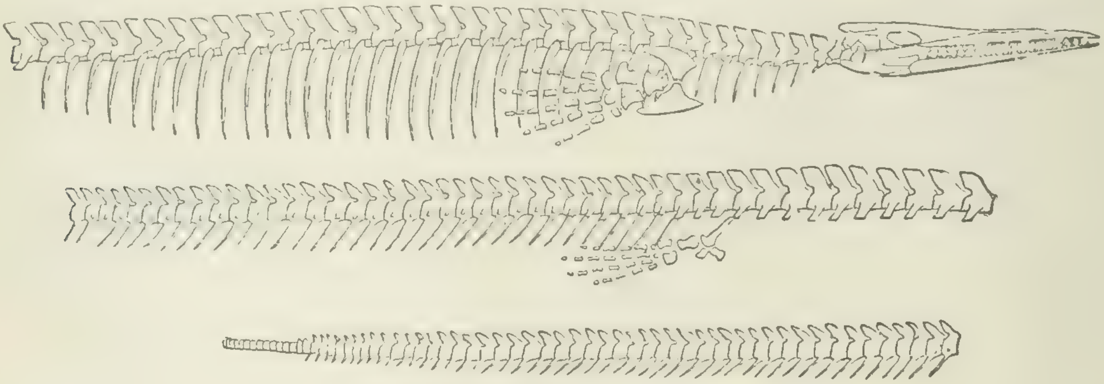

FIG. 2.—Skeleton of Clidastes (after Cope).

These characters may not fully apply to all the genera which have been referred to this order, as some are known from their skulls or other fragments only.

The best known are the PLESIOSAURIANS (*q.v.*) proper:—*Neusticosaurus,* from the Trias, with paddles in front and ordinary limbs behind: gigantic forms from the Trias, as *Nothosaurus, Simosaurus, Pistosaurus,* or post-Triassic, as *Plesiosaurus,* and *Pliosaurus, Polycotylus,* and *Elasmosaurus* (or *Discosaurus*) from the Lias and Chalk.[1]

Order 7. RHYNCHOCEPHALIA. Lacertiform Reptiles, with four limbs. Vertebræ with flat ends; two in the sacrum; the tubercular and articular surfaces are united; ribs single-headed. Os quadratum suturally united with the skull and pterygoid; an osseous infra-temporal bar. Foramen parietale present. Sternum and a system of abdominal ribs well developed. Copulatory organs absent; urinary bladder present.

One recent genus: *Hatteria.* Represented in the Upper Cretaceous and Lower Eocene by *Champsosaurus,* in the Trias by *Rhynchosaurus, Hyperodapedon* and in the Permian by *Proterosaurus, Sphenosaurus, Telerpeton* (?), *Saurosternum* (?).

Order 8. LACERTILIA. Lizards. Vertebræ generally procœlous, with short or rudimentary transverse processes; sacral vertebræ not exceeding two; ribs single-headed. Os quadratum articulated with the skull. Parts of the ali and orbito-sphenoid regions fibro-cartilaginous. Temporal region without, or with only one, osseous bar. Limbs four, two, or absent; when they are present, a sternum with sternal ribs and a pelvis are developed. Copulatory organs paired; urinary bladder present. Integuments with horny or sometimes bony scutes.

For the numerous recent genera see LIZARDS. Distinguishable representatives of the order appear first in Jurassic formations and thence downward to our period: *Acrosaurus, Ardeosaurus, Pleurosaurus, Saphiosaurus, Atoposaurus,* and *Homœosaurus* from the Oolite; *Nuthetes, Saurillus, Macellodon* from the Wealden, *Dolichosaurus, Acteosaurus, Coniosaurus, Rhapiosaurus* from the Chalk. From Tertiary formations in Europe numerous small remains are known, whilst those described from Australia belonged to much larger forms, showing more or less affinities to the Lizards of the present Australian fauna.

A distinct division of this order includes the extinct Mosasaurians, which are, in fact, the Pinnipedes among Lacertilians. Their limbs, of which they had two pairs, are transformed into paddles; by their long Snake-like body and large size the marine Reptiles form the nearest approach in nature to the modern creature of imagination, the "Sea-Snake." There is no question that they deviate more from the Lacertilian type than any of the other fossil forms mentioned above, especially in some of their cranial characters, which are more Ophidian. Hence Cope placed them into a distinct order of Reptiles, *Pythonomorpha*. Their body was covered with osseous scut

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[1] It is very doubtful whether *Placodus,* originally described as a Fish, belongs to this order.

Besides *Mosasaurus*, remains of which have been known and described since the year 1766, a number of other genera from Cretaceous rocks of Europe and North America have been distinguished by Owen, Cope, Marsh, and Dollo: *Liodon*, *Clidastes* (fig 2), *Sironectes*, *Platecarpus*, *Baptosaurus*, *Diplotomodon*, *Edestosaurus*, *Holosaurus*, *Lestosaurus*, *Tylosaurus*, *Pterycollasaurus*, *Plioplatecarpus*.

Order 9. OPHIDIA. Snakes. Vertebræ procœlous, extremely numerous: no sacrum; ribs single-headed. No chevron bones on any of the vertebræ. Not only the quadrate bone is movably articulated to the skull, but also the suspensorium and the bones of the palatal maxillary apparatus are movable; brain capsule entirely osseous. No quadrato-jugal arch. No foramen parietale. Rami of the mandible united by ligament. No trace of anterior extremities, and posterior only sometimes rudimentally indicated. Copulatory organs paired; urinary bladder absent. Integuments folded into regularly arranged scales.

For the numerous recent genera see SNAKES. Fossil forms are scarce, and do not appear before the Eocene (*Laophis*, *Palæophis*, *Paleryx*).

Order 10. CHELONIA. Tortoises and Turtles. Cervical and dorsal vertebræ not numerous. The dorsal vertebræ and expanded ribs (with the exception of *Sphargis*) are united into a carapace, the elements of which are immovable, and which is completed ventrally by a number of dermal bones, a true sternum being absent and replaced by a plastron. All the bones of the skull are suturally united, with the exception of the mandible and hyoid; the dentary portion of the mandible consists of one bone only. Pectoral arch consisting of the scapula, with which the precoracoid is united, and the coracoid. Clavicles are represented by the anterior elements of the plastron. The pelvis consists of the usual bones, but is not attached to a sacrum. Two pairs of limbs. No teeth, these being replaced by horny sheaths of the jaws. Copulatory organ single. Integuments consisting of horny scutes covering the carapace, and of scales and tubercles on the soft parts.

For the numerous living genera see TORTOISES. Remains of extinct Tortoises are found from the Trias downwards, but they do not show any approximation to some other Reptilian type, or indicate a successive development. The most generalized type, *Sphargis*, is not older (according to present evidence) than some of the more specialized genera, its earliest representative being the remarkable *Protostega* from North-American Cretacean formations. Some of the Tertiary fossils exceeded in size the largest of living forms, such as the Himalayan *Colossochelys*, the German *Macrochelys*, the North-American *Atlantochelys*. (A. C. G.)

THE ANATOMY OF REPTILES.

As the principal features known of the anatomy of extinct Reptiles have been sufficiently noticed in the several separate articles devoted to them, this chapter will deal almost exclusively with the general structure of living forms.

Inasmuch as the class of Reptiles is one of the classes which make up that great primary zoological division known as "vertebrate animals," they of course possess all those structural characters which are common to that division (see VERTEBRATA). They also possess in common a certain number of structures which they share with Birds (see SAUROPSIDA), and which will be indicated in our notice of the different sets, or systems, of organs which compose the bodies of the animals of which this article treats.

General characters.

Every Reptile has a body made up of a head, a trunk, and a tail, though, as in some *Lacertilia* and many *Ophidia*, these regions are not marked off one from another by any constriction or noticeable alteration of diameter. The posterior aperture of the alimentary tube always marks the termination of the trunk and the commencement of the tail. In some kinds of Reptiles—as, *e.g.*, in the genera *Anguis* and *Amphisbæna* amongst the *Lacertilia*, and in such forms as *Typhlops* and *Uropeltis* amongst the *Ophidia*—the whole body consists of little more than a very elongated trunk with a small head at one end and a short or even quite rudimentary tail at the other. A neck may be interposed between the head and the trunk; this, however, is generally short, as in the *Lacertilia* and *Crocodilia*, but may be more or much elongated, as in the *Chelonia*. It was extraordinarily long in the extinct *Sauropterygia*—like that of a Swan.

The head may be very large, as in the *Crocodilia* and extinct *Ichthyopterygia*, or small, as in the *Sauropterygia*, or very small indeed, as in *Typhlops* and *Uropeltis*. It always contains the organs of taste, smell, hearing, and sight, but there may be, as in many Lizards and all Snakes, no external indication of an ear, and the eyes are almost hidden by the skin in Snakes such as *Typhlops*, and certain Lizards such as Amphisbænians and some Skinks. The mouth may be very large, as in the Crocodiles, or very small, as in *Typhlops*.

The trunk may be exceedingly elongated, as in the instances just above referred to, or relatively very short and broad, as in the *Chelonia*.

The tail may vary in development from its rudimentary condition in *Typhlops* to a length which exceeds that of the body several times, as in not a few *Lacertilia*. Its distal end may be prehensile and form an important grasping organ, as in almost all Chamæleons.

Besides these regions, there are generally two pairs of limbs,—one pectoral, the other pelvic,—though these may be altogether wanting as far as regards any external manifestation, as in all Ophidians and certain Lacertilians like *Anguis* and *Ophisaurus*. Internal rudiments of limbs may, however, be present when there is no external indication of them, as will be pointed out when describing the appendicular skeleton.

There may be but one pair of limbs, and these pectoral, as in the Lizard *Chirotes*; or there may be but one pair, which are pelvic, as in the Lizards *Pseudopus*, *Lialis*, and *Ophiodes*.

The pectoral and pelvic limbs are, as a rule, pretty equal in development, and they may be very much so, as in Chelonians and the *Sauropterygia*. Both may be exceedingly small, as in many Lizards, such as a number of the *Scincidæ*, or both may be relatively large, as in Chelonians. In no existing Reptile with four limbs does either pair very greatly exceed the other in length and size, but in extinct *Dinosauria* the pelvic limbs were greatly in excess, while the reverse was the case with the extinct *Ornithosauria*.

The extremities never terminate in more than five distinct digits, and the number may be reduced to one in front, as in *Rhodona*, or one behind, as in *Dibamus*. The extremities may end bluntly and be undivided, as in land and marine Chelonians, and as in the extinct *Ichthyopterygia* and *Sauropterygia*. The pectoral and pelvic limbs are generally not very divergent in form and structure; and they may be wonderfully alike, as in the existing Tortoises and in the extinct *Ichthyopterygia* and *Sauro* *pterygia.* They were, on the contrary, extremely divergent in certain *Dinosauria*, and still more in the *Ornithosauria.*

Every Reptile has a body composed of organs of nutrition, circulation, respiration, secretion, reproduction, sensation, and motion, supported internally by a solid framework, the internal skeleton or endoskeleton, and enclosed in a firm investment, constituting the external skeleton or exoskeleton.

The External Skeleton.

The external investment of the body consists of two layers. The outer of these, the epidermal layer, or *epidermis*, is of an epithelial horny nature and never becomes bony. The deeper or dermal layer, the *dermis*, is a fibrous structure which may become bony. Neither hairs nor feathers are developed.

The exoskeleton is characterized in this class of animals by being composed of distinct superficial thickenings placed side by side and separated one from another by thinner interspaces. According to the size and form of these thickenings they are known by different names. If they are very small and rounded they are called "tubercles," and such we see on the body of the Chamæleons and Geckos. If they are large, flat, and not overlapping, they are called shields, and such we see, *e.g.*, on the head of the true Lizards. If the hinder part of each thickening is more or less prolonged over the anterior part of one or more next behind it, structures of this kind are called scales, such as we find dorsally clothing the bodies of most Lizards and many Serpents. If the median part of each such scale is still more thickened longitudinally, then such a scale is said to be carinate. In most of these cases the epidermis itself is also more or less thickened locally, as well as the subjacent dermis, remaining thin in the folds or interspaces. The dermis may be ossified, forming dense bony plates, or scutes, beneath the epidermal investment. The whole body may be thus clothed, as in the Lizard *Cyclodus* and others, or the bony plates may be confined to parts of the back, as in some Crocodilians. The development of the exoskeleton is carried to the highest degree in Chelonians, when large osseous plates form, in the Land Tortoises and Terrapins, a complete and continuous bony case for the body, invested externally by a rich corneous epidermis, and becoming internally anchylosed with the endoskeleton itself.

In most Ophidians the body is clothed with scales above and with large transversely elongated shields beneath (single or double beneath the tail), though the body may be entirely invested by small scales except the head, as in *Typhlops*, or by tubercles, as in *Acrochordus.*

Sometimes, as in *Cerastes* and the River Jack, two horny appendages are erectly developed over the nose and sometimes, as in *Herpeton tentaculatum*, cutaneous appendages project from the snout, or the snout may be exceptionally produced. The skin of the side of the body just behind the head may form a distensible fold, as in *Naja*, and there may be, as in *Python*, a claw on each side of the vent, which claw is a rudiment of the pelvic limb, as will be explained in describing the appendicular skeleton. A peculiar cutaneous depression exists between the nostril and the eye in *Crotalus* and the other Pit-Vipers. For full details on these subjects see the separate articles on the orders.

In the *Lacertilia* we find a number of different cutaneous conditions which have been already noticed in describing the various groups systematically. It will then suffice here to remind the reader that the Amphisbænians have quadrate shields over the entire body except the head, arranged in transverse rings, and that in such forms as *Chalcis* the scales are also verticillate, while in the *Scincoidea* and *Anguidæ* they are imbricate, and on the Chamæleons granulate. The head may be covered with large shields, as in the *Lacertidæ*, or with small scales like those of the body, as in the Monitors, and there are often long sharp spines on the head and body, as in *Grammatophora*, *Phrynosoma*, and *Moloch.* The integument may also extend out from the body along the back and tail, as in *Basiliscus* and *Lophura*, or from beneath the throat, as in *Iguana*, or largely across the neck, as in *Chlamydosaurus*, or on either side of the tail, as in *Ptychozoon* or from each side of the body so as to be distensible and to serve as a parachute, as in *Draco*; while in the *Ornithosauria* it passed from the elongated hand to the body and leg as in the wing of the existing Bats. It has also been before stated that in certain cases different genera are distinguished by pores, *i.e.*, the apertures of small cutaneous sacs placed on the inner side of each thigh or in front of the cloacal aperture. Folds of skin may invest the digits and constitute webbed feet, as in some Geckos, as well as in Crocodiles and Terrapins, or may bind the digits in two opposite bundles, as in each extremity of the Chamæleons. Normally each digit is terminated by a claw.

In *Crocodilia* the epidermal thickenings do not overlap as in some Lizards, but form conspicuous prominences in the dorsal region, which serve as specific characters, and which have bony plates beneath,—which plates may, as in Alligators, exist on the belly as well as the back, and may form continuous rings round the tail, those of each anterior row overlapping those of the row next behind. Not all the digits are provided with claws. The feet are webbed.

The *Chelonia* present considerable differences as to the exoskeleton. The Mud Tortoises, *Trionyx*, have a soft epidermis, and *Sphargis* has a coriaceous outer layer of integument covering a carapace divided into small subhexagonal shields. In the other Chelonians there are large epidermal shields, which may overlap, as in the Tortoiseshell Turtle (*C. imbricata*) and others, or may be conterminous, as in *Testudo* and *Emys.* These shields form a mid-dorsal series and two lateral rows on either side, while there are two longitudinal series on the ventral side of the body.

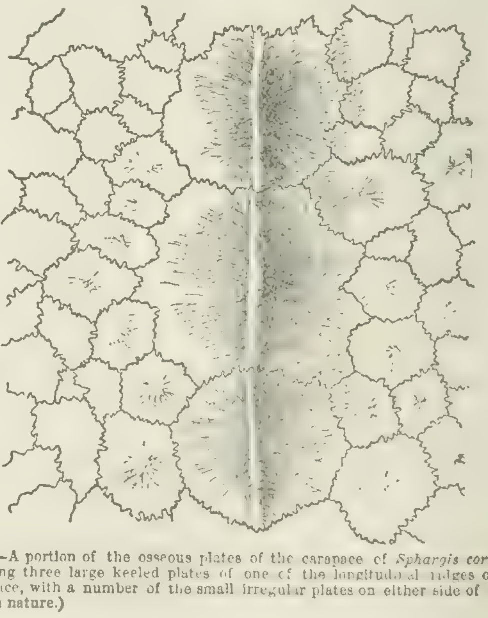

Fig. 3.—A portion of the osseous plates of the carapace of *Sphargis coriacea*, showing three large keeled plates of one of the longitudinal ridges of the carapace, with a number of the small irregular plates on either side of them. (From nature.)

Beneath the epidermal layer of the integument osseous plates are found, which plates do not coincide either in number, size, or shape with the epidermal shields which (save in *Trionyx* and *Sphargis*) cover them. Their condition in *Sphargis* is quite peculiar. In the skin of its back there are imbedded a great number of small plates flexibly united in a mosaic-like pattern. Seven longitudinal rows of these plates (one median, six lateral) differ from the rest by their large size and raised surfaces. On the ventral surface of the body there is one large thin median plate—the *episternum*, together with other very slender ossifications forming a very imperfect bony framework. All these latter bony plates, however, are very imperfectly ossified, with numerous vacuities. In the Land Tortoises and Terrapins, on the other hand, we have the exoskeleton in its greatest perfection. On the back there is a series of ten median plates, the first one of which is called nuchal and the last one pygal. On each side of these series and suturally connected therewith is a series of large lateral plates also suturally united together and with the median plates. Finally, a series of marginal plates suturally connected together and with the foregoing complete a bony investment of the back which is complete and continuous, and which is known as the *carapace.* On the ventral surface of the body nine other bony plates form another continuous shield termed the *plastron.* The most anterior pair correspond with the bones known as clavicles in Man and many other animals. The azygous plate between and behind them answers to the episternum of many animals. The carapace and plastron are united at the sides of the body, but are separated medianly in front and behind to allow the protrusion and retraction of the head and the four limbs and tail. In *Chelonia* similar plates exist, but they are less developed, and merely form an imperfect species of investment, with many vacuities between the plates. The same is the case in *Trionyx*, wherein the marginal plates are also wanting.

The skin of the neck and limbs is covered with scales. The skin of the neck may develop fimbriated processes and caruncles, as in *Chelys*, and the nose may be produced into a short proboscis, as in *Trionyx.* True claws may be absent, as in *Sphargis*, or there may be but one on each foot, as in *Chelone*, or two, as in *Caretta*, or three, as in *Trionyx*, or four or five, as in *Testudo* and *Emys.* The claws may approximate in form to hoofs in some of the large Land Tortoises. There may be a web between the digits, as in *Emys*, or the whole extremity may be united into a solid paddle, as in *Chelone.*

In all cases the skin of the jaws is found thickened and condensed so as to form a horny beak with a cutting edge.

In many Chelonians there are two pairs of glands on each side just in front of the junction of the plastron and carapace, while in the Mud Tortoises, *Trionyx*, there is yet another gland on each side in front of the margin of the plastron.

The Internal Skeleton.

The endoskeleton of Reptiles, as of most Vertebrate animals, consists of parts which are divisible into two categories:—(*a*) those which form the skeleton of the head and trunk, *i.e.*, the *axial* skeleton; (*b*) the parts which form the skeleton of the limbs, *i.e.*, the *appendicular* skeleton.

THE AXIAL SKELETON.—In describing the axial skeleton it will be well to begin with that part of it which belongs to the trunk, leaving the more complex skeleton of the head, *i.e.*, the skull, for subsequent consideration.

Skeleton of the trunk; *Skeleton of the Trunk.*—The backbone, spinal column, or spine consists in all adult Reptiles of a series of ossified vertebræ, many, almost all, of which are separate and not anchylosed one to another. Nevertheless the spinal or vertebral column varies in its structure much more in the class of Reptiles than even in the *Mammalia*, and very much more than in the class of Birds, with which the Reptiles are so much allied. This variation consists in differences not only as regards the number of regions or vertebral categories and the extent and structure of each region, but also as regards the form of the individual vertebræ and notably the form of the vertebral centra.

There may or may not be distinct cervical vertebræ with or without movable ribs. The first two vertebræ are differentiated as axis and atlas, and in front of the latter there may be a rudiment of another vertebra, which has been distinguished as the proatlas.[1] There are always dorsal vertebræ, some of the ribs of which may not, but more generally do, join a sternum. These dorsal ribs are generally movable, and may be, as in Serpents, organs of locomotion. They may, on the contrary, be firmly fixed by suture one to another as in Chelonians. There may or may not be lumbar vertebræ, and two or more (in some extinct forms many) vertebræ may unite to form a sacrum. There are always caudal vertebræ, and these generally have chevron bones beneath them. Sometimes vertebræ which are not sacral become anchylosed together, as in the dorsal vertebræ of Chelonians. Articular processes always connect together adjacent vertebræ which are not thus anchylosed, and there may be accessory articular processes peculiar to the class, and which will be shortly described later. As to the form of the vertebral centra, they may be flat in front and behind, or biconcave (amphicœlous), or biconvex, or with a ball behind and a cup in front (procœlous), or with a ball in front and a cup behind (opisthocœlous).

In the *Crocodilia* all the above-mentioned regions are distinct, there being usually 9 cervical, 11 to 12 dorsal, 2 to 3 sacral, and about 40 caudal vertebræ. In existing species all the vertebræ are procœlous except the atlas, axis, sacral, and first caudal vertebræ. The adjacent surfaces of the centra of the sacral vertebræ are flat, and the centrum of the first caudal is biconvex. The atlas consists of five pieces,[2] and the odontoid bone is not anchylosed to the axis. The caudal vertebræ are elongated and compressed, and, except the most anterior and posterior, support chevron bones. Ribs are very generally present. Those attached to the atlas and axis are single in origin. Each rib of the other cervical vertebræ bifurcates at its upper end into a tubercular and a capitular process, which respectively articulate with the neural arch and centrum of their supporting vertebra, and the interval thus left in the succeeding vertebræ forms a *canalis centralis.* The ribs of the middle five cervical vertebræ so expand distally as to impede the lateral flexion of the neck. The neural arches articulate by suture with the vertebral bodies. The dorsal ribs become attached to processes which pass out from each vertebra to the tubercular and capitular processes of the ribs respectively, and their situation with respect to the neuro-central suture changes by degrees, through the vertebral series, till in the twelfth dorsal one long transverse process, passing out above the neural central suture, supports both processes. Thence backwards these articulating surfaces approximate till at last there is but a single articular surface between each rib and its supporting vertebra, as was the case in those of the atlas and axis.

The dorsal ribs consist of two pieces—the distal piece remaining cartilaginous; and most ribs support an imperfectly ossified *processus uncinatus*, nearly as in Birds, which extends backwards from the distal portion of its ossified piece (fig 4). From seven to nine of these ribs have ossified sternal ribs which serve to connect them with the sternum. The lumbar vertebræ have only long transverse processes which arise above the neuro-central suture. The sacral vertebræ support very stout transverse processes, each of which includes a rib element and becomes anchylosed to the centra only at a late period of life, as do the comparatively long and slender caudal transverse processes. Inferior processes, *hypapophyses*, which are azygous, descend one from beneath the centrum of each of the more posterior cervical and anterior dorsal vertebræ.

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[1] Discovered by Prof. Paul Albrecht.

[2] In front of it a rudimentary proatlas has been found.

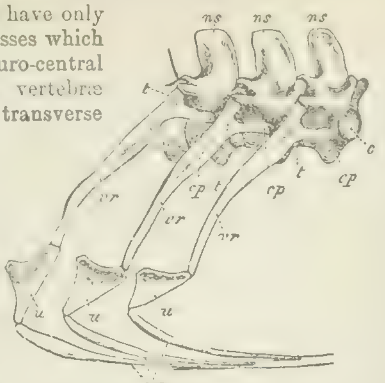

Fig. 4.—Lateral aspect of three thoracic vertebræ of *Crocodilus vulgaris* (from nature). *c*, cup on the anterior surface of centrum; *cp*, capitula of ribs; *ns*, neural spines; *rc*, rib cartilages; *t*, tubercula of ribs; *u*, uncinate processes; *vr*. vertebral ribs.

The sternum consists of an ossified rhomboidal plate, with the hinder side of which two pairs of costal cartilages articulate. A narrower piece extends backwards from this plate (connected with it by ligament), and ends in two diverging processes. With this the other sternal ribs articulate. A long slender bone, the interclavicle, or episternum, lies in a median groove of the sternal plate, and extends forwards beyond it.

There is a so-called abdominal sternum made up of a series of seven or eight slender bones which lie in the aponeurosis of the external oblique muscle of the abdomen behind the true sternum and in front of the pelvis. It lies at a lower level than the sternum, and has no direct connexion with the vertebral column.

in Hatteria; In *Hatteria*, the only living member of the order *Rhynchocephalia*, as well as in the extinct species, the vertebral bodies have flat or concave surfaces in front and behind. There are 8 cervical, 14 dorsal, 3 lumbar, 2 sacral, and 36 caudal vertebræ. There is no persistent neuro-central suture in *Hatteria*, though there may be in some extinct forms of the order. Rudiments of the proatlas are sometimes present. The atlas consists but of three pieces, and the odontoid bone is anchylosed with the atlas, and is concave anteriorly. An autogenous hypapophysis is wedged into the inferior interspace between the centrum of the axis and the third vertebræ, and similar parts are developed thence backwards to beneath the seventh and eighth vertebræ. *Hatteria* has the faculty of reproducing its tail after mutilation. When the tail is broken the fracture takes place in the middle of one of its centra and not between two adjacent centra. This is owing to the fact that each caudal vertebra is divided into an anterior and a posterior part (fig. 5), and is weakest at this line of junction which passes behind the transverse process.

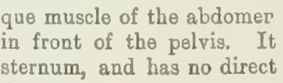

Fig. 5.—Vertical section of four (7th to 10th) caudal vertebræ. *a*, epiphysial line passing through the middle of centrum. (After Günther.)

The first rib is attached to the fourth vertebra. Those of the ninth and the following vertebræ attain the sternum. The more posterior ribs become connected with the abdominal sternum. All the ribs are single at their proximal ends, a bifurcation being scarcely indicated even at the most anterior one. Processus uncinati are fully developed.

The sternum is a rhomboidal, semi-cartilaginous plate, with a medianly situated long and slender episternum which unites with a pair of clavicles. An abdominal sternum is more fully developed than in any other living Reptile. It consists of about twenty-five transverse rods, each of which is composed of three pieces. These rods are connected and disconnected with the ribs in an alternate manner, every other rod being suspended from a pair of the true ribs.

in Lacertilians; *Lacertilia.*—In this extensive order of living Reptiles, the vertebræ are procœlous except in the *Geckotidæ* and *Uropeltidæ*, where they are biconcave. There may or may not be distinct cervical, lumbar, and sacral regions, and the number of vertebræ, generally considerable, may be very large. The distinctness of the vertebral regions depends on the development of the anterior and posterior limbs. When a cervical region can be distinguished, there are never more than nine such vertebræ. Only in rare instances are there distinct lumbar vertebræ. The sacral vertebræ are never more than two. The neural arch is always anchylosed to the centrum in adults. The atlas consists of three parts, and the axis may or may not have the odontoid bone anchylosed to it and convex in front. Ribs are attached to most of the cervical as well as to the dorsal vertebræ; but the former are not expanded distally as in the Crocodile, and thus the latter do not support uncinate processes. The more anterior ribs show two proximal articular surfaces, but these never diverge into distinct capitular and tubercular processes as in the Crocodiles, nor, as in the latter, do any of the dorsal vertebræ develop double, superimposed transverse processes. The more anterior (usually the first three or four) dorsal ribs are connected with the sternum by sternal cartilages. Those behind may be similarly connected with the diverging backward prolongations of the sternum, or may be directly connected with their fellows of the opposite side, as in the Chamæleon, a median cartilage being joined on either side by the sternal cartilage continuous with an ossified rib. In *Acontias* and other limbless Lacertilians which have but a rudimentary sternum, or none, the corresponding ribs of the right and left sides are connected across the mid-ventral line as they are in *Chamæleo*. In *Draco* the more posterior ribs are greatly prolonged, and their distal cartilages are bent backwards. This is to enable them to support the wing-like membrane which extends from either side of the body to serve as a parachute. In those Lizards which have a lumbar region, transverse processes are there developed. The caudal vertebræ (except the most anterior and the small posterior ones) have chevron bones, which are not generally anchylosed to the vertebræ which support them.

In addition to the ordinary articular processes, there are in *Iguana* certain accessory articulating structures such as are commonly found in the vertebræ of Serpents: these will be described in the next section.

The sternum consists of a rhomboidal semi-ossified or cartilaginous plate, which is sometimes continued backwards into a pair of long diverging processes. There is generally an episternum, which is often T-shaped, but it may be absent, as in Chamæleons. In the limbless Lizards the sternum is cartilaginous, and there is none whatever in some forms, as, *e.g.*, in *Amphisbæna* and *Typhline*.

In many Lizards, notably in the commonest English Lizard, the tail if broken off can be reproduced. In them the centra of the caudal vertebræ have a vertical median division similar to that already described in *Hatteria*.

in Ophidians; In Ophidians the number of vertebræ is generally very large, and may exceed four hundred. They are all procœlous, and the ball behind each is nearly hemispherical. There is no distinction of cervical, lumbar, or sacral vertebræ; but all the vertebræ after the atlas may be considered as either dorsal or caudal. The mode of articulation between the vertebræ is more complex than in almost any Lizards.

In addition to the ordinary articular processes (or zygapophyses), which are here broad and flattened, often with an accessory process, there are two noteworthy structures. The first of these is called the *zygosphene*, and consists of a wedge-shaped process with two articular surfaces, which projects forward from the anterior surface of each neural arch. The other is called the *zygantrum*, and is a corresponding excavation with two articular surfaces on the hinder side of the neural arch, and receives the zygosphene of the vertebra next behind it. It was structures such as these that were referred to in the last paragraph as existing so exceptionally amongst Lacertilians in *Iguana*.

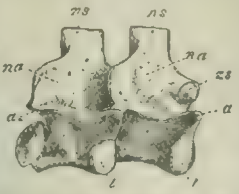

Fig. 6.—Lateral aspect of two trunk vertebræ of *Python* (from nature). *a*, articular processes; *na*, neural arches; *ns*, neural spines; *t*, transverse processes; *zs*, zygosphene

The atlas and axis have a form similar to that already described as existing in the *Lacertilia*. Long azygous hypapophyses nearly always depend from the centre of the anterior trunk vertebræ, or even from the whole of them, being especially large and numerous in some of the most poisonous Serpents, *e.g.*, *Crotalus* and *Naja*. In *Dasypeltis scaber* some of these processes in the anterior dorsal region are made to minister to alimentation,—their tips being coated with tooth substance, and penetrating within the alimentary canal, as will be again mentioned further on.

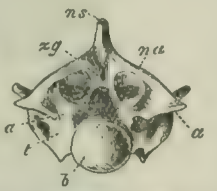

Fig. 7.—Posterior aspect of a trunk vertebra of *Python* (from nature). *a*, articular processes; *b*, ball on the surface of the centrum; *na*, neural arch; *ns*, neural spine; *t*, transverse process; *zg*, zygantrum.

The ribs assume the function of locomotion, and are therefore very movably articulated to short transverse processes. Each has two proximal articular surfaces, but they are close together, there being no diverging articular and tubercular processes. Each rib terminates in a short cartilage. The caudal vertebræ may, in rare instances, be very few, and they may be very numerous—from five to two hundred. They do not possess chevron bones, but bifold depending hypapophyses, and they have transverse processes which also are generally bent downwards.

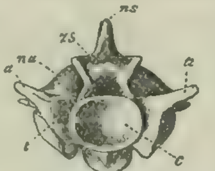

Fig. 8.—Anterior aspect of a trunk vertebra of *Python* (from nature). *a*, articular processes; *c*, cup on the surface of the centrum; *na*, neural arch; *ns*, neural spine; *t*, transverse process; *zs*, zygosphene.

Sometimes, at the limit between the body and the tail, the transverse process, or the rib, as the case may be, bifurcates or develops an ascending process, as, *e.g.*, in *Boa*, *Naja*, and *Echidna*.

No Ophidian has any sternum.

Chelonia.—The Tortoises and Turtles present a spinal structure remarkably divergent from that of all other Reptiles, and especially divergent from that of Ophidians. Nevertheless the *Chelonia* agree with the *Ophidia* in having no sternum, and in having at least a portion of the vertebral column formed for extreme mobility, in spite of the excessive rigidity and immobility of the trunk. Only in *Sphargis* do we find a structure generally resembling that of other Reptiles and diverging from that common to other Chelonians. With the exception of *Sphargis*, the structure of the vertebral column of which will be subsequently noticed, the Chelonians present the following characters. The endoskeleton of the dorsal region is intimately united with those ossified exoskeletal plates which have been already described (*supra*, p. 447) as investing both dorsally and ventrally the entire trunk. The median series of plates are united with the neural spines and arches, and the lateral plates are similarly united with the ribs, so that the carapace is formed both of endoskeletal and exoskeletal elements intimately united. The constancy of the number of vertebræ is very exceptional, as is also the very small number of those of the body. There are always 8 cervical, 12 dorsal, and 2 sacral vertebræ. The number of caudal vertebræ varies, but is never great. The cervical vertebræ have very small processes, whereby they are better fitted for great mobility. They vary greatly as to the form of their centra, some being opisthocœlous, others procœlous, others biconvex, while one at least is flattened both in front and behind—the arrangement differing even in different species of the same genus. The atlas consists of three pieces, and the os odontoideum is separate. The neuro-central suture persists. The centra of the first ten dorsal vertebræ are amphicœlous, and but loosely connected with twin neural arches, each neural arch being superimposed over the posterior half of one vertebra and the anterior half of the vertebra next behind. The sacral vertebræ have either stout ribs suturally attached or transverse processes anchylosed to the vertebræ. The caudal vertebræ are procœlous, and generally have a pair of separate descending processes, which may (as in *Chelydra*) unite distally and form chevron bones.

In *Sphargis* the endoskeleton is quite distinct from the exoskeleton. Its neural arches are very loosely united to the centra, so that they can be separated with the greatest ease. The transverse processes of the caudal vertebræ also remain unanchylosed to their centra. The dorsal vertebræ pass so gradually into the caudal that the boundary can only be determined by the somewhat increased thickness of the transverse process of the two sacral vertebræ. The summits of the neural arches are somewhat dilated (as if from superincumbent pressure) or obtusely keeled. The ribs are not much expanded, their heads fitting into a hollow formed by the centra of two vertebræ together with the neural arch superimposed upon the two. They become shorter and narrower behind, that of the tenth dorsal vertebra being even smaller than the sacral ribs.

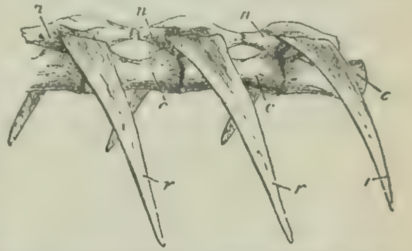

Fig. 9.—Three vertebræ of *Sphargis coriacea* (from nature). *c*, vertebral centra; *n*, neural arches; *r*, ribs.

The skull;

The Skull.—The anterior portion of the axial skeleton, or cranium, differs markedly from that of every other class of Vertebrates, while it presents a much greater diversity of structure than does the cranium of Mammals or of Birds. It differs from the cranium of the lower Vertebrate classes by its more complete ossification and by a greater prolongation backwards of the nasal cavity, which causes a greater expanse and density of the palatal structure. The skull, however, is not so much ossified as in Mammals, and the bones do not become anchylosed together so quickly and certainly as in Birds. The occipital region always consists of four occipital elements, and there is an ossified basisphenoid in front of a well-developed basioccipital. The skull almost always articulates with the atlas by a single occipital condyle. The lower jaw is always suspended to the skull by the intervention of a quadrate bone with which the os articulare of the mandible articulates. Besides the last-mentioned bone the mandible consists of as many bones as in Fishes, with the addition of a supra-angular and a complementary bone.

The bones of the cranium may form a very solid and very continuous open case, with no mobility save that of the lower jaw; or it may consist of bones several of which are so conditioned as to allow much mobility to several other parts. In all cases, however, the side wall of the anterior part of the cranial cavity is very imperfectly ossified.

The skull of the *Crocodilia* is distinguished from that of all other Reptiles by its very extensive bony palate, which exceeds in completeness that of even any Mammal save the Anteaters and Cetaceans, for not only the maxillæ and palatines but also the pterygoids—all as expanded bony plates suturally united—concur in its composition in all existing Crocodilians (though not in the extinct *Teleosaurus* or *Belodon*), and the pterygoids surround the posterior nares. The skull forms a solid whole composed of bones united by suture except at the antero-lateral and median boundaries of the cranial cavity, where it is cartilaginous or membranous. There is an interorbital septum. The quadrate bone is immovably fixed and of large size, and unites with the pterygoid, but by its upper and inner surface only. The alisphenoid is a large broad bone. The tympanic cavity is completely enclosed by the prootic and opisthotic (the latter being united with the exoccipital), the squamosal, the postfrontal, and the basioccipital and basisphenoid. It opens into the mouth by three apertures, one median and two lateral,[1] which terminate complex canals having communications among each other. There are two lateral, quasi-zygomatic arches to the skull—an upper one formed by the postfrontal and squamosal, and a lower one by the maxilla, jugal, quadrato-jugal, and quadrate. There is no foramen in the parietal region of the skull, and there is an azygous parietal bone and frontal. On either side of the hinder region of the skull the periotic and exoccipital bones form large parotic processes. There is a distinct perforated lachrymal. There are two vomers, which are generally hidden in the palate by the junction of the extensive maxillæ and palatines. There are a pair of nasal bones. Various cranial bones are pneumatic, including the os articulare of the mandible. The hyoid is very simple, and consists only of a broad cartilaginous or partly osseous basihyal, with two bony cornua, not directly connected with the skull. There is a very small cartilaginous stylohyal on the upper hinder part of the quadrate.

in Hatteria: *Hatteria.*—The skull of this living type of an extinct order resembles that of the *Crocodilia* in that there is a lower zygomatic arcade formed by the quadrato-jugal bone interposed between the malar and the quadrate, as well as a superior zygomatic arcade formed by the squamosal and postfrontal, and in that the quadrate bone is immovably fixed between the pterygoid, squamosal, and quadrato-jugal. The palate is pretty complete with wide plate-like ossifications, still it is much less so than in the Crocodiles; but the posterior nares are much more anteriorly situated—very near the anterior end of the palate—and are on each side, being each bounded by the premaxilla in front, the vomer internally, the maxilla externally, and the palatine behind. At the side of the skull we find a bone distinguished as the "columella," which passes upwards from above the suture between the pterygoid and quadrate to the parietal, to which it is attached by a slip of cartilage. It is a flattened bone, somewhat expanded above and below, and constricted towards its middle. The lateral wall of the skull at the part which in the Crocodile is occupied by the alisphenoid, and in front of that part is not osseous but fibro-cartilaginous. There is an interorbital septum. The postero-lateral region of the skull consists, as in the Crocodiles, of two outstanding "parotic processes," made up of the exoccipital, prootic, and opisthotic bones,—beneath which is the "columella auris." The basisphenoid sends down two processes to abut against the pterygoids. The parietal is perforated by a small median fontanelle. The premaxillæ are separate, and together form a sort of beak, their large teeth becoming thoroughly anchylosed and united with the bones supporting them. The nasals are double, and each sends forth a process (somewhat as in Birds) from its outer anterior angle.

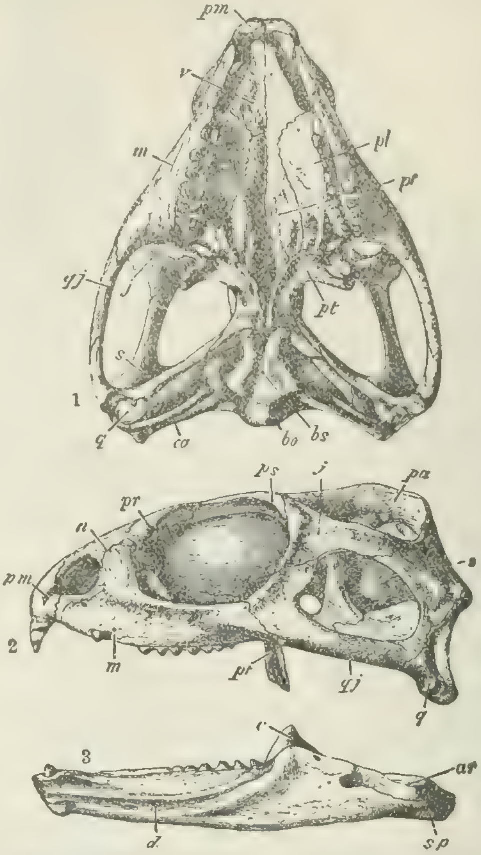

FIG. 10.—Skull of *Hatteria* (after Günther). 1, ventral aspect; 2, lateral aspect; 3, lateral aspect of mandible. *ar*, articular; *bo*, basioccipital; *bs*, basisphenoid; *c*, coronoid; *ca*, columella auris; *d*, dentary; *j*, jugal; *m*, maxilla; *n*, nasal; *pa*, parietal; *pl*, palatine; *pm*, premaxilla; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *qj*, quadrato-jugal; *s*, squamosal; *sp*, splenial; *v*, vomer.

The Lacertilian skull is formed mainly upon one of two diverging types of structure—(1) that of ordinary Lizards, and (2) that of Chamæleons. In both the quadrate bone is almost always movable and the inferior zygomatic arcade is wanting, though generally represented by a ligament; the palate is incompletely ossified, and the rather anteriorly situated posterior nares bounded internally by the bifold vomers. In the ordinary Lizard type the skull has the appearance of consisting of a system of osseous bars connecting the solid occipital parts (with its pair of parotic processes) with a flattened cranial roof and the more or less well ossified snout. The skull has an interorbital septum. The lateral walls of the cranium are, as in *Hatteria*, fibro-cartilaginous, though they may contain some insignificant ossifications; and a "columella," as in *Hatteria*, generally ascends from the pterygoid to the parietal. The last-named bone sends a backward prolongation to the parotic process and squamosal, and is movably united to the occipital; and thus, through the imperfect ossification of the cranial parietes, the facial part of the skull is capable of more or less flexion upon the occipital part

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[1] For a full description with good figures of this very complex structure, see Owen, *Phil. Trans.*, February 28, 1850, vol. cxl. p. 521, pls. 40-42.

There is generally a superior zygomatic arcade formed by the junction of the postfrontal with the squamosal, and, very generally, the orbit is enclosed posteriorly by a junction of this postfrontal with the malar. The basisphenoid sends down (as in *Hatteria*) two processes to abut against the pterygoids, which again join the quadrate bones. An os transversum unites the pterygoid, palatine, and maxilla of either side. The maxilla is thus a fixed bone; the premaxilla is generally single, and sends a median process backwards. The nasals, frontals, and parietals may be single or double. There is generally a parietal fontanelle.

By very rare exception, as in *Monopeltis*, there may be two occipital condyles, that (median) portion, which is formed from the basioccipital aborting

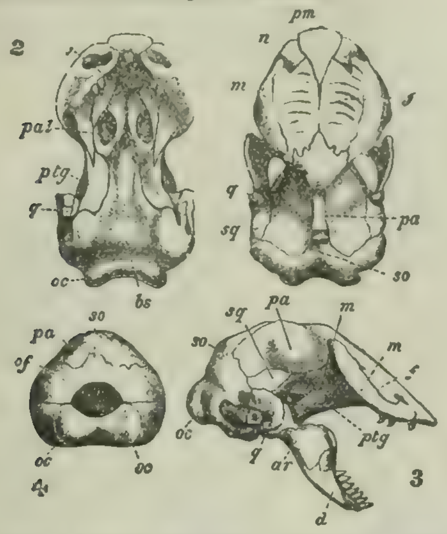

Fig. 11.—Skull of *Monopeltis sphenorhynchus* (from nature). 1, dorsal aspect, 2, ventral aspect; 3, lateral aspect; 4, posterior aspect. *ar*, articular; *bs*, basisphenoid; *d*, dentary; *f*, frontal; *m*, maxilla; *n*, nasal; *oc*, *oc*, occipital condyles; *of*, occipital foramen; *pal*, palatine; *pa*, parietal; *pm*, premaxilla; *ptg*, pterygoid; *q*, quadrate; *so*, supraoccipital; *sq*, squamosal; *v*, vomer.

The hyoid consists of two pairs of cornua, whereof the anterior is generally the longer, attached to a median portion from which azygous a bifold process may proceed both anteriorly and posteriorly.

In the Amphisbænians the skull is more solidly and continuously ossified than is usual in Lizards, though there is no columella and though the low ali- and orbito-sphenoidal regions are membranous. The parietal is not movably articulated to the exoccipital, and the facial part is solidly ossified and not movable upon the hinder portion of the skull. The orbits are not enclosed behind, and there is no superior zygomatic arcade.

The skull of *Heloderma* is very remarkable in that it has no zygomatic arch whatever, and in that the pre- and postfrontal bones unite and exclude the frontal bone from the margin of the orbit.

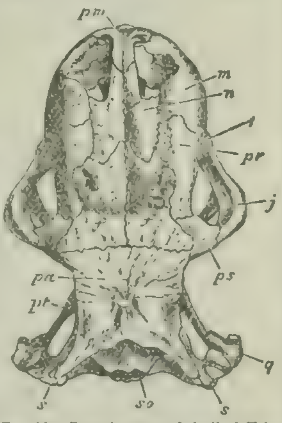

Fig. 12.—Dorsal aspect of skull of *Heloderma horridum*. *f*, frontal; *j*, jugal; *l*, lachrymal; *m*, maxilla; *n*, nasal; *pa*, parietal; *pm* premaxilla; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *s*, squamosal; *so*, supraoccipital.

The skull of the Chamæleons has even more the aspect of an osseous scaffolding than has that of ordinary Lizards in spite of the absence of a columella. This is owing to the presence of a long supraoccipital arcade formed by a long posteriorly and inwardly extending process of the squamosal, which joins the adjacent side of the singularly prolonged and upwardly and backwardly extending process of the parietal, which itself is solidly united to an upwardly extending process of the supraoccipital. Thus the facial part of the skull is not movable upon its occipital portion. The orbits are enclosed by bone, and there is a superior zygomatic arcade, the postfrontal joining the squamosal behind and the malar in front. The frontal bone is small and single. There are a pair of narrow nasals, but these do not form the boundary of any part of the anterior nares, but are excluded therefrom by the junction of the prefrontals with the maxilla, and these two bones may be prolonged so as to form great horn-like processes. The pterygoids do not articulate with the quadrates, and there is no interorbital septum. The hyoid has its posterior cornua much the longer, and a bony median basihyal.

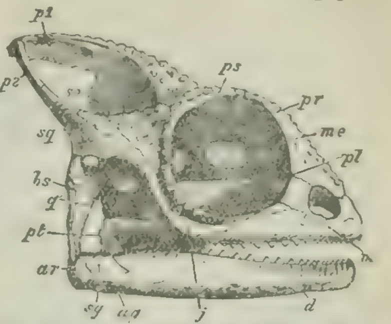

Fig. 13.—Skull of *Chamæleon vulgaris* (from nature). *ag*, angular; *ar*, articular; *bs*, basisphenoid; *d*, dentary; *j*, jugal; *m*, maxilla; *me*, median ethmoid; *p1* and *p2*, parietals; *pl*, palatine; *pr*, prefrontal, *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *sg*, surangular; *so*, supraoccipital; *sq*, squamosal.

The Ophidians, like the Lizards, have skulls which are formed on more than one type:—(1) those of the ordinary wide-mouthed Serpents; and (2) those of the Serpents with a very narrow gape, such as we find, *e.g.*, in *Typhlops* and *Uropeltis*.

The wide-mouthed Serpents, or *Eurystomata*, have a skull which in some respects is much less completely ossified and more movable than in ordinary Lizards, while in other respects it is more ossified and less movable. Thus the lateral walls of the anterior parts of the cranial cavity are well ossified, so that the anterior part of the skull is no longer movable on the occipital segment, while on the contrary the total absence of both zygomatic arcades, the non-union directly of the palatine with the vomer, the laxity of union of the premaxilla and maxilla, and especially the movable condition not only of the quadrate but also of the squamosal (often an elongated bone) from which it is suspended, all give an excessive mobility to the facial part of the skull. To this it may be added that, at the symphysis, the rami of the mandible are only united by soft, very extensible tissue. There is usually but one premaxilla, and that is edentulous. The palatines are usually connected with the maxilla by transverse bones, while the pterygoids connect them with the quadrate bones. There is no interorbital septum, and

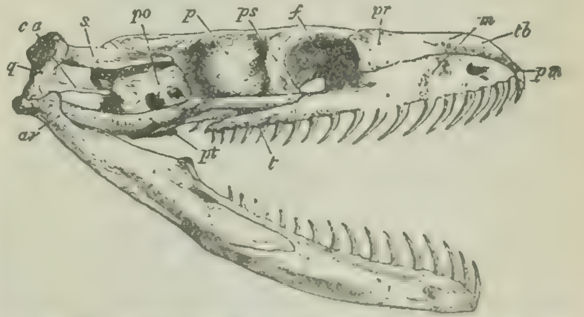

Fig. 14.—Skull of *Python sebæ* (from nature). *ar*, articular; *ca*, columella auris, *d*, dentary; *f*, frontal; *m*, maxilla; *p*, parietal; *pm*, premaxilla; *po*, prootic; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid, *q*, quadrate; *s*, squamosal; *t*, transversum; *tb*, turbinal.

no fontanelle in the cranial roof. The basisphenoid is prolonged forwards into a long bony rostrum, on the upper surface of which the cartilaginous rods (the persistent *trabeculæ cranii*) extend forwards to blend with the median cartilage of the ethmoidal region. The supraoccipital is excluded from the margin of the foramen magnum by the exoccipital. The frontal bones descend laterally to the dorsum of this basisphenoidal rostrum and then turn inwards to meet together in the median lines on the floor of the cranial cavity. The parietals also descend laterally but unite with the basisphenoid by suture. There are a pair of nasals, and also lachrymals and postfrontals, but there is no jugal or quadrate jugal. The palatines do not bound the posterior nares behind. They are widely separated, and their long axes are longitudinal. The maxillæ may be long and may support a number of teeth, as in most non-venomous Snakes, or may be very short and support a single large fang, as, *e.g.*, in Vipers.

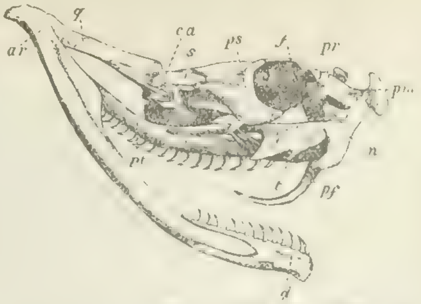

Fig. 15.—Skull of *Vipera nasicornis* (from nature). *ar*, articular; *ca*, columella auris; *d*, dentary; *f*, frontal; *m*, maxilla; *pf*, poison fang; *pm*, premaxilla; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *s*, squamosal; *t*, transversum.

The small-mouthed Serpents, or *Angiostomata*, have the pterygoids separated from the quadrates. The squamosal is small or absent, the quadrate being attached directly to the cranium. They have no postfrontal and no transverse bone, while the palatine bones have their long axis transverse, and meet, or nearly meet, on the under surface of the skull. The two rami of the mandible are also closely united together. In other details of cranial structure they agree generally with the *Eurystomata*.

The hyoid is rudimentary, and only consists of a pair of cartilaginous threads, medianly united and lying side by side beneath the trachea.

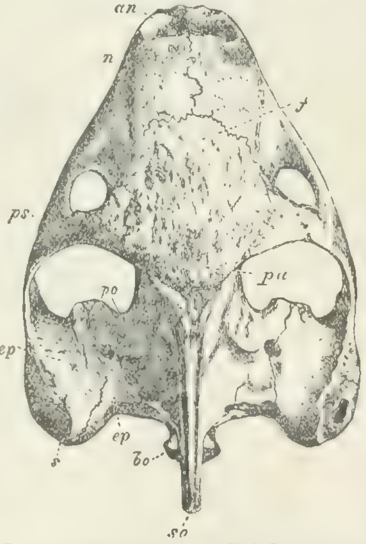

Fig. 16.—Dorsal aspect of skull of *Testudo tabulata* (from nature). *an*, anterior nares; *f*, frontal, on either side of which are the orbits, bounded behind by *ps*, the postfrontal; *bo*, basioccipital; *ep*, epiotic; *so*, supraoccipital; *q*, quadrate; *s*, squamosal; *pa*, parietal; *po*, periotic bones.

In the Chelonians the skull presents certain resemblances to that of the Crocodilians. Thus the quadrate is immovably fixed and its upper part is joined by the pterygoid, and there is a quadrato-jugal bone. The pterygoids and palatines unite by suture and form horizontal plates beneath the *basis cranii*. Nevertheless these bones differ widely from their homologues in the Crocodiles inasmuch as the posterior nares open in front of the pterygoids and are bounded by the palatines and the azygous vomer. The epiotic bone is generally quite distinct from the exoccipital. There are large parietals, which send down a process that serves the purpose of the absent alisphenoid. In front of this, the sides and front of the cranial cavity are unossified. There are a pair of frontals, and in front of them a pair of bones which bound the anterior nares above. There may be one or two premaxillæ. Sometimes, as *e.g.*, in *Chelone*, the parietal, postfrontal, jugal, and squamosal send out plate-like processes which unite and form a sort of false outer skull covering in the temporal fossa, and quite external to the real outer wall of the cranial cavity. Thus the cranium of these Reptiles is, as it were, at the opposite extreme to that of the Serpents as regards massiveness, solidity, and the immovability of its several parts one on another. It may be excessively flat and depressed, as in *Chelydra*.

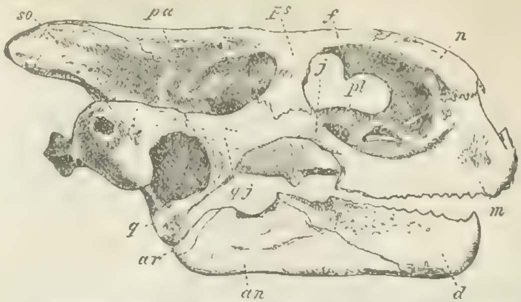

Fig. 17.—Side view of skull of *Testudo tabulata* (from nature). *an*, angular, *ar*, articular; *d*, dentary; *f*, frontal; *j*, jugal; *m*, mandible; *n*, naso-prefrontal. *pa*, parietal; *pl*, palatine; *ps*, postfrontal; *q*, quadrate; *qj*, quadrato-jugal.

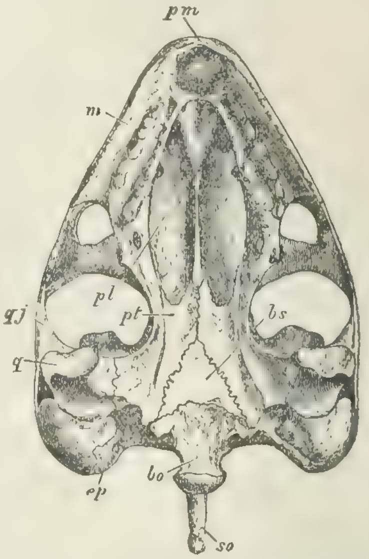

Fig. 18.—Ventral surface of skull of *Testudo tabulata* (from nature). *bo*, basioccipital; *bs*, basisphenoid; *ep*, epiotic; *m*, maxilla; *pl*, palatine; *pm*, premaxilla; *pt*, pterygoid; *q*, quadrate; *qj*, quadrato-jugal; *so*, supraoccipital.

The dentary bone of the mandible is azygous, as in Birds.

The hyoid consists of two pairs of cornua, whereof the anterior may or may not be the larger, attached to a

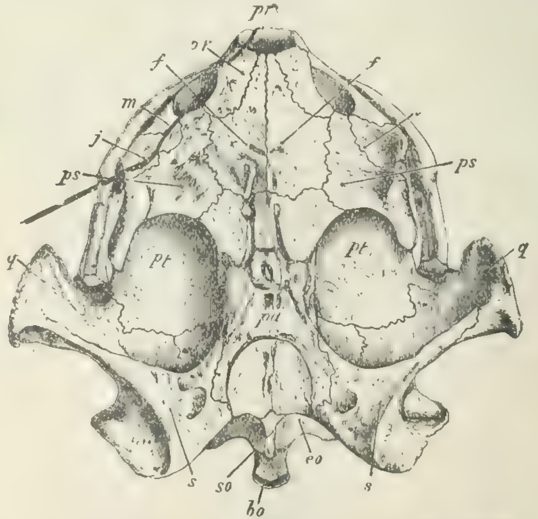

Fig. 19.—Dorsal aspect of skull of *Chelys matamata* (from nature). *bo*, basioccipital; *eo*, exoccipital; *f*, frontal; *j*, jugal; *m*, maxilla; *pm*, premaxilla; *pa*, parietal; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *s*, squamosal; *so*, supraoccipital.

broad, more or less cartilaginous, or variously ossified median portion.

THE APPENDICULAR SKELETON.—The appendicular skeleton of Reptiles, like that of Vertebrates generally, consists of a pair of limb girdles (pectoral and pelvic), with a pair of skeletal appendages proceeding from either girdle. Each such skeletal appendage has also, normally, the typical differentiation into (1) a single upper limb bone, (2) a pair of lower limb bones, (3) a group of small foot-root bones or cartilages (carpus or tarsus), (4) a series of middle foot bones (metacarpus or metatarsus), and (5) a group of small bones (phalanges) arranged in series according to the number of digits, but the number in each digit varying in different digits and in different groups of Reptiles.

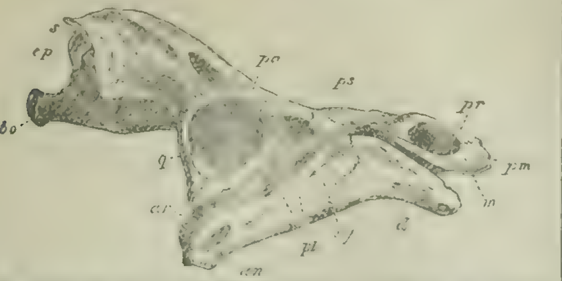

FIG. 20.—Lateral aspect of skull of *Chelys matamata* (from nature). *an*, angular; *ar*, articular; *bo*, basioccipital; *d*, dentary; *ep*, epiotic; *m*, maxilla; *pa*, parietal; *pm*, premaxilla; *pr*, prefrontal; *ps*, postfrontal; *pt*, pterygoid; *q*, quadrate; *s*, squamosal; *sa*, surangular.

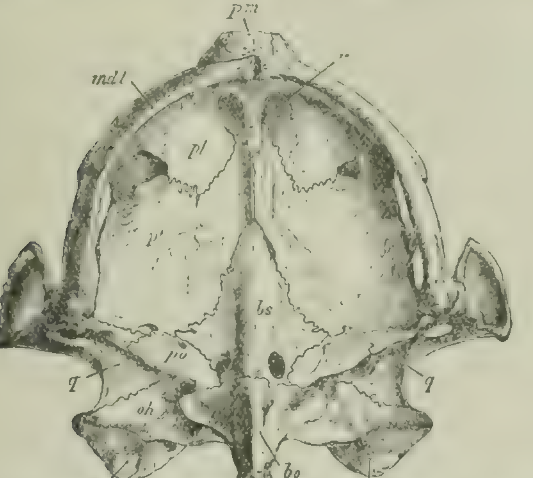

FIG. 21.—Ventral aspect of skull of *Chelys matamata* (from nature). *bo*, basioccipital; *bs*, basisphenoid; *mdl*, mandible; *oh*, opisthotic; *pl*, palatine; *pm*, premaxilla; *po*, prootic; *pt*, pterygoid; *q*, quadrate; *s*, squamosal.

Every trace of an appendicular skeleton may, however, be wanting, as is the case in most Ophidians.

There may be a pectoral limb girdle without any rudiment of a fore-limb skeleton, as in *Anguis*, *Acontias*, and *Amphisbæna*. There may be a pelvic girdle without any rudiment of a hind-limb skeleton, as in at least some, if not all, *Typhlopidæ*. Very rarely there may be both rudimentary pectoral and pelvic girdles without any trace of limb skeleton, as in *Amphisbæna*. Thus, of the two categories, (1) limb girdles, and (2) girdle appendages or limbs, the former is the more constant, as we never find rudimentary extremities and limbs without any trace of a girdle, while the contrary we do find here and there.[1]

The Limb Girdles.—Each girdle consists of two lateral halves, and each such lateral half further consists of two divisions which diverge from the articular surface offered to the limb by such lateral half. From that articular surface one division descends dorsally and does not connect itself with its fellow of the opposite side. The other ventral division passes inwards and somewhat downwards and normally does connect itself, directly or indirectly, with its fellow of the opposite side. The dorsal ascending division is generally single, and consists of two parts in serial succession. The ventral division consists normally of two or more parts, which, though diverging, pass ventrally side by side, or one in front of the other. Each girdle normally connects itself with the axial skeleton either towards the dorsal or ventral aspect of the latter.

The Pectoral Girdle.—This girdle only becomes connected (except in Chelonians) with the ventral part of the appendicular skeleton,—to wit, where it abuts against either side of the sternum. In its most complex condition —that found in some Saurians, *e.g.*, *Iguana*—the dorsal division consists of a scapula (with a forwardly extending process—the mesoscapular), and is continued upwards into a suprascapular; while the ventral division consists of a coracoid, which abuts against the sternum, and from which three parts (the precoracoid, the epicoracoid, and the mesocoracoid) diverge forwards and inwards, and also of a clavicle, between which and its fellow of the opposite side an interclavicle is interposed. This girdle normally in Reptiles, as in all other Vertebrates, embraces more or less of the axial skeleton externally; only in adult Chelonians it becomes drawn in within the circuit of the ribs.

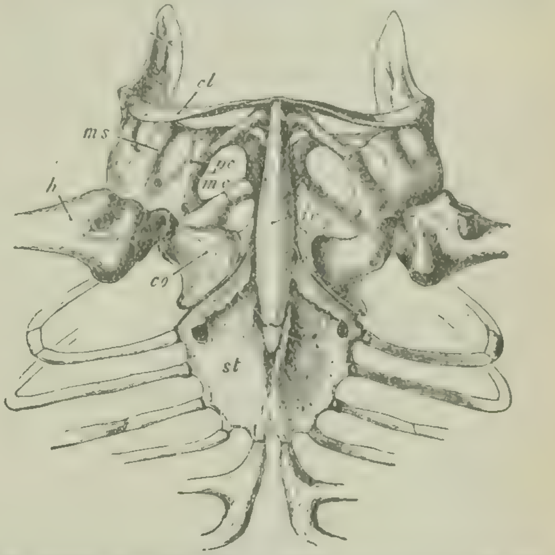

FIG. 22.—Sternum and shoulder girdle of *Amblyrhynchus subcristatus* (after Steindachner). *cl*, clavicle; *co*, coracoid; *h*, humerus; *ic*, interclavicle; *mc*, mesocoracoid; *ms*, mesoscapula; *pc*, precoracoid; *s*, scapula; *st*, sternum.

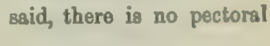

FIG. 23.—Rudiments of pectoral arch—1, of *Acontias meleagris*; 2, of *Typhlosaurus aurantiacus* (after Fürbinger).

In the *Ophidia*, as has been said, there is no pectoral girdle.

In certain *Sauria* it is in its simplest possible form, as, *e.g.*, in *Acontias* and *Typhlosaurus*, where each lateral half consists of a minute ossification representing the clavicle and coracoid, which is not connected with its fellow of the opposite side by any hard structure, as both sternum and interclavicle are wanting. It is also quite rudimentary in *Amphisbæna*, but it is fairly developed in *Chirotes*. Its most complex condition in Saurians has been already described. The Chamæleons have a simple girdle consisting of a long and narrow scapula with suprascapula and a long and narrow coracoid, the anterior part of which envelops (or is overlapped by) its fellow of the opposite side, while its hinder part joins the sternum. There is no clavicle or interclavicle.

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[1] This is interesting because it is probable that genetically the limb is prior to the limb girdle, which was an ingrowth from the former. See *Trans. Zool Soc.*, 1879, vol. x. p. 439

Hatteria has both a scapula with a mesoscapular process and a cartilaginous suprascapula, also a coracoid with a large cartilaginous epicoracoid. There is an interclavicle, the diverging anterior arms of which, as clavicles, are connected by ligament with the scapula.

The *Crocodilia* have a simple girdle, consisting only of a scapula with a cartilaginous suprascapula and a coracoid without processes or epicoracoid, nor are there any clavicles but only a median anteroposteriorly directed interclavicle.

In the *Chelonia* the girdle lies between the dorsal and ventral shields. The dorsal division is a columnar scapula, which ascends to be connected by ligament or cartilage, which sometimes contains points of ossification, with the transverse process of the first thoracic vertebra. Of the bifold ventral division, the anterior bone is a direct continuation of the scapula, and connects itself with the interclavicle of the plastron, whilst the posterior bone is a coracoid and ends freely (there being no sternum). In *Sphargis* the end of the right coracoid underlies that of the left coracoid.

The Pelvic Girdle.—This girdle only becomes connected with the dorsal part of the appendicular skeleton—to wit, where it abuts against the sacral vertebræ.

In general each of its halves consists of a dorsal division more or less simple and columnar, the ilium, united to the vertebral column by cartilage, and of a bifold ventral division, the parts of which, pubis and ischium, unite in the middle line by the intervention of a median longitudinal cartilage or ligament, a process extending forwards from the front margin of the more anterior part—the pubis—while an azygous bone, the os cloacæ, extends backwards from behind the symphysis formed by the junction of the more posterior part, the ischium, with its fellow of the opposite side. The ilium, pubis, and ischium form the acetabulum.

Although it has been elsewhere already described, it may be well again to mention here that in certain extinct Reptiles not only is the ilium greatly expanded above antero-posteriorly but the pubis sends back a long slender post-pubis nearly parallel with the ischium and closely resembling the so-called pubis of Birds.[1]

In the *Ophidia* the pelvic girdle is generally entirely absent, and, when a rudiment is present, that rudiment is never united with the axial skeleton. It may consist merely of a pair of subparallel slender pubic spicules or cartilages, as in *Typhlops*, or of a rudimentary ilium, pubis, and ischium on each side, as in *Cylindrophis*, *Ilysia*, *Stenostoma*, and *Boa*. A rudimentary pelvis also exists in *Python*, *Eryx*, and *Tortrix*.

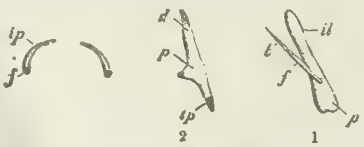

Fig. 24.—Rudiments of pelvic limb—1, of *Lialis Bartonii*. 2, of *Anguis fragilis*. 3, of *Amphisbæna fuliginosa*. *f*, femur, *il*, ilium; *ip*, iliopectineum; *p*, pubis; *t*, tibia.

In Saurians the girdle may also be detached from the axial skeleton and most rudimentary, as in *Lepidosternon*, where it consists of no more than in *Typhlops*, and in *Anguis*, where each half of it consists of an elongated ossicle with three processes corresponding to the three normal pelvic bones. It may be even more simple and yet attached to the vertebral column, as in *Acontias*, *Pseudopus*, and *Ophisaurus*. In all Saurians with ordinary hind limbs the pelvic girdle is fully developed.

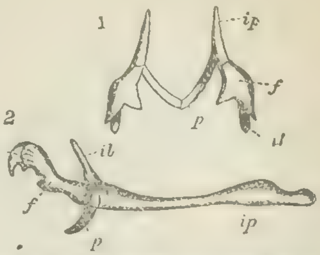

Fig. 25.—1, Rudimentary pelvis and limb of *Stenostoma macrolepis*. 2, The same parts of *Boa* (after Fürbringer). *f*, femur; *il*, ilium; *ip*, bone called "iliopectineum" by Fürbinger; *p*, pubis; *t*, tibia

The Chelonians have long ilia nearly vertical in position and with a cartilaginous margin. The pubis and ischium form an acute angle, and are only connected with their fellows of the opposite side by ligament. There is no os cloacæ.

Hatteria has a lacertilian pelvis. The pubis has a small forwardly extending process, and the ischium a much more prominent backwardly extending one.

In the *Crocodilia* the acetabulum is formed by the ilium and ischium only, and is imperfectly ossified internally. The two ischia are united by synchondrosis, and each develops a forwardly extending process contributing to close the acetabulum, from which the pubic bone extends forwards, downwards, and inwards. The two pubic bones are only united together by membrane.

The *Chelonia* have the pelvic girdle, like the pectoral one, enclosed between the carapace and plastron. In most forms it is not united with either shield, the ilium being merely attached to the transverse processes of the sacral vertebræ. In some forms, however, as in *Chelys*, *Chelodina*, *Pelomedusa*, and others, the ilia firmly unite with the posterior plates of the carapace, while the ischia and pubes unite with the plastron. The three bones concur to form the acetabulum, and the two pubes and the two ischia respectively unite in ventral symphyses. The space between the pubis and ischium of either side, the obturator foramen, is in *Chelone* and *Sphargis* separated from that of the other side by a ligament only, which proceeds from the ischiatic symphysis forwards to the pubic symphysis. In the Land Tortoises, however, the pubes and ischia so expand ventrally that the obturator foramen is (on each side) enclosed by the junction of the pubis and ischium of either side at their distal ends. Each pubis has ordinarily a downwardly bent spinous process at its anterior margin, and the ischium often has a process projecting from its hinder margin. The pubes are generally widely expanded bones, very much larger than either the ischia or the ilia.

The Pectoral Limb.—The skeleton of this limb in its full and normal differentiation resembles in its main features that of Mammals; it may, however, be simplified to a greater extent than in any other air-breathing Vertebrate class, and this according to two modes of simplification. Thus it may be a relatively minute member ending in what is (at least practically) but a single digit, as in *Rhodona*.[2] It may, on the contrary, be simplified by being made up of parts all so exceedingly similar that the typical differentiation of the limb can be with difficulty traced, while the digital elements seem to indicate more than pentadactylism, as in the extinct *Ichthyosauri*.

A peculiar complexity and extreme differentiation of this limb, however, exists, as is well known, in another extinct group, the Pterodactyles, wherein the outermost or ulnar digit is enormously elongated so as to support the wing membrane as do the four digits of existing Bats.

The following are the main conditions of the limb met with in the existing Reptilian orders. In most *Lacertilia* there is an elongated humerus, the proximal end of which is compressed and furnished with two tuberosities. Of the lower arm bones, the ulna is stronger than the radius, and its olecranon forms a short projection. The carpus consists of nine bones, one at the end of each lower limb, one at the base of each metacarpal, one—the os centrale—between these five and the two at the end of the midlimb bones, and one—the pisiforme—outside these latter two. There are five metacarpals and five digits, the latter composed of phalanges, which for the most part number two for the innermost digit or pollex, three for the next or index, four for the third digit, five for the fourth (generally the longest) digit, and three for the outermost or ulnar digit. In the Chamæleons the five proximal carpals coalesce with the metacarpals, and the phalanges are 2, 3, 4, 4, and 3 respectively; the digits, moreover, are very exceptionally disposed, the three inner or radial digits being opposed to the two outer or ulnar ones. The digits may be but four in number, as in *Saurophis*, *Gymnophthalmus*, *Tetradactylus*, and others; or but three, as in *Chalcis*, *Seps*, and others; or but two, as in *Heteromeles*, *Chelomeles*, and others; or, finally, but one, as in *Rhodona*, &c., as we have already seen. The limb may be entirely wanting, as in *Pygopus*, *Delma*, *Lialis*, *Anguis*, *Acontias*, and others.

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[1] See especially a paper by Professor Marsh in *Amer. Jour. of Sci. and Arts*, vol. xvii. (January 1879), pl. 8, and one by Dollo in the *Bull. Mus Roy. d'Hist. Bot. de Belgique*, vol. ii., 1883, "Troisième note sur les Dinosaurs, pl. 3.

[2] See Gray, *Ann. Nat. Hist.*, ii. 335; and Günther, *Ann. and Mag. Nat. Hist.*, 1867, xx. p. 46.

In the *Ophidia* the pectoral limb is entirely absent, not even a rudiment of it being found.

In *Hatteria* the limb is Lacertilian in form but has ten carpals.

The *Crocodilia* have the long limb bones well developed. The carpus has two large long ossicles articulated with the radius and ulna respectively, and a pisiforme; and an oblong bone and disk of cartilage lie between the large carpals and the five metacarpals. The third digit is the longest, and the number of phalanges of the digit from within outwards (as before) is 2, 3, 4, 4, 3.

In the *Chelonia* the humerus may be nearly straight, as in *Chelone*, or very much curved, as in *Testudo*. The radius and ulna, which, though susceptible of very little motion, are generally distinct, may become anchylosed together towards their distal ends, as in *Chelone*. The carpus has generally nine ossicles. The pisiforme may be very large, as in *Chelone*. There are always five digits, which—both their metacarpals and phalanges—may be very long, as in *Chelone*, or exceedingly short, as in *Testudo*. The number of the phalanges may be but two to each digit, as in *Testudo*, but generally it is 2, 3, 3, 3, 2, from pollex to the ulnar digit.

Pelvic limb.

The Pelvic Limb.—The skeleton of this limb, like that of the pectoral one, is in its main features normally conditioned as is that of Mammals, save as to the mobility of the tarsus, as will be shortly explained. It may, however, be simplified in two ways like the pectoral limb—namely, by the great similarity and want of differentiation of its numerous parts, as in *Ichthyosaurus*, or by excessive reduction in the number of its parts, as in certain Ophidians, and in Saurians such as *Pseudopus* and *Lialis*.

Its resemblance to the pectoral limb, which, as we have seen, is so exceedingly close in *Ichthyosaurus* and *Plesiosaurus*, may be, in other conditions, hardly less complete in some Chelonians, such, *e.g.*, as *Chelydra*. When all four limbs are fairly developed, the pelvic ones are in no existing forms so inferior in size to the pelvic ones as in the extinct *Ornithosauria*, or so superior in size to the latter as in some of the extinct *Dinosauria*, as, *e.g.*, in *Compsognathus*.

Amongst existing Reptiles the Lacertilians present us with very varied conditions. Generally there is an elongated femur furnished proximally with a trochanter on its inner side. Of the lower limb bones the tibia is larger than the fibula. A knee-pan bone, or patella, is placed in front of the junction of the upper and lower limb bones. The tarsus consists of a proximal segment made up of two large ossicles more or less firmly and immovably united by fibrous tissue to the tibia and fibula and of a distal segment, which consists of a cuboid bone and which is capable of motion upon the proximal segment, while it is firmly connected with the five metatarsals. Thus the flexion of the foot upon the leg takes place, not as in Mammals between the whole tarsus and the leg-bone, but between the distal and proximal segments of the tarsus itself. The outermost or peroneal metatarsal is more or less bent toward its proximal end. The fourth digit is the longest, and the number of the phalanges of the digits, from within outwards, is 2, 3, 4, 5, 4. In the Chamæleons the distal tarsals coalesce with the metatarsals, and two inner or tibial digits are opposed to the three outer or peroneal ones. The foot may have but four digits, as in *Campsodactylus*, *Tetradactylus*, and others; or but three digits, as in *Seps*, *Heteromeles*, and others; or only two, as in *Chelomeles*, *Rhodona*, and others; or but a single one, as in *Chalcis*. There may be but a very small and slender femur, to which a still smaller tibia unites a rudiment of a tarsal ossicle at its distal end, as in *Lialis*, or but a rudiment of a femur and tibia only, as in *Pseudopus*; or the limb may be entirely wanting, as in *Anguis*, *Acontias*, *Chirotes*, *Amphisbæna*, and *Lepidosternon*.

In the *Ophidia* the limb is generally wanting, and there is never any rudiment of the tarsus or digits, but there may be a rudiment of a femur, as in *Stenostoma*, or of a tibia as well as a femur, the tibia ending in a hooked process, as in *Cylindrophis*, *Ilysia*, and *Boa*.

In *Hatteria* the limb is as it normally is in Lacertilians.

In the *Crocodilia* there is a well-developed femur, and also a tibia and a fibula. The tarsus has two proximal bones (less closely united than in Lizards), whereof that adjoining the fibula has a large calcaneal process. The distal segment of the tarsus consists of two rounded ossicles on the peroneal side and a thin plate of cartilage on the tibial side. There are four long tibial metatarsals supporting digits and a rudimentary fifth one to which no rudiment of a digit is attached. Of the four digits the third is generally the longest, and, like the fourth digit, has four phalanges. The second digit has three, and the innermost, or hallux, but two.

In Chelonians the femur has a strong, rounded articular head, which forms a marked angle with the body of the bone. Sometimes, as in *Emys* and *Trionyx*, there are two trochanters separated by a groove. The lower limb bones are always distinct. They are longest in the Land Tortoises, and shortest in the Marine Turtles. There is no patella. The tarsal bones vary by coalescence from eight to six in number. They are exceptionally flattened in *Chelone*. In *Testudo* the metatarsals are short, but are longer than are the metacarpals, whereas the reverse is the case in *Chelone*. There are always five digits, except in *Testudo*, where the fifth is only represented by a rudimentary metatarsal. The metatarsals are shortest in *Testudo* and its allies, though they are not so short as are the digits of the hand. They are longest in the aquatic forms, though they are not so long in *Chelone* as are the digits of its hand. The number of phalanges, counting from within outwards, may be 2, 2, 2, 2, as in *Testudo*, or 2, 3 3 3, 2, as in *Trionyx*, or 2, 3, 3, 3, 3, as in *Chelone*.

Myology.

The muscles of four-footed Reptiles other than the Chelonians are arranged in a general way on the same fundamental plan as in the Mammals, though the determination of the true homology of many of them is more or less difficult if not impossible now to determine. The muscular masses are thus arranged in a similar longitudinal manner on the dorsum of the trunk, and expand into large continuous horizontal sheets of fibres in the ventral region, while for a greater or less extent longitudinal bundles of fibres underlie the vertebral bodies in different parts of the neck and trunk, and prolongations backwards of the dorsal and ventral muscles clothe the skeleton of the caudal region. Muscles like the temporal, masseter, pterygoid, and digastric of Mammals help to open and shut the jaws of Reptiles. Others descend from the dorsal region of the spine to the pectoral and pelvic girdles and to the limb bones, which latter are furnished with flexors and extensors, abductors and adductors, in essentially the same way as are the limbs of birds.

There are two special deviations from this more normal type of structure. We find one of these in the Serpents, which, being limbless and without a neck, and requiring an extraordinary mobility in the parts of the axial skeleton, have the muscles which clothe the trunk raised to their highest degree of multiplication and differentiation. The other exceptional type is furnished us by the Chelonians, which, having a perfectly rigid body and long neck and limbs singularly situated, have the muscles of the trunk atrophied to an extreme degree, the neck richly supplied with muscles, and also the limbs, while the limb muscles are so strangely different, in either origin or insertion, from those of other animals that their true nature and correct designations do not seem as yet to admit of precise and accurate determination.

Muscles of trunk and tail;

The Muscles of the Trunk and Tail.—In Saurians the caudal muscles often take the form of a series of hollow cones successively enclosed one within the other, while their continuations forward in the trunk become the longissimus dorsi, sacro-lumbalis, spinalis, levatores costarum, and the other muscles familiar to anatomists. Subvertebral continuations form muscles which proceed from the vertebral bodies to the inner surfaces of the ribs, which they tend to pull back—retrahentes costarum—and further forwards, such muscles as answer to the longus colli, rectus capitis, &c., of Mammals. Ventral muscles take the form of the two obliques and transversalis, but the differentiation may be greater than in Mammals, as *e.g.*, in *Iguana*, where the obliquus externus consists of three distinct layers. Tendinous or harder structures may produce a segmentation in the abdominal muscles, which, under special names, are prolonged to the hyoidian cornua and mandible.

In Serpents the dorsal muscles are essentially the same as in Lizards, but are more developed, while small superficial muscles run from the ribs to the inside of the abdominal shields which are agents of locomotion. The limbless Serpent is practically somewhat like a Centipede, and moves by the successive protrusion and retraction of each pair of ribs, which serve as two feet. For each pair is attached to a ventral shield the edge of which is applied to and removed from the ground by the ribs attached to it, according as these are protruded or retracted—the shields thus serving as a number of small levers to propel the body along. The subvertebral muscle may also be very largely developed, as in *Naja* and *Crotalus*, the long hypapophyses of which have been already noted, and which serve for the attachment of such muscles. By their contraction the force of the downward flow of the poison fangs is greatly increased. That subvertebral series already mentioned as the retrahentes costarum is very extensively developed in the *Ophidia*.

In the *Crocodilia* the arrangement is substantially as in Saurians, but the so-called abdominal ribs induce certain differences. Some muscles lie above, some below, and some between these "ribs." Subvertebral muscles extend beneath the cervical and anterior dorsal vertebræ, and farther back there are retrahentes costarum.

Hatteria has special muscles inserted into the distal expansions of its ribs, which may sometimes aid its motions in a very subordinate degree, as those of Serpents are so helped in the highest degree.[1]

In the Chelonians the dorsal muscles are well developed in the neck and tail. Bifold muscles pass from within the hindmost lateral plates of the carapace to the dorsum of the caudal vertebræ. Other muscles extend between the articular and transverse processes of the caudal vertebræ. Dorsal muscles are entirely wanting in the thorax of *Testudo*, but in *Emys* and *Chelydra* a longitudinal muscle lies upon the transverse processes of the trunk vertebræ. In the neck there are a number of muscles extending with various degrees of complexity between the transverse and articular processes. The neck is retracted partly by a muscle passing from it to the procoracoid and partly by a long muscle passing to the head and neck from a greater or less number of the spines and neural arches of the more posterior trunk vertebræ. Pyramidal muscles pass from the pelvis to the plastron, and oblique muscles arise from inside the costal marginal plates of the carapace and pass to the pelvis and plastron, and a transversalis extends from within the costal plates and also passes to the plastron. A diaphragm springs from the bodies of certain dorsal vertebræ and one or more ribs, and invests the surface of the lungs.

The Muscles of the Head.—In ordinary Saurians, the temporal muscle is embraced by the upper (in them the only) zygomatic arch, and descends from the side of the head to the coronoid process of the mandible. The masseter takes origin from the quadrate and columella. Of the two pterygoid muscles one arises from the upper surface of the pterygoid bone and the other from the os transversum. The digastric descends from the hinder part of the cranium to the posterior end of the mandible.

In the *Ophidia* the muscular apparatus is much more complex, as might be predicted from the great mobility of their jaws. There are on each side three elevators and several depressors of the lower jaw, and sometimes, as, *e.g.*, in *Trigonocephalus*, a muscular belly connected with one of the elevators is so arranged as to be able to compress the poison gland. In poisonous Serpents also a tendon goes from the external pterygoid to the short maxilla, so that the latter can be erected by its intervention. The suspensorium is drawn upwards and backwards by a muscle arising from the neural spines of the anterior trunk vertebræ, and downwards and forwards by another arising from the basisphenoid. Four other muscles on either side of the head are devoted to moving the palatine apparatus.

The *Crocodilia* have a temporalis, an internal and external pterygoid, and a digastric. There are also a pair of sternomandibular muscles, and of hyomandibulars (from the cornua of the hyoid), a pair of genioglossi, and a superficial mylohyoid.

The *Chelonia* have only an internal pterygoid, besides the temporal and digastric. But they have also a geniohyoid and genioglossus as well as a mylohyoid.

of pectoral girdle and limb;

The Muscles of the Pectoral Girdle and Limb.—In ordinary Saurians and in Crocodiles the scapula is drawn forwards and upwards by a trapezius and levator, and there are also a serratus magnus and a sternoscapular muscle, a cleidomastoid or sterno-mastoid, and generally an omohyoid. In the *Chelonia* the shoulder-girdle muscles are very reduced and peculiar, and no muscle draws it towards the skull, but a muscle arises from the sides of the cervical vertebræ and is inserted into the scapula. Another (smaller) passes from the second dorsal transverse process and the part of the carapace therewith connected to the scapula, which it draws backwards. Another muscle goes from the coracoid to the hyoid, and yet another—a sort of sternomastoid—from the plastron to the skull.

Lacertilians have an ordinary pectoralis and generally a subjacent small muscle passing from the coracoid to the great tuberosity of the humerus. There is a latissimus dorsi going to the lesser tuberosity and a large subscapularis. A triceps ends by a tendon inserted into the olecranon, often containing an ossicle analogous to a patella. There is also a biceps, coracobrachialis and brachialis, anticus, with other Mammalian muscles, flexors, and extensors of the digits, with even lumbrical muscles, but not with that perfect arrangement of perforating and perforated tendons which characterizes the highest class.

The muscles of the pectoral limb of Crocodiles, though showing many minor differences from those of Saurians, yet present a fundamental general resemblance to the latter.

It is otherwise with Chelonians. In them the pectoralis major is represented by two muscles, one a muscle extending from the median plastron plate and external border of the carapace to the inner of the two tuberosities of the humerus, and another muscle inserted beside the former and taking rise from the most anterior plate of the plastron. There is also a superior pectoralis, which arises from the coracoid and coracoacromial ligaments, and which is partly inserted into the same tuberosity and partly extends beyond it. There are also a coracobrachialis and a deltoid, but no suprascapular. All the muscles which arise from the scapula are inserted into the external tuberosity of the humerus. There is a muscle which represents the latissimus dorsi. It arises beneath the most anterior plate of the carapace, and is inserted into the external tuberosity. The muscles of the forearm and extremity are less exceptional.

Muscles of the Pelvic Girdle and Limb.—In Lacertilians there are several hind-limb muscles which have a subcaudal origin; some of these end at the thigh, while others extend to the feet. There are numerous flexors of the leg. A powerful muscle arises beneath the tail, and is inserted by a broad tendon into the femur. From the inferior margin of that tendon another slender tendon arises, sometimes ending (as, *e.g.*, in *Iguana*) in the interarticular cartilage of the knee-joint. The muscles of the thigh, leg, and foot have a general similarity to those of Mammals generally, as have those of the arm and hand, but those which represent the ham-string muscles have generally much complexity and intricacy of arrangement of their tendons and much connexion with other muscles in the popliteal space.

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[1] See *Phil. Trans.*, pt. ii. for 1867, p. 17.

The *Crocodilia* have an adductor femoris, which arises from beneath the transverse processes of the lumbar region and is inserted by a broad tendon into the femur. An iliacus arises from the inner side of the ilium and ischium, and goes to the inner side of the femur. Several adductors proceed to the femur from the ischium. A long muscle arises from the chevron bones and transverse processes of the anterior third of the tail, and is inserted by a strong tendon into the trochanter; thence descends another tendon along the flexor side of the femur to join the tendon of origin of the gastrocnemius, which springs from the external condyle.

The *Chelonia* possess an abductor femoris, which passes from beneath the transverse processes of the thoracic vertebræ, and also a sort of psoas extending from their transverse processes to the ilium. Another muscle goes from the hindmost thoracic transverse processes to the femur. A muscle, attrahens pelvim, arises from within the plastron and goes to the outer process of the pubis. Another muscle which antagonizes this, the retrahens pelvim, springs from the hindermost part of the plastron and goes to the pubis. Other retractors pass from the caudal chevron bones to the front border of the obturator foramen, and another muscle with a similar origin is inserted into the ischial symphysis. The muscles of the more distal part of the limb are less peculiar, and need not be described here.

The Alimentary System.

nentary system—

All Reptiles agree in having an alimentary tract which begins with jaws armed mostly with teeth, rarely with horny sheaths, but never in existing Reptiles with both, though (as has been elsewhere described) such a combination is found in some fossil forms. Moreover, teeth are mostly found not only at the margins of the jaws but also on the palate.

Almost always there is a tongue, and glandular structures around the mouth pour their secretion into that cavity, which communicates, by tubular prolongation, with the ears, the eyes, and the nostrils. The mouth opens posteriorly into the commencement of a more or less prolonged alimentary canal, the anterior part of which is not, while the greater and less posterior part is, embraced by the peritoneum. At its hinder end this canal opens into a chamber called the cloaca, into which the urinary and generative ducts also open, and which itself opens beneath the hinder part of the trunk by a roundish longitudinal or transversely extended aperture. Two accessory glands aid digestion by the products they pour into the canal. These are the pancreas and the liver, and the latter is always provided with a gall bladder. A spleen is also always found in the vicinity of the stomach or specially digestive dilatation of the alimentary canal towards its anterior end and separated from the mouth only by the œsophagus.

The several main groups of existing Reptiles present the following characters:—

The *Ophidia* all possess teeth, mostly well developed and anchylosed to the bones which support them. By rare exception, as in *Dasypeltis scaber*, the teeth may be quite minute,—the hypapophyses of the anterior trunk vertebræ penetrating the dorsal wall of the alimentary canal and being tipped with tooth substance, and taking the place of teeth, as already mentioned in describing the axial skeleton. Teeth generally exist on the palatines and pterygoids as well as on the maxillæ and mandible, and in *Python* and *Tortrix* in the premaxilla. They may be absent from the palate, as in *Uropeltis*. But the various conditions as to the disposition of the teeth have already been given in the systematic part of this article.

In the majority of Serpents the teeth are solid or have but their pulp cavity, but in some harmless ones one or more of the hindmost teeth which are set on the maxilla are longitudinally grooved along their convex side. In poisonous Serpents each maxilla supports a poison fang or tooth so deeply grooved that the margins of the groove meet and so convert the grooved tract into a canal, down which the duct of a poison gland passes. This fang may be the only functional maxillary tooth, as in *Crotalus* and *Vipera*, or there may be other teeth behind it, also grooved, as in *Naja*, or entire, as in *Bungarus*. Almost all Ophidians have a row of small labial salivary glands along either margin of each jaw, their secretion escaping into the mouth by numerous small apertures. In addition to this, some apparently innocuous snakes with grooved teeth have an additional glandular mass connected with the upper labial gland and pouring its secretion by a duct into the dental groove. The truly poisonous Serpents possess a gland placed above the maxilla and os transversum and beneath and behind the ball of the eye, and of different size and extent in different genera. In *Naja* it may extend for about one-sixth the length of the body, but in *Callophis*[1] it may be yet greater and extend throughout nearly half the length of the entire body of the animal. The poison gland has a fibrous investment, which is often contractile from the presence in it of muscular fibres, and often jaw muscles are so arranged (as already mentioned) as to exert pressure on the gland by their contraction. A nasal gland and a lachrymal gland also convey their secretion into the mouth.

The tongue is long, bifurcated anteriorly, and extremely mobile, being capable of protrusion from and retraction into a membranous sheath, placed on the floor of the mouth beneath the ventral wall of the larynx.

The œsophagus is long. The stomach begins by a well-defined limit beside the liver, and may or may not form a curve, but is always simple. A valve at its pyloric end marks the commencement of the duodenum. The small intestine varies much as to the number of its convolutions, which are connected by bands of fibrous tissue and are not followed by foldings of the mesentery. A circular protuberance generally marks its junction with the shorter large intestine, and sometimes there is a cæcum, as in *Typhlops*, *Tortrix*, *Python*, and others. The large intestine may be simple, and its internal cavity may be augmented by valves or partial partitions. The cloaca opens externally by a transverse aperture. The liver is not subdivided into conspicuous lobes. The gall-bladder lies separate from the liver and posterior to it. The ductus choledochus passes through the pancreas, which lies behind the pylorus at the right side of the duodenum and is pyramidal (or rounded), or compact, or in separate parts, as in *Hydrophis*. The spleen lies immediately behind the pancreas. It is rounded, small, and generally entire, not lobed.

In Lacertilians;

The *Lacertilia* all possess teeth along the margins of the jaws and very often in the palatines also; but it is only by rare exception, as, *e.g.*, in *Iguana*, that the pterygoids bear teeth. In the Chamæleons the teeth are very rudimentary, little more than an enamelled dentated ridge on the margin of either jaw. The teeth of most Saurians are either acrodont, *i.e.*, anchylosed to the free margins of the jaws (as, *e.g.*, in *Psammosaurus*), or pleurodont, *i.e.*, anchylosed to the inner side of the jaws, their crowns projecting above the margin (as, *e.g.*, in *Iguana*). Generally more or less conical, the teeth may be acutely pointed, or extremely obtuse, as the hinder teeth of *Cyclodus*. Sometimes, as, *e.g.*, in *Iguana*, the teeth may be compressed with a median external vertical ridge and a serrated margin. By rare exception, as, *e.g.*, in *Chlamydosaurus*, the teeth of either jaw may be much differentiated. Here we have a simulation, or anticipation, of that division of the teeth into incisors, canines, and molars which is so general in the class *Mammalia*.[2] In the genus *Heloderma* the teeth are vertically grooved so as to remind us of their structure in Serpents. The teeth indeed are more grooved than in them, for one vertical groove passes down on the antero-inner side and another on the postero-outer side of each tooth. Labial salivary glands generally exist, but are small. In *Heloderma*, however, and in no other known Lizard, there is a very large salivary gland on either side of the lower jaw. The quality of its saliva is distinctly poisonous, small animals bitten by *Heloderma* in our zoological gardens dying as if bitten by a venomous Serpent. No other such case is known to exist amongst the *Lacertilia*.

The tongue presents a number of variations of form which have been already referred to as diagnostic characters in the systematic part of this article. It will suffice here to remind the reader that it may be broad and flat without any sheath, and with a pair of anterior and of posterior processes, as in *Amphisbæna*; or short, broad, and slightly notched in front, as in *Gecko*; or short with a slight bifurcation in front and two long processes behind, as in *Chalcis*; or with a sheath, and much like that of Serpents, as in *Psammosaurus*; or cylindrical and wonderfully extensile, as in *Chamæleo*.

The œsophagus passes into a stomach, which is generally elongated and curved. The small intestine may be hardly at all convoluted (as in *Amphisbæna*) or very much so, but if so the mesentery here follows its folds. Similarly the large intestine may be short and straight, or long and with internal folds. There may be a cæcum, as, *e.g.*, in *Amphisbæna* and some Chamæleons. The cloaca opens externally by a transverse aperture.

The liver is but little lobed, and its gall-bladder lies in a fissure on its left side. The pancreas and spleen usually lie between the folds of the mesentery at the junction of the small intestine with the stomach. There is generally a pair of anal glands.

In *Hatteria* the large teeth in the premaxillæ become completely anchylosed with those bones, reminding us of the extinct *Rhynchosaurus* and *Hyperodapedon*. Most of the teeth which lie along the margin of the jaws and the palatines soon wear down to form mere enamelled cutting edges to the bones, with which they become immediately anchylosed. The extinct Dicynodonts with their large canine-like teeth, growing from permanent pulps, behind the edentulous beak-like front part of the mouth, and those *Ornithosauria* which similarly have an edentulous beak in front of the toothed parts of their jaws, may but have carried out further and more completely that process of tooth reduction which we find to be effected with age in *Hatteria*. The liver consists of two lateral lobes. There is a pair of anal glands.

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[1] See A. B. Meyer, *Monatsb. der Akad. d. Wissen. z. Berlin*, 1869.

[2] This fact thus affords an interesting illustration of the independent origin of similar structures.

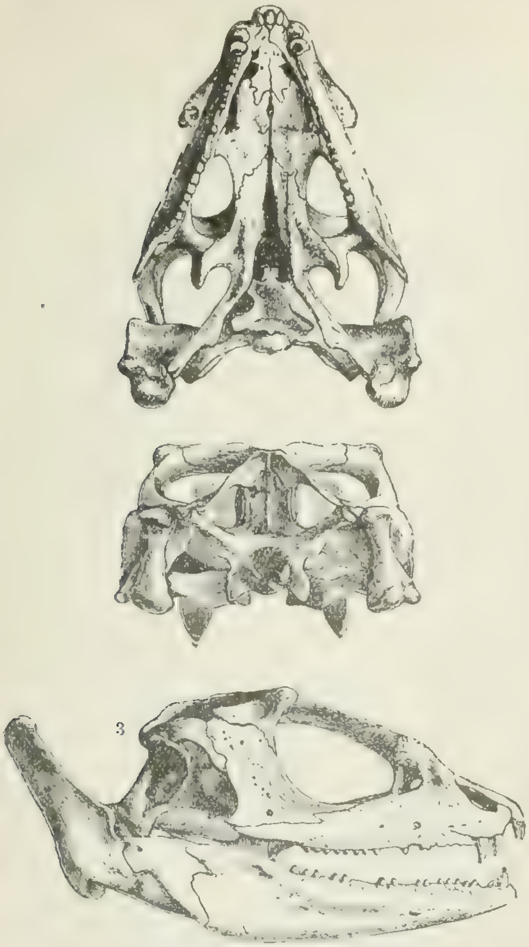

FIG. 26.—Skull of *Chlamydosaurus kingii* (old male, from nature), showing much differentiated teeth. 1, ventral aspect; 2, posterior; 3, profile, showing the enormous process at the hinder end of the lower jaw.

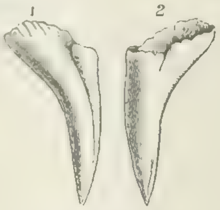

FIG. 27.—Two aspects of a tooth of *Heloderma horridum* (after Bocourt). 1, antero-internal aspect of the tooth, showing a very deep longitudinal groove; 2, postero-external aspect of the same tooth, showing a very faint longitudinal groove.

The *Crocodilia* have teeth in the maxillæ, premaxillæ, and mandible, but none in the palatines or pterygoids. They are implanted in distinct alveoli. The tongue is so flat and closely attached to the floor of the mouth that it can hardly be considered as having a distinct existence. A transverse fold of membrane extends along its hinder border and another similar fold descends in front of the posterior nares. There are no salivary glands.

The œsophagus is wide, and the stomach nearly circular and gizzard-like, having thick muscular walls formed of fibres radiating from central tendons. The small intestine consists of two parts,—an anterior part much convoluted, thin-walled, and lined with villi, which is succeeded by a thicker-walled part with internal zig-zag folds. There is no cæcum, but a circular prominence marks the commencement of the large intestine, which is short and wide with a smooth lining. It is funnel-shaped, and opens by a very narrow aperture into a very elongated cloaca, the external opening of which is rather longitudinal.

The liver, like that of *Hatteria*, is in two lobes, and the gall-bladder is beside the right lobe. The spleen lies behind the pancreas between the folds of the duodenum. The various viscera of the abdominal cavity lie, as in Birds, in separate serous sacs.[1]

In the *Chelonia* there are horny sheaths to the jaws but no teeth, though numerous rudiments of teeth have been found in the embryo of *Trionyx*.[2] The tongue is not extensible, but is differently conditioned in different genera. There appears to be only a sublingual salivary gland, though the palate of the Land Tortoise exhibits the apertures of numerous cutaneous follicles.

The œsophagus leads to the left part of the transversely placed stomach. The extent of both the small and the large intestine varies; the latter is at its shortest in *Trionyx*. The cloaca opens externally by a somewhat rounded aperture.

The liver is mostly large, and in two lobes connected by one or more transverse bands of its substance. The gall-bladder lies on its right and may be sunk within its substance. The pancreas has often several excretory ducts, and the spleen is generally of large size.

The Respiratory System.

All the *Reptilia* breathe air from the first moment of their separate existence, and are never furnished with anything in the shape of gills. The apparatus by which their respiration is effected is always a pair of sacs or lungs —whereof one sometimes aborts—into and from which air is introduced and removed by the intervention of an azygous tube, the trachea, which, passing forwards ventrally to the œsophagus, or beside it, opens in the floor of the mouth behind the tongue. The more or less dilated most anterior portion of the azygous tube is the larynx, which may become a vocal organ.

In the *Lacertilia* the external opening of the larynx may, by rare exception, as in *Phrynosoma*, be placed in front of the hindmost margin of the tongue, so that the larynx seems to perforate that organ, but is in fact merely enclosed by the posterior, exterior, and median junction of two lingual processes. A membranous or cartilaginous epiglottis may protect the entrance to the larynx as in Mammals. The larynx may be composed of one cartilage, which is produced anteriorly into two arytenoid processes, but generally these latter are distinct cartilages. Folds of membrane or vocal cords may exist, as in the Geckos and Chamæleons, and the latter have also a wide membranous sac connected with the larynx. The trachea is generally short, but may be long, as in *Amphisbæna* and *Lepidosternon*. It is never convoluted, and its cartilages may or may not form complete rings. It ends posteriorly by dividing into two bronchi, which are usually very short, but may be of moderate length, as in *Psammosaurus*. The lungs are generally of about equal size, but in the Snake-like Lizards the right lung is the longer, and sometimes, as in *Typhline* and *Acontias*, the left lung may be quite rudimentary. The lungs may be simple bags or may give out lateral processes or pouches of varying extent. In the Chamæleons their hinder halves are prolonged into narrow tubular processes. Each lung is enclosed in a fold of peritoneum.

The *Ophidia* have the opening of the larynx behind the tongue rather prominent, with only a rudimentary epiglottis. The nature of their prey and their mode of eating do not readily expose them to the danger of small particles of food finding their way into the trachea. The cartilaginous framework of the larynx is very elongated. The trachea has its more anterior cartilages in the form of complete rings. The lungs are unsymmetrical in all the genera, but much more so in some than in others—one lung entirely aborting in *Typhlops*, *Acrochordus*, and *Vipera* amongst others. The two lungs are both of tolerable size in *Python*, *Boa*, and *Eryx*, which have the bronchi leading from the trachea to the two pulmonary sacs. These sacs may or may not be divided into subordinate cells towards the hinder end of each. Sometimes part of the trachea itself may be dilated dorsally into cellular prominences like an accessory lung, as in *Hydrophis*, or ventrally, as in *Acrochordus*. A pulmonary sac may extend not only far backwards but also forwards to the hyoidean region, as in *Heterodon*.

In the *Chelonia* the opening of the larynx or glottis is longitudinal. It may be furnished with a membranous epiglottis, or may have none, as in *Testudo*. There may be cricoid and arytenoid cartilages in addition to main cartilages, but the details of structure differ in different genera. There are no vocal cords. The trachea and bronchi vary in length, the former being long in most forms, the latter in *Testudo*. In *Cinixys* the trachea and bronchi are contorted. The lungs are invested anteriorly and on their ventral side by peritoneum, and also by the diaphragm as they lie between it and the carapace, and therefore they do not project freely into the abdominal cavity.

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[1] Stannius pointed out emphatically, as long ago as 1856, the resemblance which exists in many points between Crocodiles and Birds. See his *Amphibien*, p. 193, note 1.

[2] See Owen, *Odontog.*, p. 179.

The *Crocodilia* have no epiglottis, but the larynx is attached by tendinous fibres to the front part of the shield-like basihyal. The larynx consists of a ring-shaped principal cartilage and arytenoid cartilages. There are folds which serve for vocal cords. The trachea is long, with two short bronchi. The former is generally straight, but may be contorted. The more anterior tracheal cartilages are incomplete dorsally; those of the hinder part and of the bronchi are generally complete. Each lung consists of pouches or cells, the cavaties of which open into each other, and communicate with the cavity of the bronchus by the lateral openings just mentioned. The lungs are enclosed in pouches of peritoneum, and lie, freely suspended, in the body cavity.

The Vascular System.

The vascular system of Reptiles consists of a sanguineous and a lymphatic system, and the former is further subdivided into an arterial and a venous system, as in the higher Vertebrates, though the latter two are less completely differentiated. In all there is a heart, which consists of at least three distinct cavities, namely, two auricles (which are almost always distinct) and a ventricle, which latter may or may not be completely subdivided into two distinct chambers, a right and a left ventricle. Reptiles differ from the higher Vertebrates in the heart always giving rise to at least two great vessels, which ultimately join to form a single vessel, and from these all the arteries are given off. Most of the blood of the hind limbs and tail passes either through a portal system in the liver, or else in the kidney, on its road to the heart. That which goes to the liver goes to it for the most part through the anterior abdominal veins or vein. The venous blood is conveyed to the right ventricle through a rhythmically contractile sinus venosus. The lymphatic system is well developed, with large reservoirs, and communicates freely with the venous system by a pair of rhythmically contractile so-called "lymphatic hearts."

The Heart and Arterial System.—In all the existing Reptiles except the *Crocodilia*—that is to say, in the *Rhynchocephalia*, *Lacertilia*, *Ophidia*, and *Chelonia*—the two auricles are divided by a complete septum (except in some Chelonians), but the ventricle is only imperfectly divided into a right and left chamber. Of these the latter is the narrower, the more dorsal in position, and mostly has thicker walls, and communicates directly with the left auricle. The right chamber of the ventricle is broader, more ventral, and posterior, and mostly with thinner walls, and communicates directly with the right auricle. No arteries proceed from the left chamber, but three proceed from the right chamber, one of which, the pulmonary artery, goes to the lungs, and the other two constitute the trunk roots of the whole systemic set of arteries or the two aortæ. Between the mouths of their trunk root and that of the pulmonary artery a muscular ridge or valve extends, which imperfectly divides the right chamber of the ventricle into two cavities, which, during the latter part of the ventricle's contraction, become completely divided by it so as to shut off the contained blood from any further access to the pulmonary artery These great arterial vessels thus leaving the heart are at first closely connected together and are invested with the pericardium, and sometimes, in Chelonians, their investment has been observed to contain striated muscular fibres, thus reminding us of the "bulbus arteriosus" of Amphibians. Afterwards the great arteries proceed in diverging and opposite directions, one aorta arching over to the right and the other to the left, and then meeting and uniting on the dorsal side of the heart to form by their junction the single great dorsal aorta.

Amongst the *Lacertilia*, the Monitors are remarkable for the almost complete septum between their ventricular chambers. In many Lizards the great arteries going to the head may be so connected with the two primitive arterial roots as to form two arches called aortic arches on either side, but in the Monitors, Chamæleons, and *Amphisbæna* these complications are wanting, there being but a single aortic arch on either side. Generally the right trunk root, or right fundamental aortic arch, after supplying small arteries to the heart itself, gives off a common carotid artery, which divides into a right and a left carotid, and these subdivide to supply the head and neck. It also gives off the subclavian arteries for the fore limbs and arteries to the trunk The left trunk root, or left fundamental aortic arch, gives off arteries to the viscera, and then anastomoses with the right trunk root, the two anastomosing to form the single dorsal aorta, which passes backwards beneath the bodies of the vertebræ, and gives off branches to the stomach and the viscera, and to the kidneys, sexual glands, hind limbs, and tail.

In the *Ophidia* the heart is elongated and very distant from the head, and there are of course no limb arteries given off from the aortæ.

The heart is also distant from the head in the *Chelonia*, but it is broad in shape and lies above the coracoids. Striated muscular fibres invest the aortic roots in *Emys*.

In the *Crocodilia* the ventricle is subdivided by a complete septum into two thoroughly distinct chambers, and a trunk root or fundamental aorta proceeds forth from each,—the left aorta and the pulmonary artery proceeding from the right chamber, and the right aorta from the left ventricle. Nevertheless, though there is here no communication between the chambers whence these two aortæ arise, there is a communication between these two aortæ themselves, and that not only when they anastomose after arching different ways, as in all other Reptiles, but also by a direct communication between them. When they cross one another, as the aorta from the right chamber arches to the left and that from the left chamber arches to the right, a small aperture places their cavities in communication just outside the heart and close to their respective origins.

The Venous System.—The systemic veins arising in all parts of the body collect together and anastomose till their three finally formed trunks open into a more or less capacious contractile cavity, the sinus venosus, which communicates with the right auricle. The anterior two of these three final trunks are called venæ anonymæ, and the single posterior one is called the vena cava. The former are formed by the gradual junction of the veins of the head, neck, fore limbs, and vertebral region (jugular veins, subclavian azygous veins, &c.), and the vena cava is formed by the junction of the iliac veins or those of the hind limbs, together with the veins of the rest of the body.

The veins of the alimentary canal, spleen, and pancreas, and the abdominal veins (running between the peritoneum and the abdominal muscles) or vein—there being one in the *Ophidia*—commonly collect and unite to enter the liver to form a portal system.

In the *Ophidia* the veins of the alimentary canal, generative organs, fatty appendages, pancreas, and spleen thus unite, while the caudal vein with some veins of the generative organs and intestine go to form a subordinate secondary circulation in the kidney or reni-portal system. In the *Lacertilia* the veins of the hind limbs collect in part to form a reni-portal system, and also communicate with the abdominal veins, which join the ordinary visceral veins to form the true portal system. In the *Chelonia* the veins of the tail and hind limbs join the abdominal veins above the plastron, and there with others from the bladder and viscera go to form the portal system, while small branches from the abdominal veins join others from the generative organs and vertebral veins to form a reni-portal system. In the *Crocodilia* the caudal vein divides on entering the trunk and joins the posterior limb and body veins, and goes on to form, with the visceral veins, a portal system, giving off in this way veins to the kidneys to form the reni-portal system.

In all Reptiles the veins of the lungs collect together and empty themselves into the left auricle as they do in all other air-breathing Vertebrates.

The Lymphatic System and Vascular Glands.—In *Reptilia* generally there is a pair of lymphatic hearts placed over the transverse processes of the vertebræ at the junction of the tail with the trunk. Each usually opens with a small vein which communicates with the iliac vein. Besides these bodies, more or less considerable lymphatic canals follow the course of the great arterial trunks in the body and tail, and, when there are limbs, communicate with the iliac veins. Other canals accompany the aortic arches and approach and open into the venæ anonymæ, and others extend backwards towards these from the head and anterior limbs.

A pair of bodies which answer to the thymus gland of Mammals lie close to the jugular veins and lymphatics at the anterior part of the thoracic cavity. They are elongated in Ophidians and roundish in other Reptiles, and they are much larger in young than in old individuals.

A thyroid exists in front of the pericardium on the ventral side of the great arterial trunks. It is bilobed in the Crocodiles.

The supra-renal capsules are yellowish bodies which lie more in connexion with the generative glands than the kidneys. They are very elongated in the *Ophidia*, flattened in the *Chelonia*, and roundish in the *Crocodilia*.

The Nervous System and Organs of Sense.

Reptiles, in common with other Vertebrates, have a nervous system divisible into an axial portion or neural axis made up of brain and spinal marrow, and a peripheral portion made up of the multitude of nerves which proceed from or are connected with this, and one portion of which is more or less distinctly separable and known as the sympathetic system. Reptiles also generally possess three distinct organs of sense—(1) ears, (2) eyes, and (3) nasal organs—though one or more of them may be exceptionally rudimentary and defective.

The Neural Axis.—The spinal marrow extends through nearly the whole length of the neural canal of the skeleton in the form of a long nervous cylinder with a small central cavity, with a deep furrow along the middle of its dorsal and a shallow one on the middle of its ventral aspect. It becomes more or less augmented in volume about the region of the shoulders and loins, where the nerves of the limbs are given off from it. Even where most enlarged, however, the tracts on either side of the dorsal furrow do not diverge and leave a space or sinus as they do in the lumbar enlargement of Birds. Where the spinal marrow comes to join the brain it enlarges considerably. At the medulla oblongata it is bent down at a marked angle with the more posterior part of the neural axis. The two halves of its dorsal portion also diverge so as to expose the dorsal surface of the more ventral portion in a space which is known as the fourth ventricle or ventricle of the medulla. This medulla advances forward, expanding and becoming locally differentiated to form the brain, its ventricle being continued on into a more anterior and more completely enclosed cavity known as the third ventricle. The nervous roof of the hinder part of this latter ventricle is produced into two smooth prominences placed side by side and called the optic globes or corpora bigemina (which may themselves contain a cavity), immediately behind which is an azygous nervous structure, the cerebellum, which more or less roofs over the hindmost or fourth ventricle. In front of the optic lobes are the larger rounded smooth neural masses—the cerebral hemispheres, each of which contains a cavity—the lateral or first and second ventricles, which both communicate with the anterior end of the third ventricle through an aperture termed the foramen of Munro. Between the hinder ends of these hemispheres an azygous structure projects upwards—the pineal gland—while from beneath the floor of the third ventricle another azygous structure projects downwards—the pituitary body. In front of the hemispheres are the other rounded and smaller neural masses, the olfactory lobes, which are generally elongated and contain cavities that are continuations forwards of the lateral ventricles. Three transverse bands of nervous tissue connect the structures which bound the third ventricle laterally; the first of these, placed just behind the lamina terminalis or the front boundary of that ventricle, is called the anterior commissure, and the nervous masses it joins are the corpora striata. Another more posteriorly situated band is called the soft commissure; and the third, a little farther back still, is the posterior commissure. The masses joined by those last two commissures are called the optic thalami. The brain is invested with membranes in the same general way as it is in Mammals.

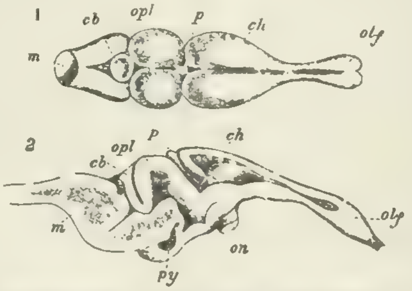

Fig. 28.—Brain of *Lacerta agilis* (after Leydig). 1, Dorsal aspect; 2, vertical longitudinal section. *cb*, cerebellum; *ch*, cerebral hemisphere; *m*, medulla oblongata; *olf*, olfactory lobes; *on*, optic nerve; *opl*, optic lobes: *p*. pineal gland; *py*, base of pituitary body.

In the *Lacertilia* the cerebellum is a thin very small body projecting rather upwards, and may be transversely segmented, as in *Platydactylus*. In the Chamæleons the optic lobes and hemispheres are of nearly equal size, and the olfactory lobes are neither separated off nor hollow. In the *Ophidia* the cerebellum nearly covers the fourth ventricle, the hemispheres are of considerable size, and the olfactory lobes may be immediately annexed to them. In the *Chelonia* the cerebellum is rather large, but it is only in the *Crocodilia* that it is marked by transverse grooves, as is the central part of the cerebellum or dermis in Mammals; the hemispheres also are of considerable volume.

In some extinct *Reptilia, e.g.*, in the Dinosaurian *Stegosaurus*, the brain was exceedingly small, probably weighing but the hundredth part of that of the Alligator compared with the weight of the bodies of the two animals. Moreover, the cerebral hemispheres but little exceeded the optic lobes in size, while the transverse diameter of these lobes only slightly exceeded that of the medulla. The cerebellum also was very small. In the *Ornithosauria*, however, the optic lobes were unlike in their situation those of any existing Reptiles, they being depressed and placed laterally instead of on the dorsum of the brain, thus resembling the optic lobes of Birds.

The Peripheral System.—As in the higher Mammals, so also in Reptiles, the neural axis gives off a series of special nerves, which in a general way correspond in number with the vertebræ they pass out between. Each also arises by a superior and inferior root, whereof the former is furnished with a ganglion. After the junction of these two roots the whole nerve thus formed divides into ascending and descending branches—the latter, in the trunk, running between the internal oblique and transverse muscles.

The cranial nerve which comes forth from the brain nearest the spinal marrow is the hypoglossal. It passes out through a condyloid foramen in the occipital bone, and goes to the tongue, hyoid, and larynx. A more anteriorly placed nerve, called the spinal accessory, exists except in *Ophidia*. It arises between the superior and inferior roots of the more anterior spinal nerves, and then enters the cranium, which it leaves again in company with that next to be noted. It supplies certain dorsal muscles of the neck or anterior part of the trunk. The next or pneumogastric nerve passes out into the spinal accessory. It is distributed to the lungs, stomach, and heart. To these, next in advance, succeeds the glosso-pharyngeal for the tongue and pharynx. Very distinct from the foregoing is the facial nerve, which passes out at a distinct foramen and turns rather backwards to supply the sides of the head. Next is to be distinguished the acoustic nerve, which goes to the internal ear, and in front of that again is the trigeminal, which is wont to make its exit at two distinct places, and diverges into three branches, which go respectively to the orbit, the upper jaw, and the lower jaw. Then come three small nerves destined to supply the muscles which move the eyeball; and foremost but one is the optic nerve; this crossing its fellow of the opposite side beneath the brain, the fibres of the two nerves blend at their point of intersection and so form what is called the chiasma. Most anterior of all are the olfactory nerves, which proceed from the olfactory lobes to the nasal organs themselves.

In the *Chelonia* the spinal accessory may take origin as far back as the root of the fourth cervical nerve. The pneumogastric and glosso-pharyngeal pass out from the skull separately as in Saurians, and not through one foramen as in Ophidians and Crocodilians.

Those spinal nerves which continue to supply the limbs form certain more or less complex unions with each other termed plexuses, and from each plexus the nerves of the fore or hind limbs, as the case may be, proceed. The plexus which supplies the nerves of the fore limb is called the brachial plexus. It is formed by the blending of about the sixth, seventh, eighth, and ninth spinal nerves in the Turtle and Crocodile, and the nerves it gives forth are the axillary, ulnar, radial, musculo-spiral, and median as in Mammals. Certain of the more posterior nerves unite to form a crural plexus and others just behind the former blend to form a sacral plexus, and from these the nerves of the leg and pelvic region proceed. Amongst these nerves are the crural, obturator, and especially the great sciatic nerve, which passes to the back of the thigh and divides into the tibial nerves.

As to the particular spinal nerves which go to form these plexuses respectively, and as to the mode of their interlacement and mode of giving origin to the limb nerves, there is not only diversity between different genera of the same order and species of the same genus, but also between different individuals of the same genus, and even between the two sides of the same individual Reptile.

Sympathetic system.

The *Sympathetic Nervous System*—nerves which copiously supply the viscera—is least marked in the *Ophidia*, in which this system is not distinct, in the greater part of the body, from the spinal nerves. Essentially the system consists of two antero-posteriorly extending nervous cords, which run on either side of the axial skeleton in its ventral aspect. Each of these two cords is joined by fibres from the spinal and cranial nerves adjacent to it except the nerves of the nose, eye, and ear. At the points of junction between the spinal nerves and the sympathetic cords there are ganglia, and from these sympathetic nerves proceed to the viscera, the heart, and the various blood-vessels.

The Ear.—The auditory organ may consist of three parts—the external, median, and internal ear. The external ear, however, hardly exists in Reptiles, for there is no external fold of skin representing the external ear of Mammals in any save in the Crocodiles, and in them it is little more than a rudiment.

The true internal ear always exists, and is composed of two parts—(1) a membranous labyrinth, containing fluid, enclosed in (2) a bony labyrinth, which has also fluid contents. The former consists of three membranous semicircular canals which open into a membranous sac, the vestibule, which is connected with a tubular structure, the membranous cochlea. It is to these parts that the ultimate fibres of the auditory nerve are distributed. The bony labyrinth is formed of the otic bones (prootic, epiotic, and opisthotic), which enclose it completely save at the points where openings are left called the fenestra ovalis and the fenestra rotunda. The latter is entirely surrounded by the opisthotic. The fenestra ovalis is partly enclosed by the prootic and partly by the opisthotic. The prootic specially protects and shelters the anterior vertical semicircular canal of the membranous labyrinth, and correspondingly constitutes that of the bony labyrinth. The posterior vertical semicircular canal is similarly related to the epiotic, and the external horizontal semicircular canal is sheltered by the prootic and opisthotic. The membranous cochlea helps to almost divide the bony chamber in which it lies into two parts called scalæ, which communicate at the apex of the cavity.

Such being the innermost ear of Reptiles and an outermost ear existing only in rudiment in Crocodiles, there is also a median ear which may or may not exist in this class of animals. This median ear is the tympanic cavity or chamber. It is into this cavity when present that the fenestra ovalis looks, while the fenestra rotunda looks into the cochlea. Both fenestræ are closed with membrane, so that the fluid in which the membranous labyrinth is suspended cannot escape through them. The fenestra ovalis has fitted to the outer side of its closing membrane a small ossicle of similar shape to itself, which generally has projecting from its outer side a more or less elongated and slender ossicle, the stapes or columella auris. This rod may be wanting, however, as in *Typhlops*, *Rhinophis*, and *Tortrix*. When a middle or tympanic cavity exists, the stapes traverses it from the ossicle, closing the fenestra ovalis to become attached to a membrane, the tympanic membrane, which forms part of the external wall of the tympanum. Where there is no tympanic cavity, the stapes simply extends outwards amongst the muscles which lie external to the internal ear. In the *Ophidia* and Amphisbænians and some other Snake-like Lacertilians there is no tympanic cavity, and there is none in *Hatteria*. Its presence is sometimes inconstant in those Lizards; thus in the Slow Worm, *Anguis fragilis*, it may exist in some individuals and not in others. When it exists, it may not show any external indication of its presence as in the Chamæleons and some Chelonians. Generally, however, the tympanic membrane is covered by a scale of corresponding size, so that its presence is plainly marked externally.

The tympanic cavity communicates with the back of the mouth by a wide opening in Lacertilians; but in Chelonians this communication is contracted into a narrow passage, the Eustachian tube, which opens (one from each tympanum) by a separate aperture on the roof of the mouth. In the *Crocodilia* these passages become further complicated and connected so that, in addition to the aperture on either side of the mouth, there is also a median aperture which is connected with both the Eustachian tubes, that of the right ear and that of the left.

The Eye.—All Reptiles have eyes, although in some forms they are quite rudimentary and hidden beneath the skin, which is not at all or but very slightly modified in structure where it passes over them, as, *e.g.*, in *Typhlops* and *Typhline*.

The eye consists of the same parts as in other Vertebrates, namely, of a nervous expansion at the back (the retina) derived from the optic nerve, a coloured lining (the choroid), a transparent medium (the vitreous humour) separated from one more anterior (the aqueous humour) by a sort of diaphragm (the iris), and a solid, transparent body (the crystalline lens), whilst the whole structure is enclosed by a fibrous membrane, the sclerotic, to form the "ball of the eye," a superficial part of the sclerotic being transparent and distinguished as the cornea.

The ball may have the skin which invests it externally separated in front of it into two folds, the eyelids. When the skin is not so separated, then a closed sac of delicate transparent membrane, the conjunctiva, lies over the cornea between it and the skin, and when the skin is divided into folds or eyelids then the conjunctiva is divided also, one layer lying as before next to the cornea, and the other layer being reflected from the outer margin of the cornea into the inside of the eyelids which it lines. There is often a third eyelid, which can be drawn obliquely over the eye, and is called the nictitating membrane. A glandular structure, the lacrymal gland, lies on the outer side of the front of the eyeball, its secretion passing into the mouth by the lacrymal canal; another gland, the Harderian gland, may lie on the inner side of the eyeball. The sclerotic may be strengthened by bony plates being formed within it. A vascular coloured membrane, the pecten, may project into the vitreous humour from near the entrance of the optic nerve. The ball of the eye is moved by four straight and two oblique muscles, and may also be suspended by a funnel-shaped muscular sheath, the choanoid muscle. There are also special muscles of the eyelids.

In the *Ophidia* the eye is generally rather large, but very small in the *Typhlopidæ* and *Uropeltidæ*. In no Ophidians is the skin over the eyes divided into eyelids, so that the sac of the conjunctiva beneath it is never subdivided. In the Eurystomatous Ophidians, however, the skin, when it passes over the eyeball, is transparent. The outer (or epidermal) layer of the skin is cast with the rest of the skin of the body. The lacrymal canal is wide, but opens into the mouth by a narrow aperture on the inner side of the palatine bone. In some *Trigonocephali* the lacrymal gland extends almost all round the eyeball. The sclerotic never develops bony plates in any Serpent.

Amongst the *Lacertilia*, many, such as the Amphisbænians, the Geckos, and many Skinks, have the eyelids undivided, as they are in Ophidians. Most Lizards, however, have an upper and an under eyelid, and also a nictitating membrane, and there may be a cartilaginous or bony disk in the lower eyelid. Many Skinks have the lower eyelid more or less transparent. The eye of the Chamæleon is most peculiar. The larger eyelids have but a minute aperture, and the two eyeballs can be rotated independently, so that their axes may be differently directed simultaneously. There is a rudiment of a third eyelid, and there is a bony plate in the lower part of the large eyelid. The Harderian gland is large, but the lacrymal is small. The lacrymal canal opens below in the outer wall of the posterior nares. In most Lacertilians there are overlapping bony plates in the sclerotic, but these are wanting in Chamæleons and Geckos. There is mostly a pecten. In some species the lacrymal gland appears to be wanting. The nictitating or third eyelid is drawn over the eye by the simultaneous action of two curiously arranged structures. One of these is a muscle which takes origin from the postero-inner orbital wall and ends by forming a fibrous loop. The other is a tendon which passes through the loop to be attached at one end to the nictitating membrane, and at the other to the inner wall of the orbit.

In *Hatteria* there are eyelids—the lower with a cartilaginous disk—and a nictitating membrane. The sclerotic contains osseous lamellæ, and there is no pecten.

The *Crocodilia* have three eyelids, and no bony plate in any part of the eye. A muscle arises from the surface of the sclerotic on its inner side and ends in a tendon which passes backwards and downwards over the optic nerve to attach itself to the margin of the nictitating membrane. There is a rudimentary pecten.

In the *Chelonia* the sclerotic is furnished with bony plates. The Harderian gland is small, but the lacrymal is considerable. There are three eyelids, and the nictitating one has the muscle which moves it combined with the elevator muscle of the eyelids. Both arise from the inner side of the sclerotic. One arches over the optic nerve and goes to the third eyelid, and the other goes from the outer angle of the eye to the lower eyelid. The fibres of these two muscles are closely interrelated at their origin.

The Olfactory Organ.—There are two olfactory organs in every Reptile, consisting of tracts or foldings of mucous membrane richly supplied with nerves and supported and protected by cartilaginous or bony structures. In existing Reptiles they always lie at, and extend near to, the anterior end of the muzzle, though in the *Ichthyosauri* and *Plesiosauri* they opened anteriorly far back and near the orbits. The olfactory membranes are always enclosed or supported by cartilages which proceed out from an azygous septum which divides them one from the other. Each nasal organ has an anterior and posterior opening, though the anterior openings may so meet as to form but one superficial aperture, as in the *Crocodilia*, and the two posterior apertures may open, not directly into the mouth, but into an azygous forwardly-extending diverticulum from it, the posterior opening of which diverticulum forms practically a common posterior termination for both the organs of smell. The nasal passages are short in all existing Reptiles save the *Crocodilia*, and open posteriorly far forwards—as has been already noticed in describing the skull, when the prolongation backwards of the posterior nares in the Crocodiles was also described. In the *Chelonia* the anterior external apertures of the nostrils are distinct though near together. Sometimes, as in *Chelys* and *Trionyx*, they are tubular, and open externally at the end of a short proboscis.

A structure called the nasal gland exists and is well-developed in the *Ophidia*. It is a peculiar rather soft body, often shaped like a mushroom with a very short stalk. It lies immediately beneath the floor of the nasal capsule, and the membranous wall of the cavity on which it lies is covered and protected by a bone, commonly called the "turbinal," which extends out from the median nasal septum to the maxilla. These cavities open on the palate by narrow apertures placed in front of the posterior nares.

In the Chelonians we find a soft, egg-shaped, whitish, azygous body (without any internal cavity), also placed in front of the posterior nares in the skin of the palate, behind the palatine part of the premaxillæ. It is supplied with palatine nerves.

The Urogenital System.

In Reptiles the urinary and generative systems are distinct, save as regards the approximation of their posterior terminations, thus agreeing with higher Vertebrates and differing from Amphibians, in which the renal and secreting organs generally continue throughout life more or less connected.

The Urinary System.—The urinary system of the *Reptilia* always consists of a pair of renal glands or kidneys, with excretory ducts which pass down to the cloaca. There may or may not be a urinary bladder, also opening into the cloaca. Besides these parts there are also a pair of Wolffian bodies, which are more or less aborted remnants of large organs which are always developed during embryonic life.

The Kidneys.—The kidneys are more or less symmetrically placed on the dorsal side of the peritoneum, in the hinder half of the trunk. Each consists of a mass of cæcal tubules into the distal end of which a tuft of minute vessels projects, thus forming what is called a glomerulus or Malpighian body.

In the *Ophidia* the kidneys are least symmetrical, the right one extending the farthest forwards. They are elongated and lobed, and sometimes in such a way as to appear spirally twisted. Each terminates behind considerably in front of the cloaca. The duct of each ureter begins at the anterior end of the kidney and thence proceeds along its inner border, and accessory ducts open into it from the interspaces of the lobes of the kidneys. The two ureters open into the sides of the cloaca. In the males each opens upon a papilla in close proximity to the opening of the male sexual duct or vas deferens. In the females the ureter opens beside the mouth of the female sexual duct or oviduct. There is never any urinary bladder.

In Lacertilians the kidneys are more posteriorly placed than in Serpents. They lie at the hindmost part of the body cavity above the cloaca, and they generally much approximate together. They are also more symmetrically placed; only in the Amphisbænians the right kidney extends the more forward, thus resembling Ophidians. There is always a urinary bladder, which is a ventral diverticulum of the cloaca. The kidneys are usually transversely furrowed. The ureters run along the inner side of the kidneys, and open into the sides of the cloaca, not into the bladder.

In Chelonians the kidneys lie near the cloaca in the cavity of the pelvis. They are rather short and thick, and more or less trihedral. Their surface is marked with many shallow meandering grooves and fewer deeper furrows. The ureters proceed as usual along the inner sides of the kidneys, and several large canals successively open from them into the ureters, which extend backwards, but to a trifling extent, beyond the kidneys. They open rather anteriorly into the cloaca close to the neck of the urinary bladder, which vessel is always present and voluminous, and is often two-horned.

The *Crocodilia* also have posteriorly situated pelvic kidneys, but they have no urinary bladder. The kidney is concave dorsally and flatter ventrally. Its surface has meandering convolutions separated by furrows. The ureters for the greater part of their length run deeply sunk in the substance of the kidneys. The ureters leave the hinder ends of the kidneys and run freely for a short distance to the cloaca, which they enter close behind the rectum.

The Wolffian Bodies.—These bodies lie one on each side on the dorsum of the body cavity, and each consists of a series of cæcal tubes with vascular balls or glomeruli like those of the kidney, the various tubes always opening at first into a common excretory duct which leads towards the cloaca. In adults they are but small organs. In a Python 10 feet long they measure but about an inch. In Serpents generally they are slender and lobed bodies which lie close to the veins in front of the kidneys.

The Generative Organs.—Reptiles, like all the higher Vertebrates, have the sexes divided, with two sets of organs which respectively characterize male and female individuals. In both sexes, as in Birds, there is a pair of sexual glands, each furnished with a passage for the exit of its product, together with, almost always, external organs destined to effect and facilitate impregnation. Unlike Mammals, however, all Reptiles have the sexual glands placed within the abdominal cavity, and, also unlike Mammals, the male external organ or agent for copulation may be either azygous or bifold according to the group to which any Reptile may belong. Unlike the more inferior Vertebrates, however, Reptiles, with the solitary exception of *Hatteria*, always possess such a copulating organ, and impregnation is invariably effected internally.

The male organs consist of a pair of glands, the testes, with their ducts, the vasa deferentia, and the external organs, penis or penes. The female organs consist of a pair of glands, the ovaries, with their ducts, the oviducts, together with rudimentary representatives of the external sexual organs of the males.

The Testes and Vasa Deferentia.—These are two compact and rather small glands, consisting of a mass of cæcal convoluted tubes, lying in the dorsal region of the abdominal cavity and completely invested by peritoneum, and with a dense albugineal coat of their own. From the mass of tubules a certain variable number of efferent tubes, vasa efferentia, come forth and soon unite in the single excretory duct of the gland, the vas deferens.

In the *Ophidia* the testes are not symmetrically placed, the right one being somewhat more voluminous and also in front of the other. Consequently the right vas deferens is larger than the left one. Each testis lies in front of the kidney of its own side, and is more or less elongated in form. The vas deferens proceeds along the inner margin of the testicle, and is a convoluted tube which narrows as it proceeds backwards. The opening into the cloaca is somewhat oblique, and is situated in a somewhat funnel-shaped depression beside the opening of the ureter.

In the *Lacertilia* the testes are spheroidal and almost symmetrically placed. The vasa efferentia come forth from their inner side and pass into a canal lying in a fold of peritoneum. This canal, the vas deferens, begins cæcally much in front of the union of the vasa efferentia with it, and this anterior portion runs along the ventral side of the kidney in a fold of peritoneum and has the appearance of a knot of tubuli or of a body transversely convoluted. The vas deferens passes backwards in numerous close-set convolutions, and often dilates towards its hinder end. It ultimately narrows, and opens on the cloaca, beside the ureter, on a small papilla.

The *Chelonia* have testes which lie somewhat external to the kidneys as well as behind them. The vas deferens terminates upon a small papilla in the cloaca, but its proximal end—anterior to the junction with it of the vasa efferentia—is wide, and consists of a very complicated mass of tubes, and it may have (as in *Chelodina*) five or six short cæcal diverticula.

The testes of the *Crocodilia* are of an elongated oval form, and lie partly in front of and partly on the inner side of the kidneys. The testis may be divided into two portions connected together dorsally. The vasa efferentia pass from the outer border of the testis to a vas deferens, which has rather thick walls with a marked dilatation towards its hinder end. It lies above the peritoneum, and opens at its distal end into a groove at the base of the penis.

The Ovaries and Oviducts.—The ovaries are, as in the class Mammals, the glands which correspond with the testes, but which, unlike the latter, are not composed of a mass of tubules, while each does not discharge its product into a tube directly continuous with it (as does the testis into the vas deferens) but into a tube, the oviduct, the distal end of which is open and discontinuous with the ovary save for a broad fold of peritoneum which connects them. The ovaries always lie in the dorsal part of the abdominal cavity enclosed in peritoneum.

In the *Ophidia* the ovaries are, like the testes, elongated and placed one in advance of the other. The right ovary is more voluminous, and the right oviduct is, of course, the longer one. The ova are so arranged within them as to form a longitudinal series. The proximal end of each oviduct shows a transversely expanded wide opening. The oviduct passes backwards in convolutions which are often spirally arranged, and it is very extensible, being lined with numerous close-set effaceable folds. The oviducts open into the cloaca by a crescentic fissure behind the opening of the rectum.

In the *Lacertilia*, except the Amphisbænians and probably some other Serpentiform Lizards, the ovaries have not their contained ova serially arranged. They may or may not be symmetrically disposed. The oviducts are usually broad and spirally disposed. Unstriated muscular fibres often exist in the folds of membrane which support their convolutions.

The *Chelonia* have ovaries symmetrically placed, often of a broad and flattened shape. The oviduct varies much in capacity in different parts of its course. The ovaries of the *Crocodilia* are compact in structure and somewhat more advanced in position than in most Reptiles. The oviduct is more uniform in diameter than in the *Chelonia*.

The External Generative Organs.—As has been already mentioned, all Reptiles have such external organs with the exception of *Hatteria*. In the rest of the class we always find such organs connected with the cloaca, and capable of being everted for use or retracted and hidden within or behind that chamber. The whole class is thus divisible into two groups according to the bifold or azygous condition of these parts.

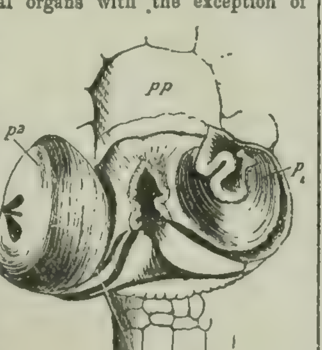

FIG. 29.—Male copulatory organs of *Lacerta agilis* (after Leydig). p_1, p_2, organs of right and left sides—between them is the anal aperture; *pp*, preanal plate.

In the *Lacertilia* and *Ophidia* they are bifold, and consist in the males of two hollow, invertible, imperforate, cutaneous cones placed one on each side of the cloaca, containing erectile tissue and capable of being protruded or retracted by appropriate muscles. The lining of each cone is continuous both with the external skin of the adjacent parts and also with the mucous lining of the cloaca. A tortuous groove which begins within the cloaca, at the aperture of the vas deferens, is continued on to the apex of the cone. When erected for use the lining membrane of the cones, with its grooves, becomes the external coat of each copulatory organ. In the females there are rudimentary but quite similar organs, just as in Mammals the clitoris of the female is present as the rudimentary representative of the penis of the male. In the *Ophidia* these hollow penes may or may not bifurcate distally, and if they bifurcate then the groove bifurcates also. The lining membrane of the cone may be smooth, as in *Python*, or spiny, as in *Trigonocephalus* and *Crotalus*, or may have transverse rows of soft lamellæ, as in *Boa marina*. The *Lacertilia*, like the *Ophidia*, may have each penis single to its apex or bifurcating distally with various other minor modifications as to relative size, the form of the apex, and the appendages borne upon it. The cones are exceptionally short in the Chamæleons.

The male *Chelonia* and *Crocodilia* have an azygous penis, and a corresponding rudimentary structure exists in the females. This organ lies at the ventral wall of the cloaca; it is not hollow or evertible, but purely distensible and so erectile. It is therefore its external coat which is continuous with the lining of the cloaca. Muscles proceeding from beneath the hinder trunk vertebræ are inserted into it. The penis is imperforate; but two ridges are continued on to it from the wall of the cloaca, and so form a groove, and during erection a temporary canal, which passes along it from root to apex. At its distal end there is a prominence which, though imperforate, may remind us of the "glans" of the Mammalian penis. The whole body of the organ, including this distal prominence, contains erectile tissue. In the *Chelonia* the penis may divide distally, and if so the groove it bears divides also. In *Chelodina* it has an undivided distal end and two lateral processes. In *Trionyx* it subdivides distally into four terminal parts. The penis of the Crocodile has a deep groove which reaches to the extreme end of the penis, a quasi-glans projecting freely beneath it.

A few Reptiles have secondary sexual characters—notably the Chamæleons, the males of which alone have the horns and other cephalic appendages which characterize certain species. In most Reptiles, however, the two sexes have hardly any distinctive external characters.

Embryology.

Most of the *Reptilia* are oviparous, but certain of the Lacertilians and many Ophidians, notably Vipers and Sea-Snakes, hatch their eggs before they are laid; that is, they are ovoviviparous. The oviduct supplies the ovum during its exit with an albuminous investment, the white of the egg, and with a shell, or testa, which may be thin and flexible, as in the *Lacertilia* and *Ophidia*, or hard and calcareous, as in the *Crocodilia* and *Chelonia*, the eggs of which animals much resemble those of Birds.

The embryo Reptile closely resembles in its general features the embryo Bird, and, as the process of development of the chick (which can be so conveniently studied) is now comparatively thoroughly well known (see REPRODUCTION), we cannot here make more than a cursory mention of the leading structural changes. Inasmuch as embryonic Reptiles thus resemble embryonic Birds, it of course follows that they present all those features which embryonic Birds share with Vertebrate animals generally, such as the segmentation of the yolk, the resulting formation on its surface of the blastoderm, and its division into the three germinal layers. As in Birds, the yolk segmentation is meroblastic.

The blastoderm spreads rapidly over the yolk, but before it has half enclosed it a pyriform patch, the embryonic shield, or area pellucida, appears at its centre. The head of the embryo is formed at the broader end of the pyriform patch. Towards its hinder end a streak of the epiblast is formed, the primitive groove,[1] and then in front of it another longitudinal indentation, the "medullary groove," the walls of which are the "medullary plates"; and it is this groove and plates with the parts immediately subjacent which lay the foundation of the developing body. The lining of the medullary groove becomes the cerebro-spinal axis, while a longitudinal cellular rod which is formed beneath it, and which is called the notochord, lays the foundation of the future axial skeleton as far forward as the hinder margin of the cranial support of the pituitary body of the brain. The anterior end of the medullary groove shows serial enlargements corresponding with the successive portions of the adult brain, while the medullary plates close over the medullary groove and convert it into a canal which ultimately persists as the central canal of the spinal cord and the ventricles into which that canal opens anteriorly. The eyes arise as outgrowths from the brain aided and modified by ingrowths from the surface of the embryo. The ears and nasal organs arise mainly from superficial ingrowths. From the tissue on either side of the notochord and medullary groove are gradually formed the axial skeleton of the trunk and the muscles and other structures adjacent to it. The sides of the medullary plates bend down on either side and form the ventral laminæ which split longitudinally, or they descend—the inner layer joining with its fellow of the opposite side to form the alimentary tube. The two outer layers form the lateral walls of the trunk, the space between the two inner and the two outer layers constituting the first condition of what is subsequently the first peritoneal cavity.

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[1] Supposed to be an indication of a form of invagination of the germinal layers characteristic of lower forms.

The limbs first appear as outgrowths from the external layers of the ventral laminæ, but no rudiment of the limbs seems ever to be developed in the apodal Ophidians. On each side of that region which subsequently becomes the head and neck a series of perforations successively appear, and for the most part disappear, known as the visceral clefts, while their intervals are known as the visceral arches. The only visceral cleft which ever persists in the *Reptilia* is that which becomes the passage from the inner end of the Eustachian tube to the outer surface of the tympanic cavity. The foundations of the skull are laid in a cartilaginous investment of the anterior end of the notochord and of the incipient membranous labyrinth, whence two columnar prolongations, the trabeculæ, pass forwards on either side of the support of the pituitary body. We have seen the persistent nature of these trabeculæ in the cranium of Ophidians. The central part of the facial region of the skull is formed by a cartilaginous ethmoidal process at the anterior end of the trabeculæ. Hence and from the side of the auditory cartilage cartilaginous processes go forth which lay the foundation of the jaws, palatine structures, and hyoid apparatus. The circulating system in its earliest condition is very different from that which ultimately exists. At first the heart is not a tubular structure, but it gradually folds and subdivides itself. The arteries proceeding from it (and the veins converging to it) at first follow the general course of the arteries (and veins) of Fishes and aquatic breathing Amphibians. The arteries ascend within the visceral arches to meet in a dorsal aorta, as they must needs do in the animals just mentioned, seeing that in them it is the visceral arches which become the gill-bearing structures wherein alone the blood is aerated.

The urinary organs are at first represented by Wolffian bodies only, which are formed from beneath the dorsal region of the body cavity, but subsequently, as has been mentioned, they become replaced by the two kidneys. The sexual glands themselves arise in connexion with the Wolffian bodies.

At a very early stage of development the embryo as it were sinks into the surface of the ovum, while a membrane arises on all sides of it meeting dorsally over it, constituting the embryonic envelope known as the amnion. From the hind part of the abdominal region of the embryo there also grows forth a vesicle which, becoming greatly enlarged and richly supplied with blood-vessels, spreads itself out on all sides just within the egg shell, and serves as the organ of respiration for the embryo. This directly respiratory structure is the allantois. The ventral surface of the embryo remains long open and connected with the ever-diminishing remains of the food yolk. As this ventral surface closes in, the remains of the yolk or vitellus become connected with the alimentary canal, but by a very narrow tube called the vitelline duct. Before the process of development is complete, however, the last remains of the yolk become absorbed and taken up, and the abdominal wall is finally closed.

Space does not here allow of more than this brief indication of some of the leading facts of bodily development. We cannot attempt to describe the complex processes of ossification by which the first foundations of the skeleton, and especially of the skull, become differentiated into its manifold component bones. For an account of this process, and of all the other details of embryonic development, the reader is referred to the valuable treatises to be found enumerated in the following list of herpetological works.

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DISTRIBUTION OF REPTILES IN TIME.

Carbon-ferous forms.

The first appearance of Reptiles on the surface of the globe is indicated by very fragmentary remains. Specimens of deeply biconcave vertebræ of Carboniferous age from Nova Scotia are believed to be those of a marine Saurian (*Eosaurus acadianus*); if this view is correct, this oldest of Reptiles would bear the stamp of one of the most Fish-like of the class.

ermian.

Formations of Permian age in North America as well as in Europe contain fossils with undoubtedly Reptilian characters, they are still associated with true Labyrinthodonts, and with remains which are too fragmentary to be assigned with certainty either to Labyrinthodonts or Reptiles. The vertebræ of all are amphicœlous. These Reptiles are Rhynchocephalians,—the oldest and best preserved being *Proterosaurus* from the Copper-Slate of Thuringia, a Reptile about six feet in length, with a comparatively long neck (which, however, was composed of seven or nine vertebræ only), with numerous abdominal splints, a long tail, and well developed and differentiated limbs.

Mesozoic.

In the Mesozoic times the Reptilian type appears in such variety and in such a high state of development that this era has been distinguished as the "Reptilian age." Yet we know chiefly such forms only as possessed bones of a size and solidity sufficient to ensure their preservation. Of small Reptiles, animals under or scarcely exceeding two feet in length, comparatively few have been discovered, although they too must have existed in abundance. In the Trias there appear first of the marine Saurians large Sauropterygians with narrow ossifications between the vacuities of the skull, such as *Simosaurus*, *Nothosaurus*, and *Pistosaurus* from the German Muschelkalk. The highly interesting genus *Neusticosaurus*, the smallest of the group, with the four limbs modified into paddles, but with the hind limbs retaining the structure of those of a terrestrial animal, seems to afford evidence of this order having been developed from a terrestrial type. Fragments of true *Plesiosaurus* and *Ichthyosaurus* begin to appear in the Rhætic bone beds of England. Also the Placodonts, the systematic affinities of which are not yet satisfactorily understood, are contemporaries of these early Enaliosaurians. The precursors of our Crocodiles were two genera, *Belodon* and *Steganolepis*, with dorsal scutes, but with amphicœlian vertebræ and anterior choanæ, neither palatines nor pterygoids being dilated into the osseous palate which is characteristic of later Crocodiles. Another order, the *Anomodontia*, flourished and died in this epoch; some fifteen genera have been distinguished, all from the South-African Trias; however, this type is probably also represented in Russian formations of the same age. Rhynchocephalians continue in several genera in European and American strata. But the largest of terrestrial Reptiles belonged to the Dinosaurs, whose presence in numerous species belonging to distinct groups, some with three, others with five toes to the hind feet, is testified by their osseous remains as well as by the tracks of their hind feet, which they left during their bipedal progression over stiff mud. These Triassic Dinosaurs were chiefly herbivorous, and already much more numerous in North America than in Europe (*Zanclodon*).

Triassic.

This Reptilian fauna continued to flourish in the Jurassic period; the types of the Trias increased in variety; still more gigantic forms were developed; and new orders which were absent in the preceding period were added. Of the marine Saurians alone some fifty species are known from European formations; the *Ichthyosauri* inhabited chiefly the northern seas of the eastern hemisphere, and were replaced in the western by Reptiles of similar structure and size, but without teeth (*Sauranodon*); the Sauropterygians have considerably advanced beyond their Triassic precursors in having more solidly ossified skulls, and are also represented by a greater number of genera in America as well as Europe; of *Plesiosaurus* alone some twelve species are known from the Lias and seven from the Oolite. Pterodactyles make their first appearance. Crocodilians have developed into the "Mesosuchian" type, their palatine bones being prolonged, pushing the choanæ backwards to the middle of the under surface of their skull, but their vertebræ are still amphicœlian; they appear in numerous genera (*Teleosaurus*) and species. Terrestrial Reptiles keep pace in development with the marine and freshwater types; the giants of the order of Dinosaurs have left their remains in a more or less perfect condition in the Jurassic strata of both hemispheres (*Cetiosaurus*, *Atlantosaurus*, *Iguanodon*, *Morosaurus*, *Apatosaurus*); forms with three toes on the hind feet lived simultaneously with four- or five-toed ones; carnivorous types (*Megalosaurus*, *Creosaurus*, &c.) represent in habit as well as relative size Mammalian *Carnivora*; they preyed upon the gigantic but weaker members of the order. The Dinosaurian type extended also into the southern hemisphere, as is testified by the West-Australian genus *Deuterosaurus*. The Chelonians, which appear first in the Upper Keuper, are in the Lias of highly advanced types, and not essentially different from recent families; they occur in many localities of Europe as Freshwater Turtles, chiefly *Chelydidæ*; but *Emydidæ* are also represented, showing, however, a less solid ossification of the carapace than the recent forms. No distinct evidence of the presence of Marine Turtles and *Trionyx* has been found hitherto in Jurassic formations.

Cretaceous.

This abundance of Reptilian life not only continues in the Cretaceous period, but is still more increased in variety and reaches its highest point of culmination. Ichthyopterygians and Sauropterygians reached an enormous size; *Discosaurus*, with a neck 22 feet long and composed of sixty vertebræ, must have been the most formidable enemy to the Fishes of the sea. Moreover these large Saurians which survived from the preceding period were now joined by a new type of marine monsters with a Snake-like body and very short extremities, the Mosasaurians, which attained to a length of from 10 to 80 feet and veritably filled the place of Sea-Serpents. Although their skull exhibits not a few Ophidian characters, their genetic relation to that order is not by any means proved. They were most numerous in the western hemisphere, some forty American species referable to many genera having been described by North-American authors; in Europe they are comparatively scarce. On the other hand no less than fifteen species of Pterodactyles are known from European formations, all armed with formidable teeth, whilst the gigantic Pterodactyles of North America are, with one exception, toothless. Together with the surviving Mesosuchian Crocodiles of the Jurassic period Gavial-like forms existed, and genera with posterior choanæ and procœlous vertebræ (Eusuchians),—among them a true Crocodile from the Cambridge Upper Greensand. The western hemisphere exceeded the eastern as regards the abundance of Dinosaurians in this period still more than in the preceding, although it should be remembered that of the latter part of the globe in fact only a small portion has been opened up, and that the little we know of the geology of Central Asia and western China points to the probability of vast palæontological treasures being reserved for the study of future generations. Rhynchocephalian genera continue in considerable variety, whilst other small-sized forms are referred to the Lacertilians. The types of Freshwater Turtles which lived in the Jurassic period pass into the Cretaceous. They appear now also in North-American strata: *Chelydidæ* first, accompanied or immediately followed by *Emydidæ*, a few *Trionyx* and *Chelonia*, and the remarkable *Protostega*, a precursor of *Sphargis*. Towards the end of the Cretaceous period its abundant Reptilian life is swept away, and not only every species but almost every Mesozoic genus disappears, a wide gap being left in our knowledge of the succession of Reptilian life between this period and the Tertiary era.

In the lowermost strata of Tertiary age a few isolated remains remind us still of the extinct Mesozoic fauna; such are one or two genera allied to the Dinosaurians (*Agathaumas*) from the Laramic beds of North America. In other respects the Tertiary Reptiles bear already the character of the present fauna; although families or genera which are distinct from the living predominate in the Eocene, from the Miocene Reptiles gradually approach more and more the specific forms of our time. True Crocodiles (of which one species occurred already in the Cretaceous period), Gavials, Alligators have now entirely superseded the "Mesosuchian" type. The remains of Lacertilians are fragmentary and generally indistinct, so as to offer a wide field for generic distinctions. *Anguidæ* have been distinctly traced back to the Miocene of North America. With a single exception, that of a poisonous Serpent, apparently a *Vipera*, the remains of which have been found in Miocene deposits at Sansan (south of France), Snakes do not appear before the Eocene, in England as well as North America; they are mostly large species, with uncertain affinities, but all innocuous (*Palæophis*, *Dinophis*, *Boavus*, *Lithophis*). Their remains are scarce, and even those of the later Tertiary formations show a greater resemblance to genera which are now-a-days locally far removed than to those living in the same geographical district. Chelonian remains are numerous throughout, probably on account of the resistance which their solid carapaces offered to destructive agencies. *Chelydidæ*, *Emydidæ*, and *Trionycidæ* and also Marine Turtles continue to exist in an almost uninterrupted series, and approach so much the modern genera that, for instance, in *Trionyx*, if specific distinctions existed between Miocene and recent species, they cannot be determined in those parts of their skeleton which have been preserved. A peculiar type intermediate between the Marine Turtles and *Emys* existed in the English Eocene (*Chelone*). Land Tortoises, the most specialized type of the order, probably did not appear before the Miocene. A number of smaller forms are referable to the genus *Testudo*, but gigantic forms existed then as now in isolated localities, and exceeded in size the living, like the *Colossochelys* of the Siwalik Hills, with a carapace computed to be 20 feet long, and the smaller *Macrochelys* from the German Molasse. It is extremely singular that the existence of these colossal Chelonians would seem to coincide with the period of the first appearance of the type of Land Tortoises.

Of the first appearance of most of the families of the recent fauna, and of their distribution in the Quaternary period,[1] we know next to nothing. With few exceptions the Reptilian type had dwindled to forms of such small size that their remains, if preserved, escape observation or are too indistinct for determination.

THE DISTRIBUTION OF EXISTING REPTILES OVER THE EARTH'S SURFACE.

Serious obstacles present themselves at the present time to a satisfactory treatment of the geographical distribution of Reptiles. We have mentioned at the end of the preceding section that the geological record is much too incomplete to permit a comparison to be drawn between their distribution in the present and next preceding periods, and that we are therefore ignorant as to the modes in which their dispersal was brought about, and unable to account otherwise than hypothetically for the numerous instances of apparently anomalous distribution. And, when we limit ourselves merely to the task of describing the facts of their distribution at the present day, it is necessary for such an attempt that the whole class should have previously undergone a thorough rearrangement in accordance with the present state of science, and that the scattered contributions to the various faunæ should have been critically examined and treated by the same uniform method. This is unfortunately not the case with the class of *Reptilia*. The systems and lists of *Lacertilia* and *Ophidia* which formed the bases for the treatises on the geographical distribution of these orders by Schlegel, Günther, and Wallace are buried under an accumulation of an immense number of additions of very different value, which require a uniform critical revision before they can be used in an inquiry of a general biological scope.[2]

In the following notes we have been able to include the majority of the genera of Chelonians and Ophidians, with an approximate estimate of the species of each that are known at present. As regards the former Strauch[3] has done much to clear the way, although the small amount of materials known to him from autopsy interfered much with his critical judgment. Not many additions have been made to this order since the time of the publication of his memoirs. Of the numerous Ophidian genera and species we have eliminated all which are based on trivial distinctions, or are named by authors without special acquaintance with the subject. We have not entered into a full consideration of Lacertilian genera, as this would have been useless at a time when they are undergoing a revision, but have restricted ourselves to the families recently proposed by Boulenger.

One of the most important results obtained by this inquiry is that the same arrangement of the so-called primary zoological regions is not applicable to all orders of Reptiles, and that the differences in their distribution are so fundamental that they can be accounted for only on the assumption of the various orders and families having appeared and spread over the globe at very distant periods, when land and water were differently distributed over the surface of the globe. At the end of this section we shall show in a short résumé the mutual relations between the various regions with respect to the several orders of Reptiles.

The means of dispersal of Reptiles are very limited.

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[1] An important memoir on Indian *Chelonia* is published whilst this article is passing through the press, "Siwalik and Narbada *Chelonia*," by R. Lydekker, in *Palæontol. Ind.*, vol. iii. ser. x., 1885.

[2] Whilst this article is being written, the *Lacertilia* are undergoing the much-needed arrangement by Boulenger (as mentioned at p. 439), who also has recently published preliminary notes on the distribution of the families of Lacertilians, which have been of great use to the present writer (*Ann. and Mag. Nat. Hist.*, August 1885, p. 77).

[3] "Chelonologische Studien," and "Die Verbreitung der Schildkroten über den Erdball," in *Mémoires de l'Acad. de St Pétersb.*, 1862 and 1865.

They are much specialized in their mode of life and propagation, and ill adapted to accommodate themselves to a change of external conditions. As air-breathing cold-blooded animals they are unable to withstand prolonged cold; they are therefore entirely absent in the arctic and antarctic zones; and such as escape the effect of the winter months in temperate zones by passing them in a torpid condition in well-sheltered places are not peculiarly organized forms, but offshoots from those inhabiting warmer climes. The tropical and subtropical zones are the real home of the Reptilian type, which there has reached its greatest development as regards size and variety of forms. In the north Chelonians advance only to 50° lat. in the western and to 56° in the eastern hemisphere, Lizards to about 56° in British Columbia, and close to the Arctic Circle in Europe, whilst Snakes disappear some degrees before the Lizards. Also in the south Lizards extend into higher latitudes than Snakes, viz., to the Straits of Magellan, whilst the latter do not seem to have advanced beyond 40° S. lat. and Chelonians only to 36°.

Marine forms.

We exclude from our account of the distribution of terrestrial Reptiles those few forms which pass almost the whole of their life in the sea, and therefore belong to the marine fauna, viz., the Marine Turtles and Sea-Snakes.

Marine Turtles.

1. The shores of the continents and islands of the equatorial zone are the home of the Marine Turtles. Endowed with a wonderful power of locomotion, the several species are now distributed over the greater part of this zone, occurring in the Atlantic as well as the Indo-Pacific; and, although some of them are common in certain districts and scarcer or even absent in others, it is probable that in the course of time their distribution will be still more general and uniform, as far as other conditions (such as access to a suitable locality for the successful propagation of their kind) will permit. Frequently Marine Turtles stray far into the temperate zones, and it thus happens that one and the same species (*Sphargis coriacea*) has been found on the south coast of England, near Cape Cod in North America, and on the coast of Chili. In short the geographical distribution of these Reptiles is that of pelagic animals generally, although by their mode of propagation they are compelled to sojourn near land during a certain period of the year.

2. The Sea-Snakes are restricted to, and highly characteristic of, the fauna of the tropical Indo-Pacific Ocean, and more especially of parts between Arabia and North Australia. They prefer the vicinity of land, but never leave the water, with, perhaps, the single exception of *Platurus*. Their distribution is not erratic; only one species, *Pelamys bicolor*, a Sea-Snake which more than any other is organized for a marine life, has spread far beyond the original home of its kindred, viz., westwards to the coasts of Madagascar and south-eastern Africa, and eastwards to the furthermost limits of the region, viz., to the coasts of central and northern South America.

All other Reptiles[1] are terrestrial, and, as they are chiefly developed in the tropics, we begin our account with the regions[2] of the equatorial zone. The scope of this article does not allow us to enter into an examination of the subregions which have been proposed by various authors.

Indian region. Chelonians.

1. *The Indian Region.*—Of the four principal groups of terrestrial Chelonians, the *Emydidæ* and *Trionycidæ* (Freshwater Tortoises and Freshwater Turtles) predominate over the *Testudinidæ*, which are scarce and restricted, the fourth (*Chelydidæ*) being absent altogether. We know fifty-seven species from this region:—

Testudo,	4	species	4
Manouria,	1	,,	35
Cistudo (Cuora),	3	,,	
Emys with its subgenera,	30	,,	
Platysternum,	1	,,	
Trionyx,	15	,,	18
Emyda,	3	,,	

Three of these genera are peculiar to the region, viz., *Manouria*,[3] *Platysternum*, and *Emyda*. Characteristic is the scanty representation of *Testudo*. One species which is common in the Indian peninsula (*T. stellata*) is so similar to an African species as to have been considered identical with it: the Burmese Tortoise is also closely allied to it, and the two others extend far into western Central Asia. Thus this type is to be considered rather an immigrant from its present headquarters, Africa, than a survivor of the Indian Tertiary fauna, which comprised the most extraordinary forms of Land Tortoises. Wallace's line marks the eastern boundary of *Trionyx*; species of this genus are common in Java and Borneo, and occur likewise in the Philippine Islands, but are not found in Celebes, Amboyna, or any of the other islands east of Wallace's line.[4]

Of *Crocodilidæ* true Crocodiles are represented by four, and Gavials by two species. Alligators are absent.

Although the region is characterized by numerous highly specialized genera of *Lacertilia*, not one of the families is peculiar to it.

Agamidæ are exceedingly numerous, and are represented chiefly by arboreal forms; terrestrial forms, like *Agama* and *Uromastix*, inhabit the hot and sandy plains in the north-west, and pass uninterruptedly into the fauna of western Central Asia and Africa. The *Geckonidæ*, *Scincidæ*, and *Varanidæ* are likewise well represented, but without giving a characteristic feature to the region by special modification of the leading forms. The *Lacertidæ* are represented by one characteristic genus *Tachydromus*,—*Ophiops* and *Cabrita* being more developed beyond the limits assigned to this region. Finally, the *Eublepharidæ* and *Anguidæ*, families whose living representatives are probably the scattered remains of once widely and more generally distributed types, have retained respectively two species in western India, and one in Khassia (Khasi Hills), whilst the presence of a single species of Chamæleon in Southern India and Ceylon reminds us again of the relations of this part of the fauna to that of Africa.

The Indian region excels all the other equatorial regions in the great variety of generic types and number of species of Snakes. The latter amount to no less than four hundred and fifty, which is nearly one-third of the total number of species known. They are referable to about one hundred genera, of which the majority do not range beyond the limits of the region. Of higher groups (termed families for the sake of convenience), the *Xenopeltidæ*, *Rhinophidæ*, *Oligodontidæ*, *Xenodermidæ*, and *Acrochordidæ* are peculiar to, and characteristic of, this fauna,—but not more so than a number of genera which will be mentioned presently.

Of *Typhlopidæ* more than twenty species are known.

Of *Tortricidæ*, the genus *Cylindrophis* is spread over several of the subregions.

The *Calamariidæ* are represented by a whole string of genera, of which thirteen are peculiar to the region. The most characteristic and geographically most important types are *Calamaria*, with twenty-four species, spread over the archipelago and the eastern parts of the continent, and *Aspidura* and *Haplocercus*, with four species, which are limited to Ceylon and southern India.

Species of those generalized forms which are termed *Coronellidæ* and *Colubridæ* are likewise numerous (sixty-six species), and referable to seventeen genera, of which ten are limited to this region. In the north-western and northern parts the genus *Zamenis*, which is one of the most characteristic types of the warmer parts of the Europo-Asiatic fauna, is represented by six species.

Freshwater Snakes are abundant in genera, species, and individuals. Of *Tropidonotus* alone some forty very distinct species have been described, besides three others which are sufficiently differentiated to deserve generic separation. Of the so-called *Homalopsidæ* all the genera, twelve in number, are peculiar, and the great development of these Snakes is, therefore, one of the most striking features of this region.

Besides two species of *Psammophis* allied to African forms, a distinct genus *Psammodynastes* has a wide range over the eastern parts of the continent and the archipelago.

Tree Snakes are represented by eight genera and twenty-six species, mostly characteristic forms.

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[1] The fact that *Orcocephalus* enters the sea habitually and *Chersydrus* frequently does not entitle these Reptiles to be classed among marine animals; they pass the greater part of their life on land, and never leave its close vicinity.

[2] As regards the general boundaries of the zoo-geographical regions we refer to Wallace's *Geographical Distribution of Animals* (London, 1876, 4to) or to the article ICHTHYOLOGY (vol. xii. pp. 665 *sq.*).

[3] Its existence in Australia is extremely doubtful.

[4] The statement that specimens of *Trionyx* had been obtained by Ida Pfeiffer in Amboyna rests upon a misunderstanding, like that of the discovery of a Barbel by the same traveller in the same island. Dr Jentink also informs us that none of the Freshwater Turtles in the Leyden Museum came from islands east of Java and Borneo.

Dipsadidæ are more numerous (eighteen species) than in the other equatorial regions.

Elachistodon and *Hologerrhum* may be mentioned as remarkable types not found elsewhere, but with a very local distribution.

The development of Lycodonts India has in common with Africa; but the genera, six in number, are distinct.

Also the presence of gigantic Snakes of the genus *Python* is a feature which India shares with Africa.

Of *Erycidæ* three species are Indian, *Gongylophis* and *Cursoria* being peculiar to the region.

Poisonous Snakes are numerous, the proportion to innocuous Snakes being as 1 : 10. Out of forty-six species, only two belong to the family of true Vipers, and they are restricted to the Indian peninsula with Ceylon, one (*Echis*) being even specifically identical with the African species, and the other (*Daboia*) having its only congener in the Mediterranean district. The remainder of the poisonous Snakes belong to the *Elapidæ* and *Crotalidæ* or Pit Vipers. The former are represented by six genera, of which no less than five are highly characteristic of the region, whilst the Cobras (*Naja*) are equally distributed over Africa. Of Pit Vipers five genera have been distinguished, the most characteristic being an arboreal form, *Trimeresurus*, with seventeen species. Also the other five genera are peculiar to India, with the exception of the genus *Halys* which is Central-Asiatic.

The relations of the Indian region to the others will be considered as we proceed with the accounts of those faunas. Japan, with regard to its Reptilian fauna as a whole, must be referred to this region. This is clearly shown by the presence of species of *Ophites*, *Callophis*, *Trimeresurus*, *Tachydromus*,—characteristically Indian forms, with which species of *Clemmys*, *Trionyx*, *Gecko*, *Halys*, and some Colubrines closely allied to Chinese or Central-Asiatic species are associated. The few Reptiles inhabiting the northern part of Japan are probably Palæarctic species.

2. *The African Region.*—Owing to its strictly continental character and diminished variety of physical features, this region is inhabited by a much smaller number of Reptiles than one might be led to expect from the large extent of its geographical area. There are but few small outlying islands, furnishing a small number of interesting additions to this fauna. Madagascar, indeed, would supply a considerable contingent of distinct forms, but it is questionable whether this large island should be united with the African region, as we shall see hereafter.

The African region is characterized by the development of three of the four principal divisions of terrestrial Chelonians, viz., *Testudinidæ*, *Chelydidæ*, and *Trionycidæ*; the *Emydidæ* are absent, being represented by one species only, in the north-western corner of the region (*Emys platyceps*) The thirty-seven species are distributed thus:—

Testudo,	with	16	species	21
Chersine,	„	1	„	
Pyxis,	„	1	„	
Cinyxis,	„	3	„	
Emys,	„	1	„	1
Dumerilia,	„	1	„	9
Sternotherus,	„	7	„	
Pelomedusa,	„	1	„	
Trionyx,	„	2	„	6
Cycloderma,	„	4	„	

The majority of the genera are peculiar, viz., *Chersine*, *Pyxis*, *Cinyxis*, *Dumerilia*, *Sternotherus*, *Pelomedusa*, and *Cycloderma*; and no other region shows a similar development of Land Tortoises. This last type has not only diverged into four genera, but is also represented by several of those gigantic forms which survived into geologically recent times. In the African region they inhabited only the neighbouring oceanic islands, viz., the Aldabra group, Mauritius, and Rodriguez; out of the eight species, which have been recognized chiefly from their osseous remains, one only survives at the present day. Also in Madagascar fossil remains of gigantic species, which must have been contemporaries of *Æpyornis*, have been discovered by Grandidier; but on the continent no trace of these large creatures has been found hitherto. The Chelonians of the eastern and western halves of the continent do not essentially differ from each other, but *Trionyx* does not extend southwards beyond the tropic.

Of *Crocodilidæ*, *Crocodilus* is represented by three or four species. Alligators are absent.

Of the families of Lizards inhabiting Africa the majority occur in the southern portion. *Agamidæ* are numerous, and represented chiefly by terrestrial forms. The *Geckonidæ*, *Scincidæ*, *Lacertidæ*, and *Varanidæ* are likewise well represented; *Eublepharidæ* by a single genus and species in West Africa. The presence of several genera of *Amphisbænidæ*, some of which are even identical with South-American, is highly suggestive. *Gerrhosauridæ*, *Zonuridæ*, and *Anelytropidæ* are peculiar to tropical Africa; but the most important feature of this Lacertilian fauna is the almost universal distribution of Chamæleons in numerous and highly specialized species.

Leaving aside, for the present, the island of Madagascar, we estimate that the number of species of African Snakes does not exceed two hundred, which are referable to about seventy genera, of which no less than fifty do not range beyond the limits of the region. On the whole the east coast genera are different from those of the west coast, but in the southern parts no such differentiation can be shown. Very little is known as regards the range of the species and genera towards the central districts. As regards higher groups only two families, the *Dasypeltidæ* and *Dinophidæ*, are peculiar to Africa; and, although they have a wide range over the region, they consist of very few species only. Other families show a greater variety of genera and species here than in any other part of the globe. The almost entire absence of the genus *Tropidonotus* and the scanty representation of Colubers are very noticeable features. Poisonous Snakes are numerous, all the various families being well represented, with the exception of the Pit Vipers; singularly enough innocuous Colubrine Snakes with facial pits occur (*Bothrophthalmus*, *Bothrolycus*).

Of *Typhlopidæ* nearly forty species have been described, and, besides, the *Stenostomatidæ* are represented by seven species.

Eight out of ten Calamaroid genera are peculiar to this fauna, and remarkable is the frequency with which among them the sub-caudal shields coalesce into a single series.

The *Coronellidæ* are represented by some twenty species, but no true *Coluber* occurs, the four species which approach this type most closely belonging to distinct genera (*Scaphiophis*, *Xenurophis*, *Herpetæthiops*).

Almost entire absence of *Tropidonotus* is a characteristic feature of this fauna. Also of other Freshwater Snakes only six genera with seven species are known.

The small family of *Psammophidæ* is well represented by three genera and nine species, of which six belong to *Psammophis*.

Of Tree-Snakes there are six genera, of which *Ahætulla* (*Philothamnus*) is most generally distributed, in twelve species.

Of *Dipsadidæ* there are five genera and ten species, four of which belong to *Dipsas* proper.

The Lycodonts are as well developed as in India, by seven genera and fourteen species; all the genera are peculiar to Africa, and some of them are modified for an arboreal mode of life.

Of Pythons three species are distinguishable; but, besides, a member of the Booid family (*Pelophilus fordii*) occurs on the west coast.

Two species of *Eryx* occur.

Poisonous Snakes are extremely numerous, the proportion to innocuous Snakes being as 1 : 5. Of *Elapidæ* four genera occur, among which *Naja* figures with at least two species; besides this family the *Dinophidæ* are a remarkable and characteristic type, having assumed entirely the appearance and mode of life of Tree Snakes. The *Atractaspididæ*, with three genera and thirteen species, are likewise almost entirely African, only one other type (*Dinodipsas*) having been recently discovered in Venezuela. Pit Vipers are absent, but the largest forms of *Viperidæ* are developed in this region, this family being represented by four genera and twelve species. The singular genus *Atheris* is a real Tree Viper with prehensile tail.

The Reptilian fauna of Madagascar is a most remarkable mixture of types belonging to different regions, which cannot be accounted for in the present state of our knowledge of the geological changes that have taken place whilst the present fauna was already in existence.

The Chelonians[1] offer a marked point of distinction from those of

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[1] The Chelonians of Madagascar require a thorough critical examination; some of the species which are recorded as having been brought from that island have been evidently introduced from the African continent. Others, as also certain species of Snakes, are certainly not natives of Madagascar.

Africa: no *Trionyx* occurs in Madagascar. On the other hand species are found of *Testudo*, *Chersine*, *Sternotherus*, and *Pelomedusa*, which are spread also over a greater or lesser area of the continent. Two Chelonians, *Pyxis* and *Dumerilia*, are peculiar to Madagascar, the latter nearly allied to the South-American *Peltocephalus*. The Madagascar Crocodile is closely allied to the common African species: and its presence in the island can be easily accounted for.

Among the Lizards we find a distinctly South-American element in two Iguanoid genera, *Hoplurus* and *Chalarodon*, replacing the Old World *Agamidæ*. The absence of *Varanidæ*, *Lacertidæ*, and *Amphisbænidæ* removes Madagascar from Africa, whilst the extraordinary development of *Chamæleonidæ* (more than twenty species) and the presence of *Gerrhosauridæ* and *Zonuridæ* are important features common to both. A very small family (*Uroplatidæ*) is peculiar to Madagascar. No special relation to the Indian region is shown by this Lacertilian fauna.

With regard to Ophidians, Madagascar has hardly anything in common with Africa. The African fauna is characterized by the great development of Lycodonts,—they are absent in Madagascar; and of the four families of African poisonous Snakes Madagascar does not possess a single one. When we analyse the affinities of the twenty-seven species known at present from Madagascar, we arrive at the following conclusions:—

1. Snakes without distinct relations to any particular region:—*Typhlops* (six species), *Ablabes* (one species), *Ithycyphus* (one species), *Dipsadoboa* (one species).
2. Snakes with affinities to the African fauna:—*Mimophis* (one species), *Pelophilus* (one species).
3. Snakes with affinities to the Indian fauna:—*Ptyas* (one species), *Langaha* (one species).
4. Snakes with affinities to the South-American fauna:—*Liophis* (one species), *Tachymenis* (one species), *Pseudoxyrhopus* (two species), *Heterodon* (two species), *Dromicus* (one species), *Herpetodryas* (one species), *Philodryas* (one species), *Dipsas* (two species), *Xiphosoma* (one species).

Africa shows affinities to all the three other equatorial regions, but chiefly to the Indian. No sharply defined boundary exists between the two regions, the intervening parts of Asia being inhabited by a desert fauna which penetrates into districts of similar nature in Africa as well as in India. Certain genera and species belonging to this desert fauna are therefore common to both regions. But there are, besides, other points of affinity of deeper significance, such as the development in both of a distinct Trionycoid genus, besides the typical *Trionyx*, the general distribution of Agamoids and *Varanidæ*,[1] the presence of the remarkable family of Lycodonts, which do not occur anywhere else, of the large forms of *Python* with concomitant absence of Booids, and of the *Elapidæ*, of which one genus (*Naja*) extends from the west coast of Africa to Borneo. But these resemblances are fully counterbalanced by great differences in other portions of the Reptilian fauna: the Indian Emydoids are replaced by *Chelydidæ* in Africa, a type which it has in common with Australia and South America, whereas India possesses no *Amphisbænidæ*, no Chamæleons.[2] With regard to Ophidians, the number of forms generally is greatly diminished in Africa, but the proportion of poisonous Snakes is doubled. The Pit Vipers of India are wholly absent, and are replaced by true Vipers. In the Indian region arboreal Agamoid Lizards prevail; in Africa the Snakes show a greater tendency towards a modification of the habitus and structure for arboreal life. The Freshwater Snakes and Colubers which are so numerous in India are much reduced in numbers in Africa, *Tropidonoti* being almost entirely absent.

3. *The Tropical Pacific Region.*—So far as Reptiles are concerned, Tasmania has to be included in this region. No *Trionyx* or *Emys* goes eastwards beyond Wallace's line. In fact, the Chelonian type disappears in the islands between this line and the Australian continent—with two exceptions. A species of *Testudo* (*T. forstenii*) occurs in, and is limited to, the island of Gilolo; and *Cuora amboinensis*, the most common Tortoise of Malaya, occurs in many of the eastern islands, but it has probably been imported by man, and by the same means may be still extending its range. On the continent of Australia *Chelydidæ* only occur, viz., eight species of *Chelemys* and five of *Chelodina*. In Tasmania, again, Chelonians are absent.

Besides the common Indian *Crocodilus porosus*, which may be considered an immigrant into this region, one or two other species of the same genus inhabit the fresh waters of the truly tropical parts, and are peculiar to Australia.

The bulk of the Lacertilian fauna is composed of Skinks, Geckos, Agamoids, and *Varanidæ*, with the addition of a small family which is peculiar to the region, the *Pygopodidæ*. A peculiar type, *Dibamus*, has been found in New Guinea; and, finally, a single Iguanoid, *Brachylophus*, is common in the Fiji Islands; how it came there, or how it survived its severance from the American stock, is a mystery. The Skinks are in this region more highly developed and more specialized than in any other part of the world; they exceed in numbers the Geckos, which generally accompany the Skinks in their range over the smaller islands of the Pacific; in these islands members of these two families represent the whole of the Lacertilian fauna. The Australian Agamoids are chiefly peculiar and partly much differentiated forms, but some have distinct affinities to, or are even identical with, Indian genera. The *Varanidæ* are also closely allied to Indian species.

The total number of Snakes amount to ninety species, of which twelve are *Typhlops*, eight other innocuous Colubrines, fifty *Elapidæ*, one *Erycine*, fourteen *Pythonidæ*, and five *Boidæ*. The number of poisonous Snakes, therefore, exceeds that of innocuous, a proportion quite unparalleled in any other part of the world. The few innocuous Colubrine Snakes belong to Indian genera, and evidently have spread from that region; but all the genera of *Elapidæ* (twelve), *Erycidæ* (one), *Pythonidæ* (five), and *Boidæ* (three) are peculiar to this region.

In Australia we meet, therefore, with the interesting fact that, whilst it is closely allied to South America, but totally distinct from India, by its Chelonians, its Lizards and Colubrine Snakes connect it with this latter region. With regard to the other Ophidians, they, although peculiar genera, have their nearest allies partly in India partly in South America; and the character of the Australian Snake fauna consists chiefly in its peculiar composition, differing thereby more from the other equatorial regions than these do among themselves. Wallace's line marks the boundary between India and Australia only as far as Chelonians are concerned, but it is quite effaced by the distribution of Lizards and Snakes. Thus in New Guinea Lizards of the Indian region are mixed with *Pygopodidæ*, and an island as far east as Timorlaut is inhabited by six Snakes, three of which are peculiarly Indian, whilst the other three are as decidedly Australian. The islands north of New Guinea and of Melanesia are not yet occupied by the Ophidian type, and only species of *Enygrus* have penetrated eastwards as far as the Low Archipelago, whilst the Fiji Islands and the larger islands of Melanesia have sufficiently long been raised above the level of the sea to develop quite peculiar genera of Snakes. Tasmania is tenanted by poisonous Snakes only.

4. *The Tropical American Region.*—An examination of the distribution of Chelonians in the New World leads to a different division of its regions from that of the other Reptiles. Central America and the West Indies, with regard to Chelonians, cannot be united with the Southern

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[1] Both these Lacertilian families extend into the Australian region; in fact they replace the Iguanoids of the western hemisphere and Madagascar.

[2] With the single exception mentioned above.

continent. The Chelonians of South America proper are the following (forty-three species):—

Testudo, ...with	8	species	8
Emys, ... ,,	4	,,	6
Cinosternum, ... ,,	2	,,	
Peltocephalus, ... ,,	1	,,	29
Podocnemis, ... ,,	5	,,	
Platemys, ... ,,	17	,,	
Hydromedusa, ... ,,	5	,,	
Chelys, ... ,,	1	,,	

The *Chelydidæ* thus predominate to the exclusion of the *Emydidæ*. They belong to five distinct genera, of which one, *Chelys*, is the most specialized of the family. They do not extend to the western side of the Andes, and cease in the south with the system of the Plate River. Northwards they penetrate to Trinidad, but become scarcer in the degree in which their place is occupied by the *Emydidæ*, which have spread from Central America over the northern parts of this region. One. *Emys d'orbignii*, following the course of the Uruguay, has penetrated southwards to the mouth of the Plate River.

Land Tortoises (*Testudo*) are at the present day almost extinct in this region, two species only (*Testudo tabulata* or *carbonaria* and *T. argentina*) being found on the continent of South America. The six other species belong to the Oceanic Island Tortoises of gigantic size. and inhabit or inhabited the Galapagos group.

Trionyx is entirely absent.

The Crocodilian order is more developed in this region than in any other. Besides at least three species of *Crocodilus*, six Alligators occur. The former occupy Central America, with Mexico, the coast of Florida, the West Indies, Ecuador, and the system of the Orinoco; the latter extend much farther southwards, throughout the system of the Plate River, whilst in North America this genus is represented by a distinct species, *A. mississippensis*.[1] Alligators found in some of the West Indian islands are believed to be immigrants from the continent.

The Lacertilian fauna connects Central with South America,—all the six families found in the latter area, viz., *Geckonidæ*, *Anguidæ*, *Amphisbænidæ*, *Tejidæ*, *Iguanidæ*, and *Scincidæ*, being represented in Central America. But Central America possesses, besides, five other families, small in species and restricted in range (some belonging to the fauna of great elevations), but highly interesting types. These are the *Eublepharidæ*, *Xenosauridæ*, *Aniellidæ*, *Helodermatidæ*, and *Lepidophymatidæ*. Their localization and differentiation can be accounted for on the hypothesis that they are the remains of the fauna of the various islands into which Central America was broken up at a former period.

By far the larger number of Lizards of the Tropical American region are *Iguanidæ*, a family which in the New World repeats the Old-World *Agamidæ*. They are spread over the whole of the region, having adapted themselves in their mode of life and structure to every variety of ground. One species (*Liolæmus magellanicus*) ranges to the Straits of Magellan. The largest Iguanoids inhabit the Galapagos Islands, where they live on the rocks of the shore, one species (*Oreocephalus cristatus*) entering sea-water and feeding on sea-weeds. The next numerous family is the *Tejidæ*, the New-World representatives of the Old-World *Lacertidæ*; *Geckonidæ*, *Scincidæ*, *Amphisbænidæ*, and *Anguidæ* are less numerous, but have also a wide range over the region. The Lacertilian fauna of the West Indies is wholly South-American; it does not comprise any peculiar family, and only a few characteristic genera, of which *Anolis* is, perhaps, the most highly specialized and the one which is composed of the greatest number of species; this genus, however, is also well represented on the continent, especially in Central America.

With regard to Ophidians the Tropical American region approaches the Indian in the number of species, which amounts to about four hundred, but it exhibits a comparatively less variety of generic and peculiar forms; of the eighty genera only about fifty do not range beyond its limits. However, a boundary line which would separate the Ophidian fauna of South America from that of the north does not exist. In Central America and Mexico the generic types of the south and north are intermingled, and as the climate, in accordance with latitude and altitude. assumes a more temperate character the specifically tropical Snakes disappear and are in part replaced by those of North America. This mixture of the two faunæ and the great variety of physical conditions within a small area account for the relatively very large number of Snakes of Central America. About one hundred and fifty out of the four hundred species attributed to the whole region belong to this district. The West-Indian Ophidians belong to the Tropical American fauna; many continental generic forms of the latter occur in the islands, and such genera as are peculiar to the West Indies do not exhibit a common feature, or are founded on slight characters. The exact limits to which Snakes extend southwards are not known; they seem to be very scarce on the southern confines of the Argentine Republic. Quite recently a Crotaline Snake, *Rhinocerophis*, has been discovered in eastern Patagonia.[2]

Of families peculiar to or highly characteristic of this fauna we can mention one only, viz., the small family *Scytalidæ*, which replaces the Lycodonts of the Old World. The *Boidæ* are likewise a prominent feature, although not exclusively confined to South America; of eleven genera eight are Tropical American, and three Australian. The true Boas include the most gigantic of Snakes, and replace the Old-World Pythons.

In this fauna a peculiar and highly ornamental pattern of coloration, which consists of more or less regularly alternate rings of black, red, and yellow, seems to be the more worthy of notice, as it occurs in very distinct families, viz., the *Calamariidæ*, *Coronellidæ*, *Natricidæ*, *Leptognathidæ*, *Scytalidæ*, *Tortricidæ*, *Elapidæ*.

Of *Typhlopidæ* more than twenty species have been described, and, besides, the *Stenostomatidæ* are represented by seven species.

Of *Tortricidæ* one species occurs.

The *Calamariidæ* are represented by thirteen genera, of which ten are peculiar. The most characteristic and geographically important are *Elapomorphus* with ten, *Hamalocranium* with sixteen, *Ninia* with four species. The Indian genus *Geophis* is represented in Tropical America by twenty-five species.

Coronellidæ are extremely numerous (sixty-six species referable to thirteen genera). Of these *Xenodon* with twelve species, *Liophis* with sixteen, *Erythrolamprus*, and *Pliocercus* deserve special mention.

Of Colubers forms with elongate compressed body, approaching arboreal forms (*Spilotes*), are not scarce.

Freshwater Snakes are not abundant, but a genus peculiar to the region, *Helicops*, occurs in eight species. *Tropidonotus* might be regarded as absent, but for three or four species which occur north of the Isthmus of Panama and in the West Indies; also the allied genus *Tretanorhinus* is confined to Central America and the West Indies.

Tree Snakes are extremely abundant—some seventy species referable to six genera, of which *Dromicus*: *Philodryas*, and *Herpetodryas* are very characteristic forms. Of *Ahætulla* some seventeen species are known.

Of *Dipsas* and allied genera only four species occur, but of the peculiarly South-American *Leptognathidæ* some twenty-five species have been distinguished.

In Central America there occur two extremely singular forms which, however, are imperfectly known and seem to be restricted to a very limited area. One, *Loxocemus*, is considered a representative of the family *Pythonidæ*, and the other, *Notopsis*, is stated to be the type of a distinct family allied to the Indian *Xenodermidæ*.

Of the twenty species of *Boidæ* the West Indian contingent amounts to no less than eight or nine, a fact which clearly demonstrates the pertinence of the West Indies to this region.

Erycidæ are absent.

Poisonous Snakes are numerous, the proportion to innocuous Snakes being as 1 : 8. Besides the singular occurrence in Venezuela of a member of the *Atractaspididæ*, *Dinodipsas*, the Colubriform poisonous Snakes are represented by one genus only, *Elaps*, which, however, shows numerous varieties or species, and is extremely common and widely spread over the region. *Viperidæ* are absent; but the largest forms of Pit Vipers (*Crotalidæ*) are developed in this region, and represented by five genera, which, if not peculiar to Tropical America, are at least confined to the New World, like *Cenchris* and *Crotalus*.

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[1] We may mention here, in anticipation, that a species of Alligator has recently been discovered in China.

[2] There is reason to believe that *Euophrys*, which has been placed among the *Psammophidæ*, is likewise a Patagonian form.

The Reptilian fauna of tropical America thus shows relations to the other equatorial regions in three of its constituent parts only, viz., in the *Chelydidæ*, *Amphisbænidæ*, and *Crotalidæ*. It has the former type in common with Africa and Australia; but, whilst the presence of *Trionyx* on the African continent forms an important distinctive feature, the resemblance of South America to Madagascar is as great as, or even greater than, that to Australia, which lacks *Testudo*.

On the other hand the Lacertilian fauna is essentially distinct from that of the Old World, with the exception of *Amphisbænidæ* (and of species of *Eublepharidæ*), whose presence in South America and Africa is a most remarkable fact, and very strong evidence of the former existence of intervening land. The Skinks and Geckos, which are generally distributed over the warmer parts of the globe, cannot come into consideration.

The Snakes of Tropical America differ also much more from those of the Old-World regions than certain other portions of its fauna, as, for instance, its Batrachians and Freshwater Fishes. A distinct affinity with India is expressed only by the development of the family of Pit Vipers,—the presence in both regions of numerous Tree Snakes, of species of the genus *Geophis*, of the family *Tortricidæ*, &c., being less significant points of resemblance. But these resemblances are more than counterbalanced by the absence in South America of Lycodonts, *Tropidonoti*, *Pythonidæ*, *Erycidæ*. The African Ophidian fauna[1] is still further removed by *Crotalidæ* being entirely wanting and replaced by *Viperidæ*; only a few genera, like *Stenostoma*, *Coronella*, *Leptodira*, *Dipsas*, *Ahætulla*, are examples in which species are found in both regions. In both *Tropidonotus* is almost absent.

As all the innocuous Colubrine Snakes of Australia are derived from the Indian region, they form no part in a comparison between the Australian and South-American faunæ. Of the other Ophidian types these regions have not a single genus in common, nor a family which would not be represented also either in Africa or India or both.

5. *The North-American Region.*—While the Chelonians of the North-American or Nearctic region (in which, so far as this Reptilian order is concerned, Central America and the West Indies have to be included) are essentially different from those of South America, the Lizards and Snakes of both belong to the same family types, and pass in an unbroken series from the northern to the southern parts of the New World

In this region the *Emydidæ* have attained to as great a development as in the Indian, and are associated with a few representatives of *Testudo* and *Trionyx*. The species, which are altogether about fifty in number, and of which a few are common to the Central-American and North-American sections, are distributed as follows:—

	Central America, including Mexico.	N. America.[2]
Testudo	0	1
Cistudo	1	1
Clemmys	13	10
Dermatemys	1	0
Macroclemmys	0	1
Chelydra	2	1
Staurotypus	3	0
Aromochelys	0	2
Cinosternum	10	3
Trionyx	0	2
	—	—
	30	21

It may be seen from this list that no Chelydoid passes northward beyond the Isthmus of Panama; the Chelonians of Central America belong exclusively to the *Emydidæ*, which are represented by some thirty species; the majority do not extend either into South or North America; two of the genera, *Dermatemys* and *Staurotypus* are peculiar to it, and *Cinosternum* has its headquarters in this section. Neither *Trionyx* nor *Testudo* occurs. Proceeding beyond the Mexican boundary, we find still the *Emydidæ* predominating, a few of the species of Central America ranging northwards into the United States; distinct species of *Clemmys*,[3] *Cinosternum*, *Chelydra*, &c., appear, with the wonderful genus *Macroclemmys*. An instance of the isolated occurrence of a *Testudo* (*T. polyphemus*) is met with here; and from the lower part of the Mississippi northward one of the most characteristic features of the North-American fauna makes its appearance, viz., two species of *Trionyx*, of which one at least follows the ramifications of that river northward and has found its way into Lake Winnipeg (51° N. lat.). West of the Rocky Mountains Tortoises are scarce and of distinct species.

In the West Indies the following species have been found:—1, *Testudo tabulata*; 2, *Podocnemis dumeriliana*; 3, *Emys concinna*; 4, *E. decussata*; 5, *E. rugosa*. Of these the first two are identical with South-American, and the third with a North-American species, and, therefore, may be regarded as strangers which in comparatively recent times have been introduced into the West Indies. On the other hand the last two are species peculiar to the islands, and, as they belong to a North-American generic type, clearly prove the pertinence of this island district to the northern continent, so far as Tortoises are concerned.

Crocodilians

The south-eastern parts of North America are inhabited by an Alligator which is specifically distinct and locally separated from the southern species.

Lacertilians and Op dians.

The tropical Lacertilian and Ophidian faunæ gradually merge into that of the temperate north, and any boundary line drawn between the north and south is more or less arbitrary. As a matter of fact so many truly tropical forms advance north of the tropic of Cancer (which by many authors is taken as the boundary line) that we are inclined to restrict the limits of this region to the district about the Rio Grande, whilst, on the other hand, the northern fauna extends to a lower latitude on the plateau of Mexico. Thus restricted, the North-American fauna includes about fifty species of Lizards, belonging to genera which with very few exceptions are already represented in Central America, or even farther southwards. By far the greatest number are *Iguanidæ*; the *Scincidæ*, *Anguidæ*, and *Tejidæ* are represented by several, the *Geckonidæ* by fewer species, whilst single species occur of the *Amphisbænidæ*, *Aniellidæ*, *Lepidophymidæ*, and *Helodermatidæ*,—all Central-American types. In fact, North America does not possess one family of Lizards peculiar to it.

It is worthy of notice that Lizards do not extend so far northwards in the western as in the eastern hemisphere; one species (*Gerrhonotus cæruleus*) ranges into British Columbia, another into Minnesota (*Eumeces septentrionalis*), and a third into Massachusetts (*Eumeces fasciatus*).

Of Snakes about one hundred[4] species could be enumerated, with a proportion of 1 : 14 of poisonous to innocuous Snakes. All the families represented in this fauna occur also in tropical America, and there is a great agreement of the genera with those of the Central-American district, so that less than one-half can be considered as peculiar to this region, viz., *Conocephalus*, *Carphophis*, *Contia*, *Cemophora*, *Hypsiglena*, *Chersodromus*, *Rhinochilus*, *Pituophis*, *Ischnognathus*, *Charina*, *Wenona*, *Lichanura*. *Calamariidæ* and

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[1] Of the relations existing between the Snakes of South America and Madagascar we have spoken above, p. 469.

[2] In a *Check-list* published by the U.S. National Museum in 1883 a much larger number of "North-American" terrestrial Chelonians is given, viz., forty-three. This is partly due to the southern boundary of "North America" being extended to the tropic of Cancer, partly to the fact that species are admitted in a different sense from those of the herpetologists of the Old World, By adopting these species a very erroneous impression would be created as regards the comparative numbers of the groups in the several regions. That check-list includes three species of *Testudo*, three of *Cistudo*, twenty-one of *Emys* and its subgenera, five of *Cinosternum*, two of *Aromochelys*, one each of *Macroclemmys* and *Chelydra*, and six of *Trionyx*.

[3] *Emys blandingii* may be erased from the list of species; we have recently examined a specimen; it is identical with *Emys lutaria*, and has evidently been introduced from Europe.

[4] One hundred and eighty, according to some authors, who include a great part of Mexico, and adopt every variation to which a binomial term has been applied.

Coronellidæ are numerous; so are Colubers, of which *Pituophis* is the most characteristic. Freshwater Snakes abound, especially of the genus *Tropidonotus* Of *Tortricidæ* three genera have been distinguished. No true Vipers occur, but Pit Vipers are represented by three genera, of which two are Rattlesnakes.

After what has been stated already, the affinities of this to other regions can be summed up in a few words. The Reptilian fauna of North and South America forms, with the exception of the Chelonians, a homogeneous whole by which the Neogean division proposed by Sclater for Passerine Birds is well characterized. On the other hand, the Chelonian fauna of North America is entirely distinct from that of South America, and most closely allied to that of India.

6. *The Europo-Asiatic Region.*—Whilst the north of the western hemisphere has at least one order of Reptiles, the Chelonians, by which it is distinguished from the south, the temperate region of the eastern hemisphere possesses no important distinguishing type of Reptile. Its Reptilian fauna is merely an offshoot of those of the two adjoining tropical regions; and, if we were to add the genera most characteristic of the Palæarctic fauna to either Africa or India, the character of neither would be modified or changed. Thus, so far as Reptiles are concerned, a Palæarctic region does not deserve to rank with the other primary regions.

The Chelonians are represented by nine species only, viz. :—

Testudo,	4 species
Emys,	3 ,,
Trionyx,	2 ,,

—types which are only specifically distinct from those of the two southern tropical regions. The Land Tortoises are confined to the warmer districts of the western portion, penetrating into the centre of the Siberian sub-region, and entirely absent in the northern and eastern parts; of *Emys* one species (*E. luturia*) is still found in north-eastern Germany as far north as 54° N. lat.[1]; and probably some other species will be found in similar latitudes in the little explored Amur country, where also a species of *Trionyx* (*T. maackii*) occurs. The second species of this latter genus which is referable to this region inhabits the Euphrates and Tigris.

The recent discovery of an Alligator in central China is a highly interesting fact, but not surprising, when we remember the occurrence in China of not a few North-American types of Batrachians and Freshwater Fishes. The common African Crocodile still lingers in the Mediterranean district,—its presence in Syria having been placed beyond doubt, and its occurrence in Sicily having been asserted on very good authority.

The Lacertilians include the only family type which this region has not derived from either Africa or India, viz., the *Anguidæ*. Two genera of this family, *Anguis* and *Pseudopus*,[2] are widely spread in Europe, and closely allied, the former to the South-American *Ophiodes*, and the latter to the North-American *Ophiosaurus*. *Lacertidæ* are abundant as in Africa, and *Amphisbænidæ* and *Chamæleontidæ* represented at least in the Mediterranean district. Towards the central parts of Asia the terrestrial *Agamidæ* are continued from north-western Africa, partly with but slight modifications, *Phrynocephalus* being a specifically Central-Asiatic genus. In the Manchurian sub-region these African types are replaced by some Indian forms, such as *Gecko* and *Tachydromus*. The northern range of Lizards in this region extends as far as Lapland (*Lacerta vivipara* and *Anguis fragilis*).

The most characteristic Ophidian genus of the region is *Zamenis*, a Colubrine form which is very widely spread, and includes more species (eleven) than any other Palæarctic genus. This genus extends over Arabia, and even into the island of Socotra, without being associated there so far as is known at present with Snakes of an either peculiarly African or Indian type. The total number of Palæarctic Snakes amounts to sixty, of which twelve are poisonous Snakes, viz., nine Viperines and three *Halys*. The majority inhabit the Mediterranean district and western Asia.

Four *Typhlops* and a single *Stenostoma* have been found in the Mediterranean district and Persia.

Of the small number of *Calamariidæ* and *Coronellidæ*, *Rhynchocalamus*, *Psilosoma*, *Lytorhynchus*, and *Ditypophis* (Socotra) are genera not found beyond this region.

Colubridæ are comparatively numerous, and show less affinity to African than Indian forms. Besides *Zamenis*, *Coluber* and *Elaphis* occur in four species each, and *Rhinechis* and *Acontiophis* (Afghanistan) are peculiar genera.

Three or four species of *Tropidonotus* represent the groups of Freshwater Snakes.

The *Psammophidæ* are well developed; besides two species of *Psammophis*, *Taphrometopon* and *Cœlopeltis* are peculiar genera, but not extending into eastern Asia.

There is one species of *Eryx*.

One species of *Naja* reaches the Caspian.

The three species of *Halys* are Central-Asiatic.[3]

Of the nine species of Viperines six belong to *Vipera* and *Cerastes*. *Daboia* and *Echis* may be considered to have their headquarters in this region, but they extend into southern India, and *Echis* has spread east and west along the barren plains or deserts of North Africa and north-western India.

7. *New Zealand.*—The southernmost parts of South America, Africa, and Australia are not inhabited by a sufficiently differentiated fauna to be separated from the tropical regions of which they are the continuation. None of the small oceanic islands south of 40° or Tierra del Fuego possess any Reptiles. On the other hand New Zealand is by the possession of *Hatteria*, the sole living remnant of the extinct order *Rhynchocephalia* (not to mention other scarcely less important parts of its fauna), so much distinguished from the other regions that it cannot be associated with any of them. Although the climate and other physical conditions seem to be well adapted for the existence of the Chelonian and Ophidian types, neither is represented; and of Lizards only representatives of the ubiquitous Skinks and Geckos have reached its shores; but some of the latter must have inhabited New Zealand for a long period, as they belong to a distinct genus, *Naultinus*, which is peculiar to this group of islands.

At the conclusion of this section it will be useful first to recapitulate the principal features of the Reptilian faunæ for each of the primary regions into which the land of the globe has been divided by zoologists, and which nearly coincide with the geographical divisions, and secondly to arrange the regions according to the natural relations as expressed by this class of animals. A division into zones comprising the corresponding parts of both hemispheres cannot be maintained for Reptiles, since the greater portion of the faunæ of the temperate are merely the offshoots of tropical faunæ, no peculiar types of a higher than generic rank being developed in them.

1. The INDIAN REGION is characterized by *Trionycidæ* and *Emydidæ*, but few *Testudinidæ*. *Crocodilidæ*, with Gavials. Lacertilians and Ophidians very numerous. *Agamidæ* chiefly arboreal (*Draco*), and *Varanidæ*. *Pythonidæ* and *Lycodontidæ*. Ground Snakes, Colubers, Tree Snakes, and Freshwater Snakes abundant in genera. *Tropidonotus*. Poisonous Snakes in the proportion of species as 1 : 10, and comprising *Crotalidæ* and *Elapidæ*, but only two *Viperidæ*.

2. The AFRICAN REGION (exclusive of Madagascar) is characterized by Land Tortoises, *Trionycidæ*, and *Chelydidæ*. Species of *Crocodilus* only. Lacertilians and Ophidians rather numerous. *Agamidæ* chiefly terrestrial; *Lacertidæ* and *Varanidæ* are well represented. *Amphisbænidæ*, *Gerrhosauridæ*, and *Zonuridæ* are peculiar to the region. *Chamæleontidæ*. *Pythonidæ* and *Lycodontidæ* True Colubers and *Tropidonotus* almost absent. *Psammophidæ*. Poisonous Snakes in the proportion of 1 : 5, comprising *Viperidæ* and numerous venomous Colubrines.

3. The EUROPO-ASIATIC REGION is composed of a mixture of Indian and African generic and family types; and only a few peculiar genera have their centre of distribution in this part, such as *Anguis*, *Pseudopus*, *Phrynocephalus*, *Uromastyx*, *Stenodactylus*, *Alsophylax*, *Ceramodactylus*, *Scincus*, *Zamenis*, *Cœlopeltis*, *Taphrometopon*, *Daboia*, *Echis*, *Halys*. The majority inhabit the sub-tropical and warmer parts abutting upon the neighbouring tropical regions and are rapidly reduced in number in the more temperate portion.

4. The TROPICAL PACIFIC REGION possesses one of the terrestrial Chelonian types, *Chelydidæ*, and species of *Crocodilus* only.

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[1] *Emys lutaria* is one of the Tortoises the range of which has become much restricted in post-Glacial times, its remains having been found in peat beds in Norfolk, Belgium, Denmark, and Sweden, where it is now completely extinct.

[2] The isolated occurrence of a species of *Pseudopus* in Khassia has been mentioned above.

[3] Viperine and Crotaline Snakes meet in the centre of the Siberian sub region (Peters, *Monatsber. Berl. Ak*, 1877, p. 736).

Besides Skinks and Geckos, terrestrial *Agamidæ* and *Varanidæ* are well represented; *Pygopodidæ*. *Erycidæ*, *Pythonidæ*, and *Boidæ* are autochthonous, whilst a small number of innocuous Colubrines are immigrants from the East Indies. The poisonous Snakes surpass in number the non-poisonous, and belong to the *Elapidæ*.

5. MADAGASCAR possesses *Chelydidæ* and *Testudinidæ* without *Trionyx*, like South America. A species of Crocodile. *Chamæleontidæ* more differentiated here than in Africa, with which it has also *Gerrhosauridæ* and *Zonuridæ* in common; *Agamidæ* are replaced by the South-American *Iguanidæ*. Snakes chiefly South-American; no poisonous Snake.

6. The TROPICAL AMERICAN REGION is characterized by the full development of *Testudinidæ* and *Chelydidæ* and absence of *Trionyx*; Emydoids are immigrants from the north. Crocodiles and Alligators. Lacertilians numerous in families and species, the majority being *Iguanidæ*; the Old-World *Lacertidæ* replaced by *Tejidæ*. Other families, *Anguidæ*, *Amphisbænidæ*, *Eublepharidæ*, *Helodermatidæ*, &c., well represented. Snakes numerous: *Boidæ* and *Scytalidæ*; Ground Snakes, Colubers, and Tree Snakes abundant, less so Freshwater Snakes; *Tropidonotus* almost absent. Poisonous Snakes in the proportion of species as 1 : 8, and comprising *Crotalidæ* and *Elaps*.

7. The NORTH-AMERICAN REGION differs from the Tropical in possessing the *Emydidæ* in their full development and *Trionyx*; only one *Testudo*. One Alligator. As regards Lacertilians and Ophidians this region occupies the same relation to tropical South America as the Palæarctic region does to Africa and India.

8. NEW ZEALAND is characterized by the possession of the Rhynchocephalian type, without any other Reptile with the exception of certain Skinks and Geckos.

Arranging these primary divisions of the globe in accordance with the distribution of the several orders of Reptiles, we find that with regard to CHELONIANS the regions stand in the following relation to each other:—

I. Emydidæ fully developed.
  A. Trionycidæ fully developed.
    1. Testudinidæ in small numbers or immigrants: *a. Indian-Palæarctic* regions, and *b. North-American* region (including Central America).
II. Chelydidæ fully developed.
  A. Trionycidæ fully developed.
    1. Testudinidæ fully developed: *African* region.
  B. Trionycidæ absent.
    1. Testudinidæ fully developed: *a. Tropical American* region, and *b. Madagascar.*
    2. Testudinidæ absent: *Tropical Pacific* region.
III. Chelonians entirely absent: *New Zealand.*

The types of CROCODILIAN and RHYNCHOCEPHALIAN orders are too few in number and either very widely or very locally distributed, so that no general division of the globe's surface can be based upon them alone.

The two large LACERTILIAN families *Geckonidæ* and *Scincidæ* are generally distributed over the warmer parts of the globe, and therefore not well adapted for the distinction of the primary regions. Nevertheless, in a more detailed account many of the genera would have to come into consideration, being confined to more or less limited areas. Both families are represented in great variety in Australia, but scantily in South America. With regard to other families the regions can be arranged thus:—

I. Agamidæ and Varanidæ fully developed.
  A. Chamæleontidæ, Lacertidæ, and Amphisbænidæ: *African* region (including as sub-region the Western Palæarctic portion, characterized by Anguidæ).
  B. Amphisbænidæ and Chamæleons (except one species) absent; Lacertidæ few: *Indian* region with Manchurian sub-region.
  C. Pygopodidæ: *Tropical Pacific* region.
II. Iguanidæ fully developed.
  A. Chamæleontidæ: *Madagascar.*
  B. Tejidæ, Amphisbænidæ, and Anguidæ: *South-American* and *North-American* regions.
III. Skinks and Geckos only: *New Zealand.*

Of the families of OPHIDIANS the *Pythonidæ* and *Boidæ*, the *Crotalidæ* and *Viperidæ*, the *Lycodontidæ* and *Scytalidæ* replace each other in their distribution, and are, therefore, best adapted for determining the relations of the zoological regions. Although the first two are so far as we know at present the geologically oldest types, and therefore might be employed in the first instance in the arrangement of the regions, their distribution is limited to the equatorial zone, and fails to show the close relations existing between the temperate and equatorial parts of the Old World on the one hand and those of the New on the other. The relations of Madagascar to Tropical America are in the following scheme less distinctly expressed than they are in nature.

I. Viperidæ fully developed.
  A. Pythonidæ and Lycodontidæ: *African* region.
  B. Tropidonoti and true Colubers: western portion of the *Europo-Asiatic* region.
II. Crotalidæ fully developed.
  A. Pythonidæ and Lycodontidæ in the tropical parts; Tropidonoti and true Colubers; none of the Crotalines with rattles: *Indian* region (including Manchuria).
  B. Tropidonoti and true Colubers; some of the Crotalines with rattles; intermediate between the Manchurian sub-region and tropical America: *North-American* region.
  C. Boidæ and Scytalidæ: *Tropical-American* region
III. Colubrine venomous Snakes only.
  A. Pythonidæ and Boidæ: *Tropical Pacific* region.
IV. Venomous Snakes entirely absent.
  A. Boidæ: *Madagascar.*
V. Snakes entirely absent: *New Zealand.* (A. C. G.)

REQUENA, a town of Spain, in the province of Valencia, 41 miles to the west of that city on the road to Cuenca, occupies a strong position near the river Oleana in the rocky mountainous district called Las Cabrillas separating Valencia from Castile. It is commanded by a castle, and still has traces of the walls that anciently encircled it. The tower of the church of San Salvador is the only other feature of architectural interest. The principal industries are those connected with the culture of grain, fruit, wine, saffron, and silk. The population of the municipality in 1877 was 13,527.

RESERVOIR. See WATERWORKS.

RESHAL, *i.e.*, RABBENU SHELOMOH LORIA (or Luria, *vulgo* Lurye), was one of the famous "Five[1] Sages" (Rabbis) of the 16th century. His father's name was R. Yehiel of Ostroff (S. W. Russia), a descendant of RASHI[2] (*q.v.*). He is also known under the name of Rashal, or Maharshal (*i.e.*, Morenu Harab R. Shelomoh Loria). He himself was chief rabbi of Lublin, where he died in 1573. His works are of importance on account of the numerous, though only incidental, notices they contain in connexion with the history of Jewish literature. We name six of these works—one edition of each:—

(1) *Ḥokhmath Shelomoh*, discussions on the Babylonian Talmud, Rashi, the Tosaphoth, &c. This work is now an integral part of the Talmud editions. (2) *Yam shel Shelomoh*:—(*a*) on Yomtob (or Beṣah), Lublin, 1636, and reprints, (*b*) on Yebamoth, Altona, 1739; (*c*) on Kethuboth (first four peraḳim), Stettin, 1862; (*d*) on Ḳiddushin, Berlin, 1766; (*e*) on Gittin, Berlin, 1761, and reprint; (*f*) on Bobo Ḳammo, Prague, 1616, and reprint; (*g*) on Hullin, Cracow, 1646, and reprints. All these are in folio. (3) *Yeri'oth Shelomoh*, supercommentary on Rashi on the Pentateuch, with special reference to Mizraḥi's supercommentary, Prague, 1608, 4to. (4) *'Atereth Shelomoh*, on the *Illicita et Licita* of R. Yiṣḥaḳ of Düren, Basel, 1599, and reprint, folio. (5) *'Ammude Shelomoh*, on the *Sepher Hammiṣvoth* of R. Mosheh of Coucy, Basel, 1599, 4to. (6) *Responsa*, Lublin, 1574, 4to, and reprints in folio. (S. M. S.-S.)

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[1] The other four were—(1) R. Mosheh Isserls of Cracow (the celebrated "Rema"); (2) R. Lewa b. Besaleel (the great Halakhist and Cabbalist), chief rabbi of Prague; (3) R. Mordekhai Yaphe (the author of the *Lebushim*), chief rabbi of Posen, &c.; and (4), last but not least, R. Yoseph Caro, principal of the academy of Safed in Palestine, and compiler of the normative *Shulhan 'Arukh.*

[2] *Yam shel Shelomoh*, on Yebamoth, iv. 33.

RESHD. See RASHT.

RESINA, a town of Italy, 6 miles south east of Naples and practically a southern continuation of Portici, is well known as the usual starting place for tourists on their way up Vesuvius, and as the nearest town to the buried city of Herculaneum. It had 13,626 inhabitants in 1881 (commune 15,593).

RESINS. A resin is a secretion formed in special resin canals or passages of plants, from many of which, such as, for example, coniferous trees, it exudes in soft tears hardening into solid masses in the air. Otherwise it may be obtained by making incisions in the bark or wood of the secreting plant. Resin can also be extracted from almost all plants by treatment of the tissue with alcohol, and it is formed by the oxidation of essential oils, many authorities being of opinion that all true resins, which are in chemical composition oxidized hydrocarbons, result primarily from the action of oxygen on essential oils. Resinous substances are further produced by the dry distillation of numerous organic compounds and by the drying of fatty drying oils. Certain resins are obtained in a fossilized condition, amber being the most notable instance of this class, and African copal and the kaurie gum of New Zealand are also procured in a semi-fossil condition. The resins which are obtained as natural exudations are in general compound bodies containing more than one simple resin and varying proportions of essential oil. These compounds when soft are known as oleo-resins, and when imperfectly fluid they are called balsams. Other resinous products are in their natural condition mixed with gum or mucilaginous substances and known as gum-resins. Varying in constitution as these bodies do, they also differ widely in physical properties; but the general conception of a resin is a noncrystalline body, insoluble in water, mostly soluble in alcohol, essential oils, ether, and hot fatty oils, combining with alkalies to form resin soap, softening and melting under the influence of heat, not capable of sublimation, and burning with a bright but smoky flame. A typical resin is a transparent or translucent mass, with a vitreous fracture and a faintly yellow or brown colour, inodorous or having only a slight turpentine odour and taste. Many compound resins, however, from their admixture with essential oils, are possessed of distinct and characteristic odours. A series of gradations among resins may be traced from the hard glassy transparent copals through soft elemis and oleo-resins, semi-fluid balsams and fluid wood oils, to the most limpid essential oils. The hard transparent resins are principally used for varnishes and cement, while the softer odoriferous oleo-resins and gum-resins containing essential oils are more largely used for pharmaceutical purposes and incense. No systematic classification of resins has yet been attempted, and there is much uncertainty as to the botanical source of some well-known commercial varieties, while the chemical constitution and relations of many still require elucidation. The following list embraces the principal resins of commerce, and particulars regarding the more important of these will be found under their respective headings. See also ROSIN, GUM, and BALSAM.

I. *Copalline or Varnish Resins*:—African Copal or Gum Animé (see COPAL, vol. vi. p. 342); Mexican Copal, from *Hymenea* sp.; Brazilian Copal, from *Hymenea* sp. and *Trachylobium Martianum*; Piney Resin, or White Dammar, *Vateria indica* and *V. acuminata*; Sal Dammar, *Shorea robusta* and other species; Dammar of *Hopea robusta*; Black Dammar, from *Canarium strictum*; Mastic, *Pistacia Lentiscus* (vol. xv. p. 621); Lac (vol. xiv. p. 181); East Indian Dammar (see DAMMAR, vol. vi. p. 795); Kaurie or Coudie Resin, *Dammara australis* (see TURPENTINE); Sandarach, from *Callitris quadrivalvis* (see SANDARACH); Dragon's Blood (vol. vii. p. 389).

II. *Soft or Oleo-Resins*:—Manila Elemi, from *Canarium commune* (see ELEMI, vol. viii. p. 122); Mexican Elemi, *Amyris elemifera*; Brazilian Elemi, *Icica Icicariba* and other sp.; Tacamahac (American), *Elaphrium tomentosum*; Tacamahac (East Indian), *Calophyllum Inophyllum*; Wood Oil, *Dipterocarpus turbinatus*; Chian Turpentine, *Pistacia Terebinthus*; Turpentine, Common Frankincense, and Thus from various *Coniferæ* (see FRANKINCENSE, TURPENTINE, and ROSIN); Balsam of Canada, *Abies canadensis* (see BALSAM).

III. *Fragrant Oleo-Resins and Gum-Resins*:—Myrrh, *Balsamodendron Myrrha* (vol. xvii. p. 121); Bdellium or Googul, *Balsamodendron Roxburghii*; Balsam of Gilead or Mecca Balsam, *Balsamodendron Berryi*; Olibanum or Frankincense, *Boswellia Carteri*, &c. (see FRANKINCENSE, vol. ix. p. 709); Benzoin, *Styrax Benzoin* and *Balsamodendron Mukul* (vol. iii. p. 581); Solid Styrax, *Styrax officinalis* (see STORAX); Liquid Storax, *Liquidambar orientalis* (see STORAX); Balsam of Peru, *Myrospermum peruiferum* (see BALSAM); Balsam of Tolu, *Myrospermum toluiferum*; Labdanum or Ladanum, *Cistus creticus*, var. *labdaniferus*.

IV. *Fetid Gum Resins*:—Ammoniacum, *Dorema ammoniacum* (vol. i. p. 742); Asafœtida, *Ferula Narthex* and *F. Scorodosma* (vol. ii. p. 675); Galbanum, *Ferula galbaniflua* and *F. rubricaulis* (vol. x. p. 22); Opoponax, *Opoponax Chironium*; Sagapenum, *Ferula* sp.; Sarcocol.

V. *Medicinal Resins*:—Gamboge, *Garcinia* sp. (vol. x. p. 60); Guaiacum, *Guaiacum officinale* (vol. xi. p. 230); Euphorbium, *Euphorbia resinifera*; Balsam of Copaiba, *Copaifera officinalis* (see BALSAM).

VI. *Extract Resins* form a class of products principally important from a medicinal point of view. They embrace Scammony from *Convolvulus Scammonia*, Jalap Resin from *Ipomea Jalapa*, Podophyllum Resin from *Podophyllum peltatum*, Churrus from Indian Hemp (*Cannabis sativa*), Cubeb Resin from *Cubeba officinalis*; and many other medicinal products owe their virtues to resinous bodies present in them.

RESPIRATION

THE continued existence of an amœba in a pool of water, or of a white blood-cell in the *liquor sanguinis*, depends upon a continual interchange of substances between the organism and the surrounding medium. The substances in question pass from the medium into the organism in a certain chemical form; they pass from the organism into the surrounding medium with their chemical form modified. Regarding merely the initial and final stages of this reconstitution of chemical form, we may speak of it as being of the nature of an oxidation. This view does not profess to be comprehensive; nevertheless, it is true that the metabolic and anabolic processes of cells, taken as a whole, resemble combustion at least to this extent that oxygen and oxidizable carbon take part in them, and that carbon dioxide results from them. Partly as a matter of tradition, and partly as a matter of convenience, physiologists have described the introduction of oxygen into the organism and the emission of carbon dioxide from it as the complemental portions of one process of *respiration*. Although such a combined consideration is not strictly philosophical, inasmuch as it leaves out of view the introduction of the carbon into the organism, yet it is extremely convenient because the two processes referred to do, in all classes of the animal kingdom from the highest to the lowest, involve the same organs and tissues in their performance. Respiration may therefore be defined as the aggregate of those processes which are concerned in the introduction of oxygen into the system and the escape of carbon dioxide from it.

Respiration in such an organism as an amœba is extremely simple. The medium surrounding it contains a practically unlimited supply of oxygen, and is so vast that the carbon dioxide put out into the medium is quickly removed from the neighbourhood of the organism. The interchange of oxygen and carbon dioxide takes place at the surface of the organism, so far as we know, continuously. In the higher animals, constituted as they are of a vast number of structural units accurately packed together, each resembling more or less in its physiological instincts the unicellular amœba, respiration presents a much more intricate problem. The fine interstices which exist between the structural elements do indeed contain a small quantity of a fluid medium which serves the function of the water bathing the amœba; but the store of oxygen in the medium would speedily become exhausted, and the emitted carbon dioxide would quickly accumulate to a dangerous degree, if the medium were not continually restored to its original purity. This revival is effected by the circulating blood which is brought by its capillaries into the neighbourhood of the remotest cells of the body. But even the mass of the blood is small compared with that of the cells it nourishes; unless it be itself purified and restored in turn the interstitial juices which depend upon it for their purification must soon fail to support the respiration of the cells. Such restoration of the blood takes place in certain organs called lungs or gills, where the blood acquires a fresh store of oxygen and parts with its excess of carbon dioxide.

Respiration in the higher animals may therefore be divided into (1) internal respiration, or the interchange of oxygen and carbon dioxide between the cells of the body and the fluid drenching them, and (2) external respiration, or the gaseous interchange taking place in the special respiratory organs (lungs, gills). The first is really a part of NUTRITION (*q.v.*); the second, or respiration proper, is the subject of the present article.

It will be evident on reflection that the process of respiration naturally falls to be described under two divisions, the first of which is concerned with the *movements* of the chest in inspiration and expiration and the manner in which they are brought about, and the second with the *interchange of gases* which takes place between the blood and the air in the lungs.

THE MOVEMENTS OF RESPIRATION.

Structure of the Organs of Respiration.

In order to understand the movements it is necessary first to know the structure of the air passages and thorax.

Anatomy of the Air Passages.—The essential organs of respiration consist of an air tube called the *trachea*, communicating at its upper end with the mouth and bifurcating below into two *bronchi*, one on the right hand and one on the left. Each bronchus divides and subdivides, diminishing in calibre at every division until a diameter of about 1 mm. is attained; such a diminutive bronchial tube is called a *bronchiole.* Every bronchiole is a cylindrical tube which divides dichotomously and rapidly several times, and finally terminates in irregular *alveolar passages.* The sides of the alveolar passages, and of the subdividing bronchioles in less abundance, are studded with hemispherical dilatations called air cells or *alveoli.* The terminal portion of an alveolar passage, with its air cells, is sometimes spoken of as an *infundibulum*—a term we may wisely forget at once, since it points to a distinction where no essential difference exists. The alveoli cluster in great abundance about the alveolar passages, and, although we have spoken of them as hemispherical, they are in reality made polygonal by mutual compression. They are surrounded by connective tissue of a very elastic quality, which gives to their delicate walls a firm support, and is so disposed about them that all the alveoli derived from one bronchiole are more closely knit together than they are bound to those of a neighbouring bronchiole; hence we may speak of a bronchiole with the assemblage of its members as a *lobule*, a term of peculiar importance since it will be evident on reflection that each lobule contains all the essential parts of a lung—is in fact a lung in miniature. By connecting tissue the lobules are compacted to form lobes, of which two on the left side and three on the right go to make up the respective lungs.

The trachea and larger bronchi are composed of a series of superposed crescentic pieces or imperfect rings of hyaline cartilage which with a tough fibrous and elastic membrane form a tube: in the trachea the incomplete cartilage-rings are so placed that their hiatuses are at the back. In the bronchial tubes, especially the smaller ones, the cartilages are fewer, and less regular in shape, being in fact mere nodules in the bronchial walls. In the bronchioles there is no cartilage. There is an external fibrous and elastic layer investing the trachea and bronchi; and stretching from tip to tip of the imperfect cartilaginous rings are bands of involuntary muscular fibres. The function of the cartilages is doubtless to maintain the patency of the primary air passages by resisting external compression; that of the muscular fibres is probably to resist unusual distension of the tubes, as in the strain of coughing, &c. The *mucous membrane* of the trachea consists of a *mucosa* of fine connective tissue, mixed with some tissue of the adenoid sort, and with elastic fibres, disposed in longitudinal bundles. Beneath the mucosa is the slight *submucosa*, which supports large blood-vessels, lymphatics, and mucous glands, and unites the mucosa to the cartilages. Above the mucosa lies the *basement membrane*, supporting a *stratified epithelium*, the upper cells of which are columnar and ciliated and may include amongst them the well-known *goblet-cells*, while the deeper layers are squamous and capable of regenerating the upper stratum if this be lost. The epithelium is pierced by the ducts of glands. Blood-capillaries, lymphatics, and fine nerves have all been shown to exist in the tracheal mucosa.

The same structural elements as are found in the trachea continue to be found in all the series of bronchial tubes above 1 mm. in diameter; they are arranged in much the same order, save that the muscular fibres are relatively increased and that they surround the whole tube (within the zone occupied by the cartilaginous nodules) somewhat like the tunica media of an artery. The mucous membrane is still ciliated, but its surface-cells are squat. On the other hand the bronchioles and alveolar passages have a different structure: cartilage and glands are no longer found; the epithelium is flat and ciliated; and the muscular fibres gradually thin out on the walls of the alveolar passages.

It is, however, the air-cells which have most interest for the physiologist. They are about $\frac{1}{100}$th inch in diameter, and their walls are made up of a delicate film-like basement membrane, on the outside of which are numerous elastic fibres. Elastic connective tissue intervenes between neighbouring alveoli, and mingled with it are not a few involuntary muscular fibres. The alveoli are lined with flat cells in a single layer, some cells being large, clear, and polygonal, while others are small and granular, and are found singly or in groups of two or three inserted between the edges of the clear sort. The cells are united together by cement in which fine holes are sometimes to be seen; through these holes, or *pseudostomata*, migratory leucocytes can make their way into and out of the alveoli.

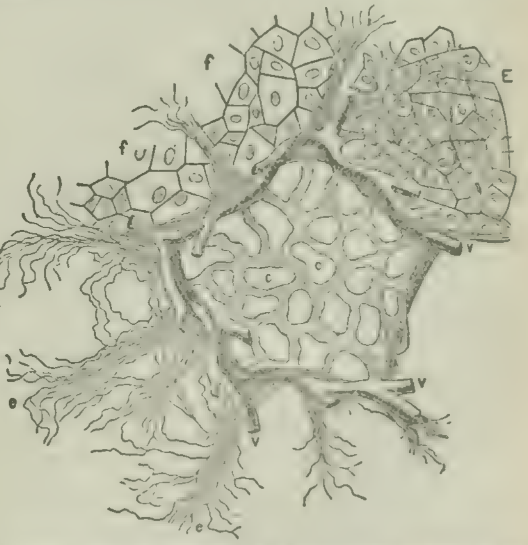

FIG. 1.—Histology of the lung-vesicles. V, V, blood-vessels bordering on the alveoli; c, c, blood capillaries of an alveolus; f, f, alveolar epithelium shown separately; E,E, relative position of alveolar epithelium and blood-capillaries; e, e, elastic texture of lung-substance. (From Hermann's *Handbuch der Physiologie*.)

The blood-vessels of the lung are of two sorts, nutritive and functional, *i.e.*, concerned in the function of the organs. The former are called *bronchial*, and arise from the aorta or intercostal arteries. They serve to nourish the tissues of the lung, and the blood they contain finds its way, in part into the bronchial veins and thence into the vena azygos, intercostal vein, or superior vena cava, and in part into veins of the functional system. The latter system of vessels consists of the *pulmonary arteries*, which arise in the right ventricle and run through the lung substance *pari passu* with the bronchial tubes to the lobules. Here they branch into a dense network of capillaries which spread over the outside of the alveoli, enmeshing them so tightly as to indent their walls. From the capillaries the blood flows into pulmonary venules which run together to form the large *pulmonary veins*, which open into the left auricle. The pulmonary venules may anastomose freely, but the arteries never do so. The veins possess no valves.

The lymphatic vessels of the lung abound in all parts, but are usually described as having a threefold distribution,—(*a*) in the layer of tissue beneath the membrane investing the whole lung, (*b*) in the perivascular tissue, and (*c*) in the peribronchial tissue. When fine carbon particles are introduced into the alveoli of the lung they find their way with the greatest ease into the inter-alveolar tissues, and finally come to lie in the three positions just referred to, as may be demonstrated in the lung of any coal miner. The lymphatics of the membrane investing the lung communicate with the free surface of that membrane by means of openings not unlike the stomata of leaves.

The lungs, with the heart and great vessels, are the chief organs contained in the thorax, or that division of the great body cavity which lies above the diaphragm. Each lung is invested with a membrane called *pleura*, which plays a most important part in the mechanism of respiration.

The Pleural Membrane.—Let us imagine a bag shaped like an hour glass, and let us suppose one half of this bag to be packed up small and pushed through the constricted portion of the hour glass into the interior of the other half. We should then have a bag shaped like one half of an hour glass but provided with double walls—a more or less globular double-walled bag with a narrow opening into it. If further we imagine the interior of this double-walled bag (*not* the interior of the hour glass) to be entirely filled with one lung, we shall have an exact conception of the relationship of the lung to the pleura. The lung so covered is placed in its proper half of the thorax, which in circumstances of health it accurately fills. The outer layer of the double-walled bag is closely glued to the inner wall of the thorax. The inner layer is as firmly adherent to the surface of the lung. The space between the double walls, *i.e.*, the interior of the original hour glass, is called the *pleural cavity*; it is vacuous in health, being moistened by a mere trace of fluid. The substance of the pleural membrane is mainly connective tissue; and the interior of the pleural cavity is lined with a single layer of flat epithelial cells exhibiting the *stomata* already referred to.

The Thorax.—The chest or thorax is formed by the dorsal section of the *spinal column* behind, with the *ribs* that spring from it on each side, and the *sternum*, which lies between the ends of the ribs, in front. The dorsal spine is bowed, so that its concavity looks forward. The ribs, speaking generally, are bowed with their concavity turned towards the interior of the chest; and if we consider the plane of each rib, *i.e.*, that plane in which the arched rib would (approximately) lie flat, we shall find that it declines from the horizontal in a twofold manner—first the rib-plane slopes from behind downwards and forwards, and secondly it slopes on each side from the mesial plane of the body downwards and outwards. The ribs 1–7 are connected with the sternum by means of pieces of cartilage which really form the anterior portion of each rib arch; these ribs are called "true"; the eighth, ninth, and tenth ribs are united by cartilage, not to the sternum, but to the cartilages of the seventh, eighth, and ninth ribs respectively; these ribs are called "false"; the eleventh and twelfth ribs are called "floating" because they are unattached anteriorly. Each rib has a *head*, by which it is joined to the vertebral bodies constituting the spinal column; a *tubercle* or shoulder at a little distance away from the head, by which in all cases, except those of the tenth and eleventh ribs, it is joined to the transverse process of a vertebra; an *angle* or rough line a little beyond the tubercle, where the rib, rather suddenly, begins to sweep forwards; and a *neck*, the part intervening between the head and tubercle. The space between the ribs is filled up by two layers of muscles called *intercostal*—an outer or superficial layer, whose fibres run from above downwards and forwards, and a deeper or internal layer, whose fibres cross those of the former. The outer layer is not found between the costal cartilages in front, nor the inner layer between the costal necks behind. The upper opening of the thorax is filled by the windpipe blood-vessels and other structures passing into or out of the thorax. The floor of the thorax is formed by

The Diaphragm.—This consists of a thin arched muscular partition, whose fibres spring from the edge of the lower opening of the thorax and converge towards a sheet of tendon in the centre, which is shaped somewhat like a trefoil leaf. We may group the muscular fibres of the diaphragm according to the quadrant from which they spring:—(1) a vertebral portion, whose fibres stretch down to be attached in two well-marked columns or pillars to the bodies of some of the lumbar vertebræ and by tendinous arches to the transverse processes of the first lumbar vertebra and the twelfth rib; (2) a sternal portion, which springs from the back of the tip of the sternum, and from the sheath of the rectus abdominis muscles below it; (3) and (4) two lateral or costal portions, which spring from the lower edge of the thorax all round from the tip of the twelfth rib to the junction between the sixth and seventh costal cartilage where the sternal portion begins. The whole diaphragm forms a dome or cupola projecting so far into the thorax that the lateral vertical portions of the dome lie in close apposition to the walls of the thorax, as is shown in fig. 2. The top of the dome is somewhat flat and the right moiety of the top is on a higher level than the left, the highest point corresponding with the level of the junction of the right fifth rib with the sternum.

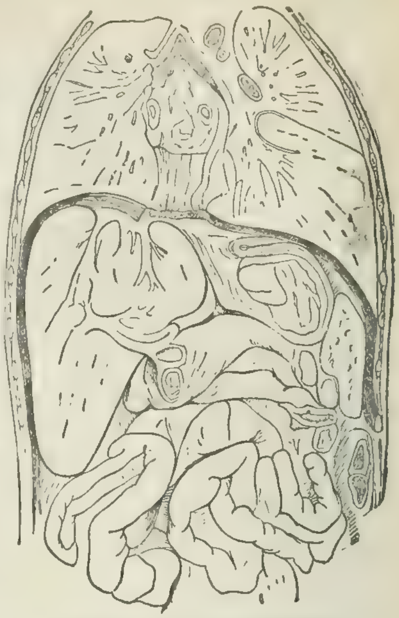
FIG. 2.—Section through tip of 12th rib. (From Hermann.)

Other Muscles of Respiration.—The ribs are movable in the sense that each rib plane, which has been described as declining in two ways from the horizontal plane, may be made to approach the horizontal, and may afterwards return to its original position. To accomplish these movements various muscles are provided, the exact position of which need not be very fully described. Suffice it to say that in general they arise from the vertebral axis, or from some extra-thoracic fixed point, and take hold of the movable parts of the thorax in such a manner that they can pull them up or pull them down. Such muscles are the following (enumerated without reference to their function as inspiratory or expiratory muscles; particular descriptions of them must be sought in the article ANATOMY):—levatores costarum; the three scalene muscles; the sterno-cleidomastoid; serratus posticus superior; parts of the great erector spinæ muscle; possibly serratus magnus; pectoralis minor and major in certain positions of the arm; obliquus externus; obliquus internus; transversalis abdominis; triangularis sterni; serratus posticus inferior; quadratus lumborum. In addition to these muscles many others may lend occasional aid in respiration by fixing points, such as the scapula, otherwise too freely movable to act as a *point d'appui*; such are trapezius, latissimus dorsi, rhomboidei, and levator anguli scapuli.

Dimensions of the Thorax.—The circumference of the chest just below the level of the arms is about 34¼ inches in men, and 32 inches in women. At the level of the tip of the sternum it is 32 and 30⅓ inches respectively. The measurement from clavicle to lower edge of thorax varies very much in different cases. The transverse diameter above the nipple is about 10 to 10½ inches in men, and about 9½ to 9¾ inches in women. The antero-posterior diameter, measured from the spines of the vertebræ behind to the surface of the chest in front is in the upper part of the chest about 6½ inches, and in the lower 7⅓ inches. The right half of the chest is generally somewhat larger than the left, because its muscles are usually better developed. Instruments for measuring the exact circumference of the chest at a given level are called *cyrtometers*; the best of these is a strip of lead which can be laid along the side of the chest from the spine round to the sternum, and which is pliable enough to follow the inequalities of the chest wall, yet resistent enough to keep the shape imparted to it.

For other figures illustrating the structure of thorax and lungs, see ANATOMY.

The Physiological Actions of the Respiratory Organs.

The organs above described perform during the whole of life certain movements. The commonest are the movements of ordinary quiet respiration, but we must include under the head of physiological actions, as distinguished from those provoked by disease, other movements, viz., forced respiration, such as accompanies strenuous muscular exertion, and those modifications of the respiratory act called coughing, hawking, sneezing, snoring, crying, sighing, laughing, yawning, and hiccoughing.

Normal Respiration.—If the naked body of a person asleep or in perfect inactivity be carefully watched, it will be found that the anterior and lateral walls of the chest move rhythmically up and down, while air passes into and out of the nostrils (and mouth also if this be open) in correspondence with the movement. If we look more closely we shall find that with every uprising of the chest walls the membranous intercostal portions sink slightly as if sucked in, while at the same time the flexible walls of the abdomen bulge as if protruded by some internal force. If respiration be in the slightest degree hurried these motions become so marked as to escape the attention of no one. The elevation of the chest walls is called *inspiration*, their depression *expiration.* Inspiration is slightly shorter than expiration, and usually there is a slight pause or momentary inaction of the chest between expiration and the following inspiration. Apparatuses for measuring the excursion of a given point of the chest wall during respiration are called *thoracometers* or *stethometers.* Apparatuses for recording the movements of the chest are called *stethographs* or *pneumographs.*

Frequency of Respiration.—The frequency of respiration during perfect rest of the body is 16 to 24 per minute, the pulse rate being usually four times the rate of respiration; but the respiratory rhythm varies in various conditions of life. The following are the means of many observations made by Quetelet: at the age of one year the number of respirations is 44 per minute; at 5 years, 26; from 15 to 20 years, 20; from 25 to 30, 16; from 30 to 50, 18·1. Muscular exertion always increases the frequency of respiration. The higher the temperature of the environment the more frequent is the respiration. Bert has shown that with higher atmospheric pressures than the normal the frequency of respiration is diminished while the depth of each inspiration is increased. The frequency of respiration diminishes until dinner time, reaches its maximum within an hour of feeding, and thereafter falls again; if dinner is omitted, no rise of frequency occurs. The respiratory act can be interrupted at any stage, reversed, quickened, slowed, and variously modified at will, so long as respiration is not stopped entirely for more than a short space of time; beyond this limit the will is incapable of suppressing respiration.

Depth of Respiration.—The depth of respiration is measured by the quantity of air inspired or expired in the act; but the deepest expiration possible does not suffice to expel all the air the lungs contain. The following measurements have been ascertained, and are here classified according to the convenient terminology proposed by Hutchinson. (1) *Residual air,* the volume of air remaining in the chest after the most complete expiratory effort, ranges from 100 to 130 cubic inches. (2) *Reserve* or *supplemental air,* the volume of air which can be expelled from the chest after an ordinary quiet expiration, measures about 100 cubic inches. (3) *Tidal air,* the volume of air taken in and given out, at each ordinary respiration may be stated at about 20 cubic inches. (4) *Complemental air,* the volume of air that can be forcibly inspired over and above what is taken in at a normal inspiration, ranges from about 100 to 130 cubic inches. By *vital capacity,* which once had an exaggerated importance attached to it, is meant the quantity of air which can be expelled from the lungs by the deepest possible expiration after the deepest possible inspiration; it obviously includes the complemental, tidal, and reserve airs, and measures about 230 cubic inches in the Englishman of average height, *i.e.,* 5 feet 8 inches (Hutchinson). It varies according to the height, body weight, age, sex, position of the body, and condition as to health of the subject of observation.

Vital capacity is estimated by means of a *spirometer,* a graduated gasometer into which air may be blown from the lungs.

The residual air, which for obvious reasons cannot be actually measured, may be estimated in the following way (Harless, Grehant). At the end of ordinary expiration, apply the mouth to a mouth-piece communicating with a vessel filled with pure hydrogen, and breathe into and out of this vessel half a dozen times—until, in fact, there is reason to suppose that the air in the lungs at the time of the experiment has become evenly mixed with hydrogen. Then ascertain by analysis the proportion of hydrogen to expired air in the vessel and estimate the amount of the air which the lungs contained by the following formula:—

$$v : V + v = p : 100;$$

$$V = \frac{v(100 - p)}{p};$$

where V = volume of air in the lungs at the time of experiment, v = volume of the vessel containing hydrogen, p = proportion of air to hydrogen in the vessel at the end of the experiment. V, then, is the volume of air in the lungs after an *ordinary* expiration; that is, it includes the residual and the reserve air; if we subtract from this the amount of reserve air ascertained by direct measurement, we obtain the 100–130 cubic inches which Hutchinson arrived at by a study of the dead body.

Volume of Respiration.—It is clear that the ventilation of the lungs in ordinary breathing does not merely depend on the quantity of air inspired at each breath, but also on the number of inspirations in a given time. If these two values be multiplied together we get what might be called the *volume* of respiration (*Athmungsgrösse,* Rosenthal) in contradistinction to depth of respiration and frequency of respiration. Various instruments have been devised to measure the volume of respiration, all more or less faulty for the reason that they compel respiration under somewhat abnormal conditions (Rosenthal, Gad, Panum, Hering). From the data obtained we may conclude that the respiratory volume per minute in man is about 366 cubic inches (6000 cubic centim.). In connexion with this subject it may be stated that, after a single ordinary inspiration of hydrogen gas, 6–10 respirations of ordinary air must occur before the expired air ceases to contain some trace of hydrogen.

Types of Respiration.—The visible characters of respiration in man vary considerably according to age and sex. In men, while there is a moderate degree of upheaval of the chest, there is a considerable although not preponderating degree of excursion of the abdominal walls. In women the chest movements are decidedly most marked, the excursion of the abdominal walls being comparatively small. Hence we may distinguish two types of respiration, the costal and the abdominal, according to the preponderance of movement of one or the other part of the body wall. In forced respiration the type is costal in both sexes, and so it is also in sleep. The cause of this difference between men and women has been variously ascribed (*a*) to constriction of the chest by corsets in women, (*b*) to a natural adaptation to the needs of childbearing in women, and (*c*) to the greater relative flexibility of the ribs in women permitting a wider displacement under the action of the inspiratory muscles.

Certain Concomitants of Normal Respiration.—If the ear be placed against the chest wall during ordinary respiration we can hear with every inspiration a sighing or rustling sound, called "vesicular," which is probably caused by the expansion of the air vesicles; and with every expiration a sound of a much softer sighing character. In children the inspiratory rustle is sharper and more pronounced than in adults. If a stethoscope be placed over the trachea, bronchi, or larynx, so that the sounds generated there may be separately communicated to the ear, there is heard a harsh to-and-fro sound during inspiration and expiration which has received the name of "bronchial."

In healthy breathing the mouth should be closed and the ingoing current should all pass through the nose. When this happens the nostrils become slightly expanded with each inspiration, probably by the action of the M.

dilatatores naris. In some people this movement is hardly perceptible unless breathing be heavy or laboured. As the air passes at the back of the throat behind the soft palate it causes the velum to wave very gently in the current; this is a purely passive movement. If we look at the glottis or opening into the larynx during respiration, as we may readily do with the help of a small mirror held at the back of the throat, we may notice that the glottis is wide open during inspiration and that it becomes narrower by the approximation of the vocal chords during expiration. This alteration is produced by the action of the laryngeal muscles. Like the movements of the nostril, those of the larynx are almost imperceptible in some people during ordinary breathing, but are very well marked in all during forced respiration.

The Mechanics of Respiration.

In the description of the anatomy of the thorax it has been shown that the thorax is practically a closed box entirely filled by the lungs, heart, and other structures contained within it. If we were to freeze a dead body until all its tissues were rigid, and then were to remove a portion of the chest wall, we should observe that every corner of the thorax is accurately filled by some portion or other of its contents. If we were to perform the same operation of removing a part of the chest wall in a body not first frozen we should find, on the other hand, that the contents of the thorax are not by any means in such circumstances bulky enough to fill up the space provided for them. If we were to measure the organs carefully we should find that those which are hollow and whose cavities communicate with the regions outside the thorax are all larger in the frozen corpse than in that which was not frozen. In other words, the organs in the thorax are distended somewhat in order that they may completely fill the chest cavity; and the nature of this curious and important condition may best be illustrated by the simple diagrams, figs. 3 and 4 (from Hermann's *Physiologie des Menschen*),—where *t* is the trachea, *l* the lung, *v* the auricle of the heart, *k* the ventricle, *i* an intercostal space with its flexible membranous covering. When the interior of the vessel is rendered vacuous by exhaustion through the tube *o*, the walls of the lungs and heart are expanded until the limits of the containing vessel are accurately filled, while all flexible portions of the walls of the vessel (corresponding to the intercostal membranes and the diaphragm of the thorax) are sucked inwards.

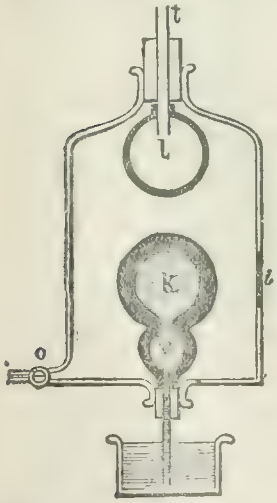

Fig. 3

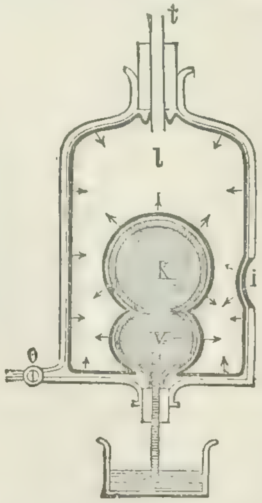

Fig. 4.

From this description it follows that the lungs, even when the thorax is most contracted, are constantly over-distended, and that, when the cause of this over-distension is removed, the lungs, being elastic, collapse. It further follows that if the thorax is dilated, the flexible hollow organs it contains must perforce be still more distended,—a distension which in the case of the lungs is followed by an indrawing of air through the trachea in all cases where the trachea is open. Thus, as the act of respiration is primarily a dilatation of the thorax, the part played by the lungs is, as Galen knew, a purely passive one.

How is dilatation of the thorax effected? It has been pointed out that the rib-planes decline from the horizontal in two directions, viz., from behind forwards, and from the antero-posterior mesial plane outwards; a glance at fig. 5 will make this double sloping clear to the reader. It has, moreover, been explained that the diaphragm arches upwards into the thorax in such a manner that the lateral parts of the arch are vertical and in contact with the inner face of the thoracic walls (see fig. 2). This being the structure of the thorax, the enlargement of its cavity is brought about (1) by raising the rib-planes until they approach the horizontal, and (2) by depressing the diaphragm and making its rounded dome more cone-like in outline. A moment's consideration will show how these actions enlarge the boundaries of the thorax. (*a*) When the postero-anterior slope of the rib-planes is diminished by the raising of the anterior ends of the ribs, the whole sternum is thrust upwards and forwards, and the antero-posterior diameter of the thorax is increased. (*b*) When the lateral slope of the rib-planes is diminished by the ribs being moved upwards about an axis passing through their sternal and vertebral extremities, it is evident that the lateral diameter of the thorax must be increased. (*c*) When the muscular portion of the diaphragm contracts, the curves of its dome-like shape are straightened, the whole diaphragm comes to look more conical on section, and the apposition of its lateral parts to the inner surface of the thorax is destroyed; the two apposed surfaces are drawn apart much as the leaves of a book might be, and a space is formed between them, into which some portion of the lung slips. (*d*) When the diaphragm descends it draws with it the whole contents of the thorax; inasmuch as the contents as a whole are conical in shape with the apex upward and are fitted into the conical space of the thoracic cavity, it is clear that the descent of the contents will tend to create a space between them and the thoracic walls; for each stratum of lung, &c., which is adapted to fit a certain level of thorax, will thereby be brought into a lower and (as the thorax is conical) a more spacious level. Hence the descent of the diaphragm causes a much greater enlargement of the thorax than is measured by the mere elongation of the vertical diameter. In this manner the thorax is distended and air is drawn into the lungs. The contraction of the thorax in expiration is brought about by the return of the ribs and diaphragm to their original position of rest.

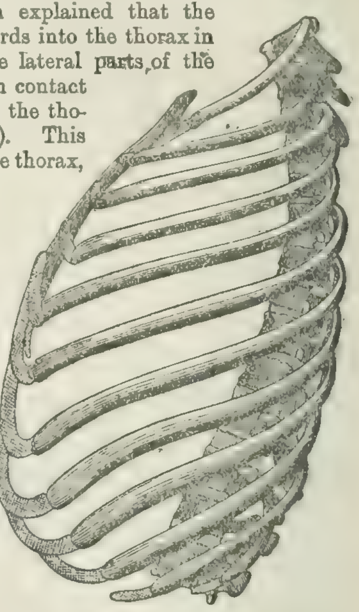

Fig. 5.—Showing slope of ribs. (From Hermann's *Handbuch*.)

We must now explain how the respiratory muscles effect these movements.

How the Inspiratory Movements are Produced.—The Rib Movements.—These are caused by the contraction of muscles which are fixed either to the central axis of the body (including under that term the head and vertebral column) or to some point rendered sufficiently stable for the purpose by the action of other adjuvant muscles. Thus the M. levatores costarum arise from the transverse processes of the 7th cervical and eleven upper dorsal vertebræ, and are attached to the ribs below in series; the M. scaleni spring from the cervical vertebræ, and are attached to the anterior parts of the first and second ribs; he M. sterno-cleido-mastoidei arise from the side and back of the skull, and are inserted into the upper part of the sternum and the clavicle; the M. pectoralis minor arises from the coracoid process of the scapula, and is inserted into the anterior ends of some of the ribs; the M. serratus posticus superior arises from certain of the cervical and dorsal vertebræ, and is inserted into the posterior part of certain of the ribs; the M. cervicalis ascendens (part of the M. erector spinæ) arises from certain of the cervical vertebræ, and is inserted into the posterior part of certain ribs. The M. serratus magnus and the M. pectoralis major, which are affixed on the one hand to the upper arm and to the scapula respectively and on the other to the ribs and to the sternum respectively, may in certain elevated positions of the arm and shoulder act as inspiratory muscles. When all these muscles contract, the ribs are raised in the twofold way already described, some pulling up the anterior ends of the ribs, and others causing the arched ribs to rotate about an axis passing through their vertebral and sternal joints.

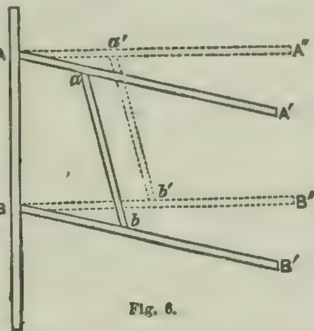

Fig. 6.

In addition to the muscles just enumerated the M. intercostales externi are undoubtedly inspiratory muscles. Every external intercostal muscular fibre between a pair of ribs must, when it contracts, of necessity raise *both* ribs, as is clearly shown by the accompanying diagram (fig. 6). Here $a'b'$ must be shorter than ab, for if $\mathrm{BA}a = x$, then

$$ab^2 = \mathrm{AB}^2 + (\mathrm{B}b - \mathrm{A}a)^2 + 2\mathrm{AB}\,(\mathrm{B}b - \mathrm{A}a)\cos x\,;$$

hence ab will be larger the smaller the angle x, for the cosine increases as the angle diminishes.

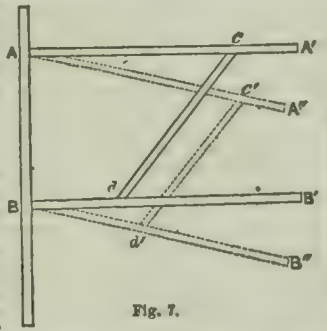

Fig. 7.

By a similar geometrical treatment of the question it may be shown that the internal intercostal muscles when they contract must of necessity depress both the ribs to which they are attached. If the angle $\mathrm{BA}c' = x$ (fig. 7), then

$$c'd'^2 = \mathrm{AB}^2 + (\mathrm{A}c' - \mathrm{B}d')^2 - 2\mathrm{AB}(\mathrm{A}c' - \mathrm{B}d')\cos x\,;$$

hence $c'd'$ will be larger the larger the angle x.

The case, however, is not so clear with reference to the anterior portions of the internal intercostals which lie between the cartilages; for it is evident that these fibres have the same direction with regard to the sternum as an axis as the external intercostals have with regard to the vertebral column as an axis; that is to say, the geometrical diagram in fig. 6 applies to the intercartilaginous internal intercostals as perfectly as it does to the interosseous parts of the external intercostals, the inference being that the intercartilaginous internal intercostals tend to elevate the pair of ribs between which they stretch. The geometrical argument is, however, overborne by physiological experiment: Martin and Hartwell have observed in the dog and the cat that the internal intercostals throughout their whole extent contract (not synchronously) but alternately with the diaphragm; hence we must conclude that their function throughout is not inspiratory like that of the diaphragm, but expiratory.

The Movements of the Diaphragm.—The muscular fibres of the diaphragm are arranged in a radial manner, or more strictly speaking in a manner like the lines of longitude on a terrestrial globe. The central tendon of the diaphragm corresponds to the pole of such a globe. The contraction of the fibres is expended on straightening the longitudinal curves rather than on pulling down the central tendon to a lower level; in fact the central tendon moves very little in ordinary respiration.

How the Expiratory Movements are Produced.—The action of inspiration disturbs many organs from the position of rest into which gravity and their own physical properties have thrown them. The ribs and sternum are raised from the position of lowest level; the elastic costal cartilages are twisted; the elastic lungs are put upon the stretch; the abdominal organs, themselves elastic, are compressed and thrust against the elastic walls of the belly, causing these to bulge outwards. In short the very act of inspiration stores up, as it were, in sundry ways the forces which make for expiration. As soon as the inspiratory muscles cease to act these forces come into play, and the position of rest or equilibrium is regained. It is very doubtful whether any special expiratory muscles are called into action during ordinary respiration. The internal intercostals may in man be exercised in ordinary expiration (although they are certainly not so exercised in the dog and the cat); but in laboured expiration many muscles assist in the expulsive effort. The muscles forming the belly walls contract and force the abdominal contents against the relaxed diaphragm in such a manner as to drive it farther and farther into the thorax. At the same time by their attachment to the lower edge of the thorax these same muscles pull down the ribs and sternum. The M. triangularis sterni, which arises from the back or thoracic aspect of the sternum and lower costal cartilages and is inserted into the costal cartilages higher up, can obviously depress the ribs. So also can the M. serratus posticus inferior, which arises from the thick fascia of the loins and is inserted into the last four ribs. So also can the M. quadratus lumborum, which springs from the pelvis and is attached to the last rib. Indeed there is hardly a muscle of the body but may be called into play during extremely laboured respiration, either because it acts on the chest, or because it serves to steady some part and give a better purchase for the action of direct respiratory muscles.

Certain Abnormal Forms of Respiration.

Coughing.—There is first a deep inspiration followed by closure of the glottis. Then follows a violent expiratory effort which bursts open the glottis and drives the air out of the lungs in a blast which carries away any light irritating matter it may meet with. The act is commonly involuntary, but may be imitated exactly by a voluntary effort.

Hawking, or Clearing the Throat.—In this act a current of air is driven from the lungs and forced through the narrow space between the root of the tongue and the depressed soft palate. This action can only be caused voluntarily.

Sneezing.—There is first an inspiration which is often unusually rapid; then follows a sudden expiration and the blast is directed through the nose. The glottis remains open all the time. The act is generally involuntary, but may be more or less successfully imitated by a voluntary effort.

Snoring is caused by unusually steady and prolonged inspirations and expirations through the open mouth,—the soft palate and uvula being set vibrating by the currents of air.

Crying consists of short deep inspirations and prolonged expirations with the glottis partially closed. Long-continued crying leads to sobbing, in which sudden spasmodic contractions of the diaphragm cause sudden inspirations and inspiratory sounds generated in larynx and pharynx.

Sighing is a sudden and prolonged inspiration following an unusually long pause after the last expiration.

Laughing is caused by a series of short expiratory blasts which provoke a clear sound from the vocal chords kept tense for the purpose, and at the same time other inarticulate but very characteristic sounds from the vibrating structures of the larynx and pharynx. The face has a characteristic expression. This act is essentially involuntary, and often is beyond control; it can only be imitated very imperfectly.

Yawning is a long deep inspiration followed by a shorter expiration, the mouth, fauces, and glottis being kept open in a characteristic fashion. It is involuntary, but may be imitated.

Hiccough is really an inspiration suddenly checked by closure of the glottis: the inspiration is due to a spasmodic contraction of the diaphragm. The closure of the glottis generally leads to a characteristic sound.

Innervation of the Respiratory Movements.

The respiratory actions are seen from the above description to be very complicated: their regular performance depends upon the coordination of a great number of factors; and, inasmuch as the respiratory movements do not happen invariably after one stereotyped pattern, but admit of various modifications, such as sighing, hiccoughing, &c., we must infer that the coordination is such as to admit of corresponding variations. The coordination of the inspiratory and expiratory movements is brought about through the nervous system, the connexion of which with the organs of respiration already described must now be stated.

Speaking very generally, there is a nervous centre in the cerebro-spinal axis from which certain nerve fibres proceed to the muscles of respiration; these are called the efferent or centrifugal fibres. There are other fibres which run from the peripheral parts of the body towards the same centre and exert a control over it; these are called afferent or centripetal. The impulses to movement start from the centre and travel down the efferent fibres to the muscles, while impressions arising in the periphery of the body are carried along the afferent fibres to the centre and modify its action.

The Respiratory Centre.—There is a portion of the medulla oblongata destruction of which causes immediate and permanent cessation of all respiratory movements. This spot has been found to lie in the grey substance near the tip or nib of the calamus scriptorius; it extends on both sides of the middle line, and has received the name of "le nœud vital" (Flourens). If the spinal cord be severed immediately below the spot, all respiratory movements in the parts of the body below the level of section cease at once, while movements of respiration in parts situated above the level (*e.g.*, in the face) continue momentarily. If the severance be made above the vital knot, the facial movements of respiration cease, while those of the trunk continue. The nervous centre is bilateral, each half serving its proper side of the body; if the medulla oblongata be split longitudinally in the middle line, through the nœud vital, respiration goes on unchecked; but if one lateral half of the vital area be destroyed, respiration at once ceases on the same side of the body.

While the above hypothesis of a respiratory centre in the medulla presiding over the movements of respiration is in all probability substantially correct, it must be stated that, in certain circumstances of experiment (*e.g.*, when the animal is young and has been poisoned with strychnia, or is kept in a warm chamber), respiratory movements do occur even when the medulla oblongata with the nœud vital has been removed. That is to say, there are centres in the cord of a lower order than the medullary respiratory centre which are under ordinary circumstances dependent on the main centre but which may act independently.

The respiratory centre must be regarded as the seat of origin of the impulses which cause the muscular movements of inspiration and expiration. During the whole of intra-uterine life the centre is inactive, but almost immediately after the child is born, or the placental circulation is interrupted by compression of the umbilical blood-vessels, the centre becomes quickened, and fails not to yield the appropriate stimulus at short intervals during the whole after-period of life. It is impossible to resist the conclusion that the immediate cause of the activity of the respiratory centre is the impure and impoverished state of the blood, which it is the function of respiration to remedy. So long as the placenta performs the function of purifying the blood of the fœtus and supplying it with oxygen the respiratory centre is quiescent; the moment the placenta becomes incapable of purifying the fœtal blood, as, for example, when the mother is suffocated or asphyxiated, the respiratory centre prepares to act and respiratory movements follow.

If it is true that the presence of impure or venous blood in the respiratory centre is the cause of the first respiratory act of an animal, it is also true that the presence of highly arterialized blood is sufficient to render the centre absolutely inactive again. If air or oxygen gas be driven through the lungs of an animal and allowed to escape through holes made in the chest walls, the blood becomes so rapidly and perfectly purified that the whole vascular system is filled with the pure blood which is commonly found in the arteries only. In this case the movements of respiration cease until such time as the blood has again lost its purity, when respiration begins, as one might say, *da capo*. There is no doubt that the essential cause of the inactivity of the respiratory centre in this experiment is the presence in excess of oxygen gas, and that the absence of a certain proportion of oxygen in the blood circulating in the body endows the blood with a power of stimulating directly or indirectly the respiratory centre. To this subject we shall return.

The Efferent Fibres.—The fibres proceeding from the respiratory centre run down the spinal chord and emerge for the most part in the cervical and dorsal region. Some fibres are collected into a nerve trunk which takes its rise in the third, fourth, and fifth cervical nerves; this is the *phrenic nerve*, which supplies that half of the diaphragm lying on the corresponding side of the body. Section of one phrenic nerve causes paralysis of the corresponding half of the diaphragm. Other fibres run in the *intercostal nerves* for the supply of the intercostal muscles, levatores costarum, &c.; others again run in the *cervical nerves* for the supply of the sterno-mastoid, scaleni, &c. Section of these nerves leads to paralysis of the muscles supplied by them. The facial muscles of respiration are supplied by efferent fibres from the seventh cranial nerve, and the laryngeal muscles by the laryngeal branches of the vagus.

In addition to the nerves which supply the respiratory muscles, there are efferent fibres which run in the course of the vagus to the muscles supplying the larynx and the bronchial tubes. The vagi (also called the pneumogastric nerves) are two important trunks which arise from the medulla oblongata, and, after receiving communications for neighbouring nerves, run down by the side of the windpipe to reach the thorax and abdomen. By means of appropriate apparatus, of which several varieties have been devised, contraction of the small bronchial tubes may be readily made sensible and even graphically recorded. A study of the experimental results obtained after electrical stimulation of the pneumogastric nerves leaves no doubt that these nerves contain motor fibres for the bronchial tubes. The exact distribution of the superior and inferior laryngeal branches of the vagus to the muscles of the larynx is described under ANATOMY.

The Afferent Fibres.—Many nerve fibres have been ascertained by physiological experiment to have communication with the respiratory centre. For example, the nerves of the skin of the chest, when stimulated by the application of cold water, cause a gasping inspiration; the nerves of the skin of the sides of the body and of the soles of the feet, when stimulated by tickling, cause that peculiar series of spasms of the diaphragm which constitute laughing; and so on. But the vagus nerve is that which contains the afferent fibres of chief importance to the respiratory movements. The vagus fibres proceeding from larynx, trachea, lung, and stomach certainly, and possibly also those proceeding from other organs of the abdomen, are all capable of influencing the activity of the main respiratory centre. If the trunk of the vagus nerve on each side of the neck be laid bare and divided in an animal such as a rabbit, the respiratory movements become much less frequent but at the same time deeper. If the end of the nerve above the point of section be carefully stimulated by a weak electric current, respiration again becomes quicker and proportionately shallow until in fact the natural type is restored. If the strength of stimulus be still further increased, the rapidity and the shallowness of breathing become still more remarkable, until a degree of stimulation is reached when there is no longer any rhythmical character in respiration, which is reduced to a feeble inspiratory spasm. These facts are conveniently grouped and explained by the following hypothetical statement. The vagus nerve contains fibres running up to the respiratory centre which have the function of modifying the native tendencies of the centre in such a manner as to accelerate its explosions of activity and at the same time render them less formidable. These fibres are constantly in action during healthy life; hence, on dividing the vagus trunk including these fibres, the respiratory centre reverts to its natural type of slow and deep action. On stimulating these fibres artificially they may be brought to spur on the centre once more, or even carry the accelerating process to the point of producing continuous inspiration.

Experiment has, however, shown that the influence of the vagus nerve is not so simple as is here supposed. There are other fibres in the vagus which seem to arise in the larynx and run in the trunk of the two laryngeal (but chiefly in the superior laryngeal) branches of the nerve; these have powers exactly opposed to those ascribed to the main-trunk fibres. If the superior laryngeal nerve be divided and the higher end at the point of division be stimulated, respiration becomes less frequent and more powerful. These fibres of opposite tendencies run side by side in the vagus trunk, and must be alike excited when an electrical stimulus is thrown into the nerve. The fact that the total result of stimulation is in favour of the first-described accelerating nerves may be hypothetically explained by supposing the accelerating fibres to be more numerous, or more potent with the given stimulus, than the slowing fibres.

Nature of the Activity of the Respiratory Centre.—Various interesting questions arise as to the exact mode of action of the respiratory centre. Is there an expiratory centre apart from the inspiratory? In ordinary quiet breathing expiration is not a muscular act in the sense that inspiration is; but in laboured breathing many muscles are coordinated to help in the act; we may therefore assume that there is an expiratory coordinating mechanism as well as an inspiratory. Another inquiry touches the question of the stimulation of the respiratory centre. We have arrived at the conclusion that a certain impoverished or impure state of the blood is the cause of the activity of the respiratory centres. Is it by a direct action of the blood on the nerve centre, or is it by an action of the blood upon the end-organs of nerves in the peripheral parts of the body which indirectly induce the respiratory centre to act? In other words, would the respiratory centre act under the stimulus of a certain degree of impurity of its blood if it were cut off absolutely from its afferent fibres? This is not a question which admits of an absolutely decisive experimental answer; but this may be said in reference to it, that, if the cerebrum be extirpated, the pneumogastric nerves divided, and the spinal chord severed at a point below that from which the main respiratory efferent nerves emerge, notwithstanding that the respiratory centre is thus separated from by far the greater number of the sensory nerves of the body, respiration still goes on. Further, if the spinal axis is divided at a level immediately above that of the respiratory centre, respiration goes on in the lower parts of the body but ceases in the upper—that is, the facial movements cease; while, if the division be carried through a point immediately below the level of the respiratory centre, although chest movement ceases and respiration may in strictness be said to be permanently stopped, yet the facial movements, which are just as essential to the complete idea of respiration, and which are innervated from the common respiratory centre, continue to be performed so long as any life remains in the mutilated animal. There is therefore a very strong presumption that the respiratory centre is automatic, that is, that it has within itself the spring of its own activity, and that the impurity of the blood which sets the respiratory mechanism agoing does so by acting upon the respiratory nervous centre directly. However started, the inspiratory stimulus is discharged rhythmically down the efferent respiratory nerve during healthy life. The rhythm is capable of wide variation, both by the exercise of the will and by the operation of external conditions, such as heat and muscular exercise of the body, which accelerate respiration independently of the will. The question why the discharge is rhythmical is one of the deeper problems of physiology, and touches the essential nature of nervous actions in general. It is customary in physiological treatises to illustrate it by supposing a mechanism which offers a resistance to the discharges of its own energy; when the energy reaches a certain degree of tension resistance is overcome and the discharge takes place, but a certain time must elapse before energy can again accumulate to the extent of overcoming resistance. It is further supposed that resistance is capable of being varied by external agencies; when it is increased the discharges occur at longer intervals, because more energy must be accumulated before resistance can be overborne, but at the same time they are more violent; when resistance is diminished, the discharges are more rapid but less powerful, until, when resistance becomes *nil*, the discharge is continuous. Such illustrations are, however, of very doubtful value; they impart a sense of clearness to our views of nervous action by turning attention from the problem we wish elucidated to another and altogether different problem. There is in fact no probability whatever, so far as facts yet go, that nervous rhythmical action is brought about in any such way.

CHEMISTRY OF RESPIRATION.

The mechanism which has just been described has for its object an interchange of substances between the body and the external medium. Certain substances pass out of the body at the lungs, and others are taken into the body. The discussion of this interchange pertains to what is called the Chemistry of Respiration.

Comparison of Inspired and Expired Air.—No inconsiderable knowledge of this exchange of matters may be obtained at once by a simple comparison of inspired and expired air. The air we breathe varies somewhat according to the various circumstances of season, time of day, height above sea level, prevailing wind, &c.; but all samples of pure atmospheric air have substantially the following composition:—

1. Gases:—

Oxygen	20·84 to 20·92	vols. p.c.
Nitrogen	79·00 to 79·05	„
Carbon dioxide	0·04	„

2. Aqueous vapour.—The absolute amount of this ingredient varies very much, and must be distinguished carefully from the relative or sensible moisture, which depends more upon the temperature of the air than upon the absolute quantity of watery vapour it contains.

Air which is expired from the lungs has approximately the following composition:—

1. Gases:—

Oxygen	16·03	vols. p.c.
Nitrogen	79·02	„
Carbon dioxide	3·3 to 5·5	„

Probably there is an exceedingly small excess of nitrogen in expired air as compared with inspired air.

2. Aqueous vapour.—The absolute amount is always such as to saturate the air at the temperature which it has on expiration, *i.e.*, 36°·3 C.

3. Organic matter of uncertain composition but hurtful when reinhaled.

On an average (subject, however, to considerable variations) it appears that the body takes up in respiration oxygen gas to the amount of 4·78 vols. per cent. of the air inhaled, and it gives off carbon dioxide to the average amount of 4·38 vols. per cent., besides traces of nitrogen, ammonia, hydrogen, and light carburetted hydrogen. Leaving out of calculation the minute traces of the latter bodies, it will be observed that the volume of oxygen taken into the body is larger than the volume of carbon dioxide given off; and, since, under like conditions of pressure and temperature, equal volumes of oxygen gas and carbon dioxide gas contain the same quantity of oxygen, it is clear that more oxygen enters the body at the lungs than escapes from it; therefore the whole of the oxygen taken into the body does not leave it as carbonic acid or expired air. The ratio of CO_2 expired to O absorbed is called the "respiratory quotient"—

$$\frac{CO_2}{O} = \frac{4{\cdot}38}{4{\cdot}782} = 0{\cdot}916.$$

Composition of Air in the Air Cells.—The whole of the air of the lungs is not expelled at each breath, some remaining in the depths as residual air lodged in the alveoli or air cells. Hence we cannot assume, from an examination of expired air, that we know the constitution of the air in the recesses of the lungs where it comes most intimately into contact with the blood. To attain such knowledge it is necessary to examine the deeper air directly, and the air is obtained for such purposes by means of a lung catheter.[1] In this way it has been ascertained that the alveolar air of a dog's lung contained about 3·8 per cent. of CO_2 at a time when the expired air contained about 2·8 per cent. As to the amount of O we may safely assume that the alveolar air never in ordinary circumstances contains less than 10 per cent. when the expired air contains 16 per cent.

Daily Quantity of Substances Exchanged.—During 24 hours an average person would take in about 10,000 grains of oxygen in respiration, and give out about 12,000 grains of carbon dioxide, corresponding to 3300 grains of carbon; at the same time about 9 oz. of water would be exhaled. These quantities vary, however, within wide limits according to the conditions of age, sex, atmospheric pressure, and the like. Thus, for example, in young persons the O absorbed is relatively greater than the CO_2 given off, and a child gives off twice as much CO_2 in relation to its body weight as an adult. Again, males after the first few years of life give off more CO_2 than females. When the external temperature is so low as to depress the body temperature, less CO_2 is given off; if it is so high as to raise the body temperature, the CO_2 is increased. If, however, the surrounding medium is cooler than the body but not cold enough to lower the body temperature, more O is taken in, and more CO_2 is given out; and *vice versa*. Muscular exercise also increases considerably the CO_2 given off; and more CO_2 is given off a short time after a meal than during fasting, especially when the meal includes substances rich in carbon. Speaking generally, alcohols, ethers, tea, &c., diminish the CO_2; but the results are not constant. Again, while the number and depth of the respirations do not influence the formation of CO_2 in the body, they affect the removal of that which is already formed. Increased rate of respiration and increased depth of respiration both cause an absolute increase in the quantity of CO_2 expired, although with reference to the total amount of air which passes into and out of the lungs during such laboured breathing the CO_2 is relatively diminished. Lastly, when the atmospheric pressure is diminished, as in ballooning, respiration becomes difficult, CO_2 is imperfectly removed from the body, and the blood contains less O. When pressure is increased, respiration is easy and slow (2–4 per minute), the capacity of the lungs increases, the activities of the tissues are marked, and as a result of this more O is absorbed and more CO_2 is excreted.

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[1] This is a flexible tube so thin as to pass readily into a small bronchial tube. It is provided with an india-rubber collar, which is capable of inflation. The apparatus is passed (with the collar collapsed) through a hole in the trachea and guided into one of the finer bronchial tubes; the collar is then inflated, and serves to fix the catheter hermetically in the bronchial tube and to place that tube with its tributary tubes and alveoli in direct communication with the outer air through the fine catheter. Breathing is unimpeded; and air may be collected from the recesses of the lung for analysis.

The Blood in Respiration.

Having ascertained the nature and quantity of the materials exchanged in the lungs, we may now ask concerning the method of the exchange. There is no difficulty in understanding how the cold air introduced into the lungs is warmed and saturated with moisture by contact with the moist walls of the air passages and bronchi. As to the gaseous substances which appear in traces in the expired air nothing definite is known; they may in part arise in the decomposition of the solid organic impurities of expired air, and may in part escape from the blood itself. The origin of the solid poisonous organic substances, which are of such vital interest from a sanitary point of view, is also a matter of great obscurity. Some portions of it doubtless consist of effete particles of tissue from the walls of the bronchial tubes and cavity of the mouth and nose; for example, epithelial scales may be discovered in the condensed moisture of the air expired into an ice-cold globe, and so also may the organized bacilli of tubercle when the subject of experiment happens to be phthisical. Other portions may spring directly from the blood. The chief inquiry, however, centres about the origin of the carbon dioxide and the absorption of the oxygen, for the understanding of which a knowledge of the blood is necessary.

The Blood.—This, as it circulates in the vessels of man and vertebrates generally, is a viscous and to the naked eye homogeneous liquid of red colour,—the blood of the pulmonary veins, of the left side of the heart, and of the systemic arteries being normally of a bright scarlet hue, and the blood of the right side of the heart, of the systemic veins, and of the pulmonary artery being of a brownish-red colour. In other words the blood enters the capillaries of the lungs of a brownish-red colour, and leaves them bright scarlet in hue; it enters the general capillaries of the body as a bright scarlet fluid and leaves them as a brownish-red fluid. Although homogeneous to the naked eye, the blood is found on microscopic examination to consist of a colourless fluid, called *liquor sanguinis* or *plasma*, holding in suspension large numbers of solid bodies, the *corpuscles* of the blood; the more numerous of these are *red*, the others are colourless and are commonly spoken of as *white*. The specific gravity of blood probably varies between 1045 and 1075. Fresh blood is feebly alkaline in reaction.

When blood is shed it remains for a minute or two as fluid as it is in the blood-vessels; but in 2–6 minutes it begins to pass into the state of a soft red jelly, which gradually acquires greater consistence, and by the contraction of one of its constituents at length expresses a fluid; the contracted jelly is called the *clot*, or *crassamentum*; the expressed fluid is the *serum*; and the whole process is denominated *coagulation*. Contraction of the clot may go on for 10–48 hours. This process of coagulation is due to the separation from the plasma of a body called *fibrin*, which entangles in its meshes the corpuscles of the blood. When coagulation is delayed for several minutes (as it always is in horse's blood, and as it usually is in the blood of men suffering from inflammatory diseases), the blood corpuscles, being specifically heavier than the plasma, have time to subside a little way before coagulation commences. Hence the uppermost layers of such blood become nearly free from coloured corpuscles; and subsequently, when the blood coagulates, the clot exhibits the phenomenon of the *buffy coat*,—that is, the upper part of the clot is of a yellowish colour. If, instead of allowing blood to coagulate undisturbed, it be stirred or whipped with twigs, the fibrin does not entangle the corpuscles but separates as a stringy mass which adheres to the twigs; the corpuscles remain in the serum and constitute *defibrinated blood*. Coagulation is promoted (*a*) by exposure to a temperature slightly higher than that of the living body; (*b*) by contact with foreign matter; (*c*) by the addition of minute quantities of common salt or other neutral salts. It is delayed or suspended (*a*) by exposure to an ice-cold temperature; (*b*) by contact with the living blood-vessels; (*c*) by the addition of a sufficient quantity of sodium chloride, sodium sulphate, or some other neutral salts.

Reviewing all the facts which have been ascertained respecting coagulation, it would appear that the process is dependent upon the presence in the liquor sanguinis of a proteid body called fibrinogen, which under favourable circumstances undergoes conversion, or perhaps decomposition, into fibrin. This conversion, when it occurs outside the body, appears to be connected with the action of a ferment produced in the colourless corpuscles, and probably only set free when they break down

The red corpuscles of man and the *Mammalia* generally, except the *Camelidæ*, are biconcave disks, possessing neither skin nor nucleus or interior body. In birds, reptiles, and most fishes they are nucleated, elliptical, and biconvex. In the camel the red corpuscles are oval. The average diameter of the disk in man is $\frac{1}{3200}$ inch and the thickness about $\frac{1}{12400}$ inch.

The substance of which the red disks is composed is elastic; the disks may therefore be squeezed through fine chinks smaller than their own diameter and may afterwards regain their original shape. When in the blood-vessels the red corpuscles are hurried along indiscrimately in the blood current, but when the blood stands the red corpuscles cling together in rows like piles of coin, which are technically called *rouleaux*; this is a physical phenomenon entirely due to the shape of the corpuscles. The white or colourless corpuscles are globular masses of granular protoplasm, provided with one or more interior bodies called nuclei, but destitute of a skin. They have the power of independent movement, which the red cells have not, resembling in this respect the amœba. They can send out processes, change their outline, and move from place to place by laying hold on resistent objects by means of a projected process and dragging their bodies along. They have a diameter of $\frac{1}{2500}$ inch when at rest and globular. They are far less numerous than the red corpuscles; the proportion of white and red corpuscles in various conditions is shown in the following table:—

In the morning fasting state	1 : 716
Half an hour after breakfast	1 : 347
Three hours after breakfast	1 : 1514
In the splenic vein	1 : 60
In the splenic artery	1 : 2260
In the hepatic vein	1 : 170
In the portal vein	1 : 740

In addition to typical white and red corpuscles there are others, provisionally called *intermediate corpuscles, red granular corpuscles, or hæmatoblasts,* which are granular and nucleated. Probably these corpuscles are involved in a special manner in the development of the fibrin-ferment. It has been calculated that one cubic millimetre (*i.e.*, a cube whose side measures about $\frac{1}{25}$ inch) contains five million corpuscles of all kinds.

The chief constituents of the blood may now be discussed seriatim:—

Constituents of the Liquor Sanguinis.

Fibrin.—When fresh this is an elastic substance belonging to the group of proteid bodies; it is insoluble in pure water, but is soluble in solutions of common salt and in dilute hydrochloric acid at the temperature of the body. Human venous blood yields from 2·2 to 2·8 parts per thousand of fibrin. So far as we know, fibrin does not exist as such in the plasma before it is coagulated; but there does exist a body, fibrinogen, which is the precursor of fibrin. It may be separated from plasma by diluting the plasma freely with water at an ice-cold temperature, and passing for a long time a stream of CO_2 through it; or by adding common salt to plasma until the plasma contains 12 to 16 per cent. of salt the fibrinogen is precipitated in a flaky form. Besides fibrinogen, liquor sanguinis contains another proteid body intimately concerned in the formation of fibrin; this is *serum-globulin* or *para globulin.* It also may be precipitated from diluted plasma by a stream of CO_2; but it may be much more perfectly eliminated by adding magnesium sulphate until the plasma is saturated. It is a body the presence of which greatly facilitates or promotes the development of fibrin from fibrinogen, indeed some observers have supposed that fibrin arises in the union of the two bodies fibrinogen and para-globulin.

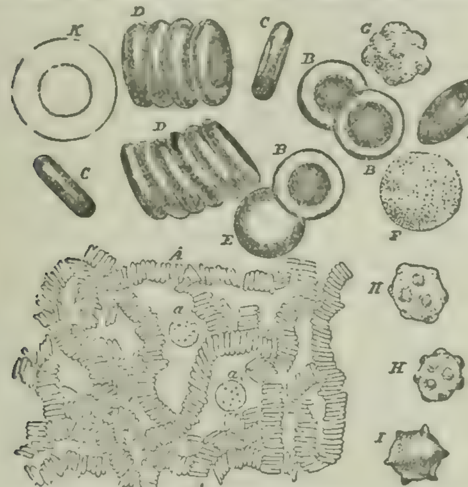

FIG. 8.—Blood corpuscles. *A*, Moderately magnified; red corpuscles in rouleaux; white corpuscles at *a*, *a*. *B*, *C*, *D*, Red corpuscles more highly magnified. *E*, Red corpuscle swollen to a sphere by imbibition of water. *F*, White corpuscle, magnified same as *B*; *G*, the same, throwing out blunt processes; *K*, the same, treated with acetic acid, and showing nucleus magnified same as *D*. *H*, *I*, Red corpuscles puckered or crenate—*H*, all over, *I*, at edge only. (From Huxley's *Elementary Physiology.*)

Serum-albumin.—This is a proteid body which coagulates on heating.

Certain extractive matters.—These include neutral fats, lecithin, and cholesterin; sugar; urea, uric acid, creatine, creatinine, &c.; and a yellow pigment.

Inorganic Salts.—These are the chlorides, phosphates, and sulphates of sodium, potassium, calcium, and magnesium; sodium and chlorides are the main constituents.

Gases.—Especially CO_2: but see below

Constituents of the Red Corpuscles.

Oxyhæmoglobin.—This interesting substance has the general chemical composition of an albuminous body with the addition of the element iron:—C, 54·00; H, 7·25; N, 16·25; Fe, 0·42; S, 0·63; O, 21·45 = 100·00.

It is the cause of the red colour of the corpuscles. It may be obtained in the form of beautiful crystals by a variety of methods, which all have the following steps in common:—(1) to effect the solution of the oxyhæmoglobin of the red corpuscles in the serum or in water, and (2) to effect the crystallization of it from solution either by adding alcohol, or by cold, or by both combined. The forms of the crystals differ in different animals; the chief forms are given in fig. 9. Oxyhæmoglobin has the property of giving up a portion of its oxygen on very slight provocation, *e.g.*, when treated with easily oxidizable substances, or when submitted to moderate heat in a vacuum. The resulting substance is called reduced hæmoglobin or, shortly, hæmoglobin; it is capable of reproducing the original oxyhæmoglobin on simple exposure to oxygen or to air. This property is of the highest importance in the function of respiration, as will be explained in the section on the gases of the blood.

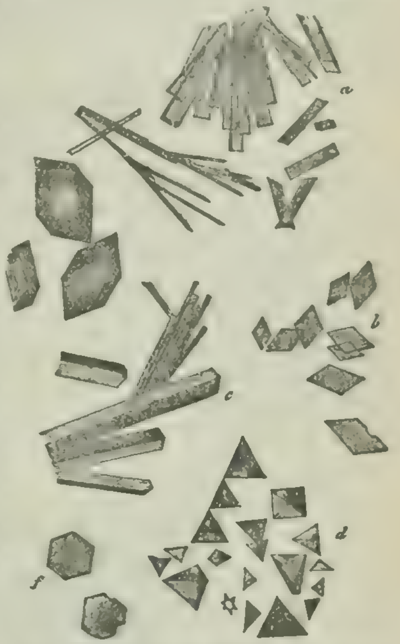

FIG. 9.—Crystals of oxyhæmoglobin; *a*, *b*, *c*, *e*, forms from blood of man and majority of mammals: *d*, tetrahedral crystals from blood of guinea-pig; *f*, hexagonal crystals from squirrel's blood.

Solutions of oxyhæmoglobin of moderate strength have the fine scarlet hue of arterial blood. When interposed between the sun and a spectroscope they cause the absorption of definite portions of the spectrum, and give a characteristic appearance to it. After the solution has been reduced (as it may be very readily by means of an alkaline solution of a ferrous salt, in which precipitation of ferrous hydrate is prevented by the presence of tartaric or citric acid), it assumes a brownish colour and the absorption spectrum becomes changed. The spectra of oxyhæmoglobin and of reduced hæmoglobin when the solutions are of moderate strength are given in fig. 10.

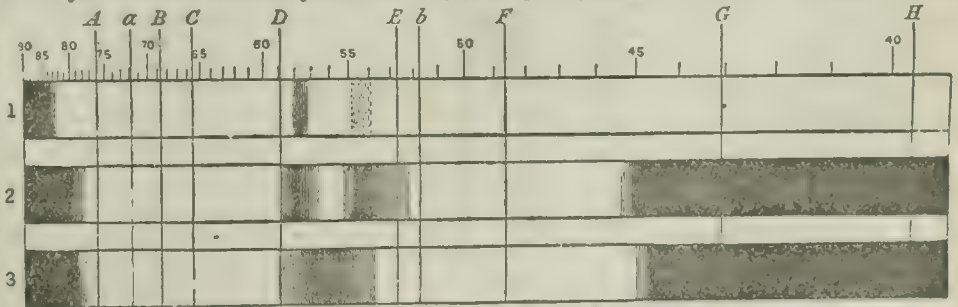

FIG. 10.—1, 2. Spectra of solutions,—1 containing less than 0·01 per cent. and 2 containing 0·37 per cent. of oxyhæmoglobin 3, spectrum of solution containing about 0·2 per cent. of hæmoglobin.

It has been determined that 1 gramme of hæmoglobin can link to itself 1·671 cc. of oxygen gas (at 0° C. and 760 mm. pressure) in the above-described loose manner,—that is, in such a manner that when admitted to a vacuous space at a moderate temperature the two become again dissociated.

When blood or a solution of oxyhæmoglobin is shaken up with carbon monoxide, the "dissociable" or "respiratory" oxygen is displaced, and a new compound of CO and hæmoglobin is formed which has a spectrum very like that of oxyhæmoglobin, but is incapable of reduction by the means which are sufficient to reduce oxyhæmoglobin. In like manner (with certain precautions) a compound of hæmoglobin with NO may be formed.

Various products of the destructive decomposition of hæmoglobin are known, possessing characteristic spectra and properties; these need not be further described.

Proteid Substances.—Besides oxyhæmoglobin, the red corpuscles contain other proteid substances, probably for the most part paraglobulin.

Lecithin.

Cholesterin.

Inorganic Salts.—Potassium and phosphates are the main constituent; sodium, calcium, and magnesium are also found as chlorides and sulphates.

Gases.—See below

Constituents of the White Corpuscles.

Proteid Substances.—Several varieties have been separated

Lecithin.

Certain *extractives*, including *glycogen.*

Inorganic Salts.—Especially potassium and phosphates.

The Gases of the Blood.

The blood when admitted into a vacuous space readily gives up more than half its volume of mixed gases, consisting of oxygen, carbon dioxide, and nitrogen. The oxygen is present in much larger quantities than could be held in simple solution by the water of the blood; it is in fact mainly held in feeble combination by the hæmoglobin of the coloured corpuscles; only a trace of it is, under ordinary circumstances, held in true solution. The carbon dioxide, whilst not existing in larger quantity in blood than would be possible if it were simply dissolved by the water of that fluid, is nevertheless to a small extent in a state of loose chemical combination in which both plasma and corpuscles share. The nitrogen is held in a state of simple solution in the liquor sanguinis. These gases are yielded in different proportions by arterial and venous blood, as is shown in the following table:—

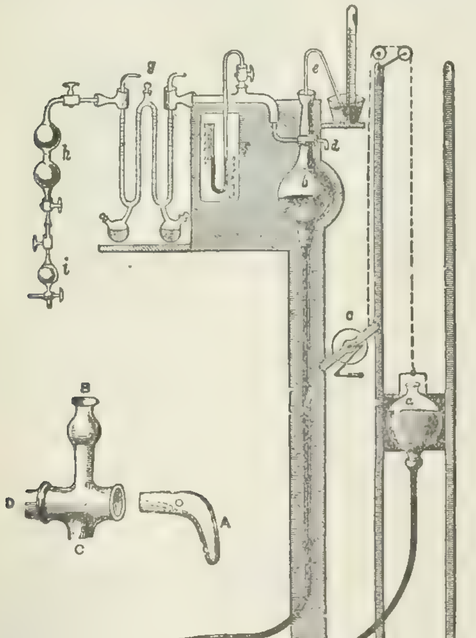

FIG. 11.—Pump for extracting gases of the blood. *a*, filling-globe; *b*, barometer bulb; *d*, three-way stopcock (B C D, the same enlarged, A, its plug); *e*, gas-delivery tube; *f*, mercurial gauge; *g*, drying apparatus, containing sulphuric acid; *h*, froth-chamber; *i*, bulb in which the blood is boiled.

From 100 vols. of Blood.

	O.	CO_2.	N.
Arterial..................	22 vols.	35 vols.	1–2 vols.
Venous....................	8–12 vols.	40–50 vols.	1–2 vols.

The method of extracting the gases of the blood which has been found to be most convenient is one in which the blood is introduced into the Torricellian vacuum existing above the column of mercury in a barometer. Blood is collected over mercury in such a way as to avoid all access of air; it is then introduced by an appropriate mechanism into the space above the barometric mercury. At once the gases froth up and fill the space; the aqueous vapour which at the same time arises is absorbed by a special drying apparatus communicating with the vacuum. Means exist of warming the vacuous space up to about 45° C., which is a temperature sufficient to cause the escape of nearly all the gases of the blood; the last portions of carbonic acid are, however, more rapidly evolved by allowing a small volume of a thoroughly boiled-out solution of phosphoric acid to enter the blood receptacle near the close of the operation.

How the Gaseous Exchanges are Effected in Respiration.

For the purposes of description, and in reference exclusively to its respiratory function, the blood may be looked upon as a watery solution of certain substances having respectively a slight chemical attraction for oxygen and for carbon dioxide. The chief of these substances is hæmoglobin, which is concerned solely with the oxygen; others, less perfectly known, are concerned with the carbon dioxide, and include certain saline constituents of the plasma ($NaHCO_3$)[1] and perhaps also certain constituents of the corpuscles. The affinity of these substances for oxygen and carbon dioxide respectively is of so slight a nature that the mere exposure of the substances to a vacuum at a certain moderate temperature is sufficient to overcome the affinity, and dissociate the captive gases. Granted such a solution in the blood-vessels of the lungs, separated from the air of the air cells by the thin moist membranes of the alveolar walls, how are the gaseous exchanges of respiration brought about? In the first place we must premise certain physical relationships which exist between gases and fluids in contact with one another. If a definite quantity of pure water be exposed to the air it will at a given temperature dissolve a definite volume of air. If the air be compressed to one-half (or one-quarter) of its original bulk the water will still absorb the same *volume* of it, albeit that volume now contains twice (or four times) the former *quantity* of gas. If the pressure be diminished again the air will escape from the water exactly in proportion to the diminished pressure. This is a concrete example of Dalton's law that the quantity of a gas dissolved by a liquid varies directly as the pressure of the gas at the surface of the liquid. What is true of the air is true of its constituents. In the above example the quantity of the constituent oxygen absorbed after the compression of the air is twice (or four times) the quantity absorbed before compression. But the quantity which is absorbed of any constituent of a gaseous mixture depends, not upon the total pressure exerted on the liquid by all the gases of the mixture in contact with its surface, but by the partial pressure, or fraction of the total pressure, exerted by the constituent in question. To take an example, let us suppose that a solution of oxygen in water made at a certain definite pressure is exposed to an atmosphere of pure nitrogen exerting as great a pressure, or even a greater, on the surface of the liquid; notwithstanding this pressure the oxygen would escape from solution as readily as if the solution had been placed in a perfectly vacuous space. If water be exposed in a certain space of air (which is, roughly, a mixture of nitrogen and oxygen), the oxygen which it is capable of absorbing would be equally well absorbed if all the nitrogen were removed from the space and the oxygen alone left to fill it. These remarks are equally true of a liquid separated from a gas by moist membranes. In short, the blood of the pulmonary vessels, regarded as a simple liquid capable of absorbing O and CO_2, and apart from the remarkable chemical bodies contained in it, obeys Dalton's law like any other liquid.

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[1] In a vacuum $2HNaCO_3$ splits up into $Na_2CO_3 + CO_2 + H_2O$.

The blood is, however, not a simple fluid, but contains substances having a peculiar affinity for certain of the gases of the atmosphere; especially does it contain hæmoglobin. It has been stated that the "dissociable" or "respiratory" oxygen of oxyhæmoglobin is all yielded to a vacuum at the temperature of the body. This yield differs from the yield of a gas simply dissolved in a liquid (which also is perfect in a vacuum) in not proceeding *pari passu* as the pressure approaches *nil* On the contrary in the case of solutions of hæmoglobin, as the oxygen pressure is diminished at the surface of the solution, no changes occur in the oxyhæmoglobin until the oxygen pressure reaches 25 mm. (about 1 inch) of mercury; then the oxyhæmoglobin yields up its respiratory oxygen. If the steps are retraced, and oxygen is gradually readmitted to exercise pressure upon the hæmoglobin solution, the latter takes up oxygen once more as soon as the oxygen pressure reaches or exceeds 25 mm. of mercury.

We may now consider the actual physical conditions of the blood in the lungs. Venous blood is hurried into the capillaries surrounding the air cells; much of its hæmoglobin has been "reduced" (or deprived of its dissociable oxygen), and further it is rich in carbon dioxide, which it has obtained from the active tissues in distant organs. In the alveolar walls it comes into relationship with the air of the alveoli; probably these are filled with air which never contains less than 10 per cent. of oxygen, and which (in the dog, be it remembered) contains 3·8 per cent. of CO_2 at a time when the expired air contains 2·8 per cent. Are these conditions such that, owing to the physical laws described, oxygen must pass into the blood, and carbon dioxide out of it? First, as regards the oxygen. An atmosphere containing 10 per cent. of oxygen implies a partial O-pressure of ,76 mm. of mercury (10 per cent. of 760 mm.); as this is far above the dissociation point (25 mm.) of oxyhæmoglobin, it is clear that any reduced hæmoglobin present would greedily absorb oxygen from such an atmosphere. When the air breathed is much rarefied, the case is different; the partial O-pressure in the alveoli may be so far reduced that the absorption of O by the blood becomes most difficult or impossible. As regards the carbon dioxide the matter is not so clear; but, inasmuch as air drawn from the depth of the lung by means of a catheter contains (in a dog) 3·8 per cent of CO_2, while at the same time the venous blood of the right side of the heart possesses a CO_2 tension of approximately the same percentage, we may assume that CO_2 escapes from the pulmonary capillaries into the alveoli until equilibrium ensues. It is, however, conceivable that the epithelium of the air cells may assist the elimination of CO_2 from the blood by a process of true excretion independently of the above merely physical considerations.

So-called Internal Respiration.

Venous blood yields up its carbon dioxide and takes up oxygen in the capillaries of the lungs; arterial blood passes to the general capillaries of the tissues and there yields up its oxygen and receives carbon dioxide. To this act, which in its issues is complementary to the interchanges of pulmonary respiration, the term internal respiration, or respiration of the tissues, has been applied. With as much propriety we might speak of internal urination in reference to the nitrogenous effete matters which the tissues cast into the blood. We are in fact not in a position to form any clear picture of the interchanges which occur between the blood and the tissues other than that which is sketched under NUTRITION (vol. xvii. pp. 678–682). Muscle is the tissue whose metabolic processes are most clearly understood. Living muscle yields no oxygen to a vacuum, although it gives up carbon dioxide freely; therefore it is presumably itself in a condition to take up oxygen from arterial blood and to give up carbon dioxide to it. But the absorption of oxygen is not *immediately* necessary to the escape, or the formation, of the carbon dioxide, however much it is so in the last instance. In other words, the oxygen passes into the tissue and is at once combined into some intermediate compound which only at a later stage decomposes and yields carbon dioxide. Whenever an organ is active its blood-vessels dilate and permit a more copious flow of blood through it than when it is at rest. In the salivary glands the blood may even pulsate in the veins and look like true arterial blood in colour. After passing through active muscles the blood contains both more CO_2 and less O than after passing through resting muscle.

Dyspnœa and Asphyxia.

When the entrance of air to the lungs is entirely prevented the phenomena of dyspnœa and asphyxia begin to appear. At first respiration is deeper and more frequent than usual (dyspnœa), the extraordinary muscles being called into play in both inspiration and expiration; the heart beats more quickly at first, but afterwards more slowly; this is the *first stage.* It is succeeded by the *second stage,* in which the violence of respiration is less marked, although the coordination of the act is more irregular; indeed towards the end of the stage respiratory movements merge in general convulsions of the whole body. Throughout this stage expiration is more marked than inspiration, and the pressure of the blood in the blood-vessels is very great. The *third stage* is one of exhaustion, which supervenes suddenly, and is marked by loss of consciousness, dilated pupils, and absence of the powers of reflex action. The animal seems dead, except that at long intervals feeble inspiratory gasps occur. Finally there comes one great inspiratory effort. the mouth is fixed wide open, the head thrown back, the body arched backwards, the nostrils dilated, and the pulse after a second or two is indistinguishable (asphyxia). The whole series of events lasts from three to five minutes if the interruption to the entrance of air has been absolute. After death the right side of the heart, with the vessels immediately opening into it, viz., the venæ cavæ and veins of the neck and the pulmonary artery, are engorged with black blood containing little or no oxyhæmoglobin. The left side of the heart and the systemic arteries are contracted and empty. All these phenomena are best explained by the known power of venous blood to stimulate the nervous centres. As the blood becomes more and more venous it stimulates more powerfully the great nerve-centres of the medulla oblongata. The respiratory centre is stimulated, especially its expiratory portion; and, finally, the whole muscular centres of the spinal system are excited, causing general convulsions. The vaso-motor centre is stimulated, causing the rise of blood pressure in the early stage. The slowing of the heart during the close of the first and second stages is due to stimulation of the vagus cardio-inhibitory centre in the medulla. Finally the centres become exhausted from the impurity of the blood bathing them, and their activity fails altogether.

Stimulation of the Respiratory Centre.

It remains to ask what property of venous blood confers upon it the power of stimulating nerve centres. Venous blood differs from arterial blood chiefly in the relative amounts of O and CO_2 it contains. Which of these substances is it whose deviation from the arterial standard causes stimulation? It so happens that we can experimentally separate the two factors. If an animal be placed in a chamber of some inert gas, such as nitrogen, the escape of CO_2 from the lungs is unimpeded and no accumulation of CO_2 in the blood is brought about; nevertheless dyspnœa and asphyxia follow as if the entrance of air to the windpipe had been interrupted. Here there is no accumulation of CO_2 in the blood, but total deficiency of O. On the other hand, if an animal be placed in a chamber containing a large excess of CO_2 beyond the standard of expired air, but at the same time a superabundant supply of O, no dyspnœa supervenes, and no asphyxia threatens. The animal may suffer from drowsiness (for CO_2 is narcotic in its effects), but true dyspnœa never occurs so long as the supply of O is sufficient. There is little doubt therefore that the absence of O from venous blood is the essential condition of its stimulating property.

Diversity of Modes in which the Function is Carried on.

Respiration, if we assume the essential fact of that process to be the absorption of O and the elimination of CO_2 by the animal body, is coextensive with the whole animal kingdom. It is not, however, in every case served by special air-containing organs or lungs. Indeed the essential interchange of respiration goes on wherever the blood comes into sufficiently close contact with oxygen. For example, the air which happens to be swallowed with our food is so closely in contact with the blood of the intestinal vessels that an interchange of gases occurs, constituting a true intestinal respiration. The *Mammalia* all possess true lungs. In birds also there are lungs, but the mechanism of respiration is unlike that of man, since the diaphragm is wanting. There are, in birds, besides lungs, "air sacs" lying among the viscera and communicating with cavities in the bones, these sacs being supplied with air from the lungs. Reptiles and some amphibians breathe by lungs, other amphibians breathe by gills, as also do the young of some of the air-breathing *Amphibia* (frogs). Fishes breathe by gills, using the O dissolved in water.

Many invertebrates respire in air, which is carried into the midst of their tissues in tracheæ or air-tubes branched like a tree; other invertebrates breathe by gills in water; others again have lungs. In some the oxygenized water is carried into the body along a series of tubes—the water-vascular system; and in still simpler animals the general surface of the body seems to serve the respiratory function. (A. G.*)

RESTIF, Nicolas Edme (1734–1806), called Restif de la Bretonne (the form Retif, though occasionally used by the author himself, and adopted by M. Monselet, has the less authority), was born at Sacy in the present department of the Yonne, France, on 23d October 1734. His father was a farmer of not the lowest rank, and the vanity of Restif has preserved or invented an extraordinary genealogy (supposed to date from his grandfather's time) in which the family is traced to the Roman emperor Pertinax. This Restif did not take very seriously, but he is himself almost the only authority for the details of his own career, which he has voluminously recorded, and these details are in part so incredible, in part so obviously distorted by various motives, that it is very hard to do more than discover the general outline of his life. He was well educated—partly if not chiefly by his own devotion to books—he was apprenticed to a printer at Auxerre, and, having served his time, went to Paris. Here he worked as a journeyman printer for some time (indeed he continued his manual work for the greater part of his life), and in 1760 he married Anne or Agnes Lebègue, a relation of his former master at Auxerre. He soon tired of her, and has left the most unfavourable pictures of her morals and temper. In the early years of their married life they were but little together, and for the last twenty they never saw each other; but Restif's own account is sufficient to show that certainly not all, and probably very few, of the faults were on the wife's side. It was not till five or six years after his marriage that Restif, who by his own account had written voluminously from his earliest youth but had published nothing, appeared as an author, and from that time to his death on February 2, 1806, he produced a bewildering multitude of books (amounting to something like two hundred volumes, and many of them printed with his own hand) on almost every conceivable variety of subject. The most noteworthy are *Le Pied de Fanchette*, a novel (1769); *Le Pornographe* (same date), a plan for regulating prostitution which is said to have been actually carried out by the emperor Joseph II., while not a few detached hints have been adopted by Continental nations; *Le Paysan Perverti* (1774), a novel in which much of his own experience is worked in; *La Vie de Mon Père* (1779), a really remarkable monument of filial piety; *Les Contemporaines* (42 vols., 1780–85), a vast collection of short stories showing at once Restif's fertility of invention, his narrative faculty, and his accurate observation of the manners of Paris; *Ingénue Saxancour*, also a novel (1789); and, lastly, the extraordinary autobiography of *Monsieur Nicolas* (16 vols., 1794–97; the last two are practically a separate and much less interesting work), in which at the age of sixty he has set down voluminously his remembrances, his notions on ethical and social points, his hatreds, and above all his numerous or innumerable loves real and fancied. The original editions of these, and indeed of all his books, have long been bibliographical curiosities owing to their rarity, the beautiful and curious illustrations which many of them contain, and the quaint typographic system in which most are composed. The author's life during this long period was a singular mixture of hard work and perpetual falling in love. He seems to have really seen society of the most varied kind, though in this as in all other matters he certainly exaggerates and perhaps invents in a way which makes it impossible to discern the exact truth. Some of his books sold well, and, as has been said, he was always industrious as an author or a printer and sometimes as both. But he had repeated losses, and though never in actual want was never in easy circumstances. He was arrested once during the Revolution but had no difficulty in getting off; indeed he seems to have been a convinced republican. In 1795 he received a gratuity of 2000 francs from the Government, and just before his death Napoleon gave him a place in the ministry of police, which he did not live to take up. After his death Cubières Palmeaux, a gentleman literary-hack of the day, wrote his life.

Restif de la Bretonne undoubtedly holds a remarkable place in French literature, though the rarity and curious character of his books have sometimes induced his editors and commentators to take too high a view of his merits. He was inordinately vain, of extremely relaxed morals, and perhaps not entirely sane. His books were written with such haste and in such bulk that they can only be praised with great allowance. Their licence of subject and language renders some if not most of them quite unfit for general perusal. But when every deduction is made there will remain on a just estimate the facts that Restif had a singular and profound knowledge of the human heart (the second title of his *Monsieur*

Nicolas is *Le Cœur Humain Dévoilé*), that among his random and often chimerical speculations on social, ethical, and political matters thoughts of extraordinary justness now and then occur, that his observation of manners was keen, and that his narrative faculty, at least in short tales and detached passages, was exceptionally good.

Original editions of Restif are, as has been said, bibliographical curiosities. The works of Ch. Monselet (1853) and P. Lacroix (1875), Assézat's selection from the *Contemporaines*, with excellent introductions (3 vols., 1875), and the valuable reprint of *Monsieur Nicolas* (14 vols., 1883-84), will be sufficient to enable even curious readers to form a judgment of him. The selection from the *Contemporaines* preserves Restif's curious printing and spelling.

RESTOUT, JEAN (1692–1768), French painter, born at Rouen, March 26, 1692, was the son of Jean Restout, the first of that name, and of Marie M. Jouvenet, sister and pupil of the well-known Jean Jouvenet. Jean Restout's father died young, and his son was placed at Paris with his uncle Jean Jouvenet. In 1717, the Royal Academy having elected him a member on the work which he had executed for the Great Prize, he remained in Paris, instead of proceeding to Italy, exhibited at all the salons, and filled successively every post of academical distinction. He died on January 1, 1768. He left several pupils, none of whom were of great distinction. His works, chiefly of vast size—altarpieces (Louvre Museum), ceilings, designs for Gobelin tapestries—were much engraved by Cochin, Drevet, and others; his diploma picture may still be seen at St Cloud.

RESTOUT, JEAN BERNARD, son of the above, was born at Paris, February 22, 1732, and died in the same city on July 18, 1797. In 1758 he won the Great Prize, and on his return from Italy was received into the Academy; but his refusal to comply with rules led to a quarrel with that body which alienated him from his profession. Roland brought him into notice by appointing him keeper of the Garde Meuble, but this piece of favour nearly cost him his life during the Terror: he was cast into prison and was only saved from the guillotine by the reaction of Thermidor. The St Bruno painted by him at Rome is in the Louvre.

RETFORD, EAST, a market town and borough of Nottinghamshire, is situated on the Idle and on the Great Northern and Manchester, Sheffield, and Lincolnshire Railways, 36 miles north-east of Nottingham by rail, and eight south-west of Gainsborough. The church of St Swithin, a large cruciform structure with a square embattled tower, dates from the 13th century, but was rebuilt in 1658 by a brief granted by Richard Cromwell. Among the modern buildings are the town-hall, the corn exchange, the court-house, and the covered markets. There is a large trade in corn, cheese, and hops, and the town possesses iron foundries, paper and corn mills, and india-rubber works. The population of the municipal borough in 1871 was 3194, but in 1878 the area was extended to 4532 acres, and in 1881 the population was 9748.

The town derives its name from an ancient ford over the Idle. In Domesday it is written *Redeford*, and early in the 13th century it is called *Este Reddfurthe*. It is a borough by prescription, and was granted in 1279 to the burgesses by Edward I. at a fee farm rent of £10, with the right of choosing a bailiff. Its rights were confirmed and extended by Edward III., Henry IV., and James I. It sent two members to parliament in the reign of Edward I., but the privilege was dormant from 1330 to 1571. The parliamentary borough, which was largely rural, having been extended in 1829 to include the whole wapentake of Bassetlaw, and comprising 207,906 acres in 1881, ceased to exist as a borough in 1885. The municipal borough is divided into three wards, and is governed by a mayor, six aldermen, and eighteen councillors.

RETHEL, ALFRED (1816–1859), historical painter, was born at Aix-la-Chapelle in 1816. He very early showed an interest in art, and at the age of thirteen he executed a drawing which procured his admission to the academy of Düsseldorf. Here he studied for several years, and produced, among other works, a figure of St Boniface which attracted much attention. At the age of twenty he removed to Frankfort where he studied under Philip Veit; and, having, in common with so many of the German artists of the period, manifested an aptitude for fresco-painting, he was selected to decorate the walls of the imperial hall at Römer with figures of famous men. At the same period he produced a series of designs illustrative of Old Testament history. Four years later he was the successful competitor for the work of ornamenting the restored council house of his native city with frescos depicting prominent events in the career of Charlemagne, but various discussions and delays prevented the execution of this work for some six years. Meanwhile Rethel occupied himself with the production of easel pictures, and of drawings; and in 1842 he began a most striking and important series of designs dealing with the Crossing of the Alps by Hannibal, in which the weird power which animates his later art becomes first apparent. In 1844 Rethel visited Rome, occupying his time both in study and in production, and executing, along with other subjects, an altarpiece for one of the churches of his native land. In 1846 he returned to Aix, and commenced his Charlemagne frescos. But the strain of production, aggravated by a lack of sympathy, and by vexatious delays and interferences, produced a most injurious effect upon both the health and the spirits of the artist. Symptoms of mental derangement, remotely attributable, it is believed, to an accident from which he suffered in childhood, began to manifest themselves in strange and groundless suspicions against his friends and brother artists. While he hovered between madness and sanity, "with a mind"—as Mr Ruskin has said in reference to the very parallel case of William Blake—"disturbed, but not deceived, by its sickness, nay, partly exalted by it," Rethel produced some of the most striking, individual, and impressive of his works. Strange legends are told of the effect produced by some of his weird subjects. He painted Nemesis pursuing a Murderer—a flat stretch of landscape, with a slaughtered body relieved against the flushing evening sky, while in front is the assassin speeding away into the darkness, clutching his blood-stained knife, thorns and thistles springing up around his path, and above, hovering over his head, with unhasting but ceaseless flight, an angel of vengeance, holding an hour-glass from which the last sands are escaping, and a sword which is slowly descending upon the fated head. The picture, so the story goes, was won in a lottery at Frankfort by a personage of high rank, who had been guilty of an undiscovered crime, and the contemplation of his prize drove him to distraction, and he became a lunatic. Another design which Rethel executed was Death the Avenger, a skeleton appearing at a masked ball, scraping daintily, like a violinist, upon two human bones. The drawing haunted the memory of his artist friends and disturbed their dreams; and, in expiation, he produced his pathetic design of Death the Friend, a skeleton draped in long monk's robes, tolling solemnly the passing bell in a church tower, while beside the open window, lit by the last sunset radiance, sits an old sexton, with the peaceful face of a quiet departure. Rethel also executed a powerful series of drawings—the Dance of Death—suggested by the Belgian insurrections of 1848. It is by such designs as these, executed in a technique founded upon that of Dürer, and animated by an imagination akin to that of the elder master, that Rethel is most widely known. Certainly his fame can rest very securely upon such works as Death the Avenger and Death the Friend,—those "inexpressibly noble and pathetic woodcut grotesques," as Mr Ruskin has so justly styled them. Rethel died at Düsseldorf on December 1, 1859.

His picture of Peter and John at the Beautiful Gate of the Temple, is preserved in the Leipsic Museum, and his St Boniface and several of his cartoons for the frescos at Aix in the Berlin National Gallery. His life by Wolfgang Müller von Königswinter has been published. See also *Art Journal*, November 1865.

RETZ, JEAN FRANÇOIS PAUL DE GONDI, CARDINAL DE (1614–1679), was born at Montmirail in 1614. The family was one of those which had been introduced into France by Catherine de' Medici, but it had acquired great estates in Brittany and had been connected with the noblest houses of the kingdom. It may be added that Retz himself always spelt his designation "Rais," and the spelling is not inconvenient for foreigners. He was the third son, and according to Tallemant des Réaux was made a knight of Malta on the very day of his birth. The death of his second brother, however, destined him for a closer connexion with the church. The family of Retz had military traditions, for the cardinal's father, Philippe Emmanuel, was general of the galleys, and his grandfather Albert was marshal of France. But it had also much church influence, Retz's uncle being archbishop of Paris, and, despite the very unclerical leanings of the future cardinal, which were not corrected by the teachings of St Vincent de Paul, who was his tutor, the intentions of his family never varied respecting him. It was in vain that, as he has recounted with some vanity in his famous memoirs, he flirted, fought duels, and endeavoured in every way to show that he had no vocation. His friends might have some excuse for doubting his aptitude for a more active career despite his vivacious temperament, for by unanimous consent his physical appearance was not that of a soldier. He was short, near-sighted, ugly (though his ugliness had much in common with that of Wilkes), and exceptionally awkward of hand and gesture. Retz, however, despite the little inclination which he felt towards clerical life, was not a man to leave any kind of career to which he had access untried. He entered into the disputes of the Sorbonne with vigour, and when he was scarcely eighteen wrote the remarkable *Conjuration de Fiesque*, a little historical essay of which he drew the material from the Italian of Masoardi, but which is all his own in the negligent vigour of the style and the audacious insinuation, if nothing more, of revolutionary principles. It is said, though the anecdotes of this time are always suspicious, that Richelieu's verdict after reading the pamphlet was "voilà un homme dangereux." However this may be, Retz received no preferment of importance during Richelieu's life, and even after the minister's death, though he was presented to Louis XIII. and well received (the king offered him a bishopric), he found a difficulty in attaining the object of his wishes, that is to say, the coadjutorship with reversion of the archbishopric of Paris. But almost immediately after the king's death Anne of Austria appointed him to the coveted post on All Saints' Eve, 1643. Retz, who had according to some accounts already plotted against Richelieu, set himself to work to make the utmost political capital out of his position. His uncle, who was old, indolent, and absurdly proud, had lived in great seclusion; Retz, on the contrary, by assiduously cultivating the parish *curés* and distributing large sums in alms, gradually acquired a very great influence with the populace of the city. This influence he gradually turned against Mazarin—partly from the general dislike which the French nobles had to that low-born adventurer, but partly also, it would appear, because he himself was not in Mazarin's place. No one had more to do than Retz with the outbreak of the Fronde in October 1648, and his history for the next four years is the history of that confused and, as a rule, much misunderstood movement. Of the two parties who, sometimes in union and sometimes at variance with each other, opposed the system of absolute monarchy carried on by an omnipotent minister, Retz could only depend on the bourgeoisie, not on the nobles, and even in the case of the bourgeoisie he had little influence out of Paris. The fact, moreover, that although he had some speculative tendencies in favour of popular liberties, and even perhaps of republicanism, he represented no real political principle, as the parliament of Paris did and as did great nobles like La Rochefoucauld, inevitably weakened his position. His adroitness of intrigue and his boldness in action (which was even shown on the field of battle) served him little in the long run, and when the break up of the Fronde came he was left in the lurch, having more than once in the meanwhile been in no small danger from his own party. One stroke of luck, however, fell to him before his downfall. He was made cardinal almost by accident, and under a misapprehension on the pope's part. Then, in 1652, he was arrested and imprisoned, first at Vincennes, then at Nantes; he escaped, however, after two years' captivity, and for some time wandered about in England and elsewhere. He made his appearance at Rome more than once, and had no small influence in the election of Alexander VII. He was at last, in 1662, received back again into favour by Louis XIV. and on more than one occasion formally served as envoy to Rome,—commissions which have left abundant records in the shape of official documents. Retz, however, was too shrewd, and perhaps too weary of political intrigue to attempt any interference with the new order of things at home, and he was glad in making his peace to resign his claims to the archbishopric of Paris. The terms were, among other things, his appointment to the rich abbacy of St Denis and his restoration to his other benefices with the payment of arrears.

The last seventeen years of Retz's life were comparatively quiet, and were passed partly in his diplomatic duties (he was again in Rome at the papal election of 1668), partly at Paris, partly at his estate of Commercy, but latterly at St Mihiel in Lorraine. His retirement to this place was made under circumstances which were unusual for the age. His debts were as enormous as his revenues were large, and, as the latter were almost entirely derived from ecclesiastical appointments, his creditors had no remedy. In 1675 he resolved to make over to them all his income except twenty thousand livres, and, as he said, to "live for his creditors." This plan he carried out, though he did not succeed in living very long, for he died at Paris on the 24th August 1679. One of the chief authorities for the last years of Retz is Madame de Sévigné, whose connexion he was by marriage. Great friendship existed between them, and the cardinal was especially devoted to Madame de Grignan, who seems to have treated him with her usual selfish indifference.

Retz and La Rochefoucauld, the greatest of the Frondeurs in literary genius, were personal and political enemies, and each has left a portrait of the other. La Rochefoucauld's character of the cardinal is on the whole harsh but scarcely unjust, and one of its sentences formulates, though in a manner which has a certain recoil upon the writer, the great defect of Retz's conduct,—"Il a suscité les plus grands désordres dans l'état sans avoir un dessein formé de s'en prévaloir." The last two words indicate but too clearly the self-seeking which was the bane of the Fronde and of the French noblesse generally. But it is perfectly true that no general design of benefiting either himself or his country, or even any party or order in his country, can be traced in Retz's conduct, and that he seems to have kindled the fires of civil war in pure gaiety of heart. He would have been less, and certainly less favourably, remembered if it had not been for his *Memoirs*, which, with Madame de Sévigné's notices, give a rather high idea of the amiability of his character at the same time that they confirm its levity, and above all prove his possession of remarkable literary faculty. They were certainly not written till the last ten years of his life, and they do not go further than the year 1655. They are addressed in the form of narrative to a lady who is not known, though guesses have been made at her identity. In the beginning there are some gaps. They display, in a rather irregular style and with some oddities of dialect and phrase, extraordinary narrative skill and a high degree of ability in that special art of the 17th century—the drawing of verbal portraits or characters. Few things of the kind are superior to the sketch of the early barricade of the Fronde in which the writer had so great a share, the hesitations of the court, the bold adventure of the coadjutor himself into the palace, and the final triumph of the insurgents. Dumas, who has drawn from this passage one of his very best scenes in *Vingt Ans après*, has done little but throw Retz into dialogue and amplify his language and incidents. Besides these memoirs and the very striking youthful essay of the *Conjuration de Fiesque*, Retz has left diplomatic papers, sermons, Mazarinades, and correspondence in some considerable quantity.

The *Memoirs* of the Cardinal de Retz were first published in a very imperfect condition in 1717 at Nancy. The first satisfactory edition was that which appeared in the twenty-fourth volume of the collection of Michaud and Poujoulat (Paris, 1836). They were then re-edited from the autograph manuscript by Géruzez (Paris, 1844), and by Champollion-Figeac with the Mazarinades, &c. (Paris, 1859). In 1870 a complete edition of the works of Retz was begun by M. Feillet in the collection of *Grands Écrivains*. The editor dying, this passed into the hands of M. Gourdault and then into those of M. Chantelauze, who had already published studies on the connexion of St Vincent de Paul with the Gondi family, &c. The edition is still incomplete, and the critical biography of Retz which it may be expected to contain is much wanted. (G. SA.)

REUBEN (רְאוּבֵן, Ῥουβήν, Ῥουβίλ), eldest son of Jacob and of Leah (Gen. xxix. 32). Reuben plays no great part in the patriarchal legend; in the Elohistic version of the story of Joseph he appears in a somewhat favourable light, but in Gen. xxxv. 22 he is charged with a grave offence, which in Gen. xlix 4 is given as a reason why the tribe which called him father did not take in Hebrew history the place proper to its seniority. The Reubenites settled east of the Jordan on the Moabite border. In Judges v. they are described as a pastoral tribe which took no share in the patriotic movement under Barak and Deborah. The Moabites soon proved too strong for them (comp. MOAB, vol. xvi. p. 534) and overspread their country (comp. Isa. chap. xv. *sq.* with Josh. xiii. 16 *sq.*); in Deut. xxxiii. 6 the tribe appears as threatened with extinction. Dathan and Abiram (Num. xvi., Deut. xi. 6), whom the earth swallowed up for rebellion against Moses, were Reubenites. After this time only the book of Chronicles has anything considerable to relate of the tribe (1 Chron. v. 1 *sq.*, 18 *sq.*).

REUCHLIN, JOHN (1455–1522), the first great German humanist and the restorer of Hebrew and in large measure also of Greek letters among his countrymen, was born February 22, 1455, at Pforzheim in the Black Forest, where his father was intendant of the Dominican monastery. In the pedantic taste of his time the name was Græcized by his Italian friends into Capnion, a form which Reuchlin himself uses as a sort of transparent mask when he introduces himself as an interlocutor in the *De Verbo Mirifico*. For his native place Reuchlin always retained an affection; he constantly writes himself Phorcensis, and in the *De Verbo*, when he tells how he had sojourned at Paris and almost all the great schools of France and Germany, as well as at several Italian seats of learning and finally at Rome, the "caput studiorum," he does not forget to ascribe to Pforzheim his first disposition to letters. Here he began his Latin studies in the monastery school, and, though in 1470 he was a short time in Freiburg, that university seems to have taught him little. Reuchlin's career as a scholar appears to have turned almost on an accident; his fine voice gained him a place in the household of the margrave of Baden, and by and by, having already some reputation as a Latinist, he was chosen to accompany to the university of Paris the third son of the prince, a lad some years his junior, who was destined for an ecclesiastical career. This new connexion lasted but a year or so, but it determined the course of Reuchlin's life. He now began to learn Greek, which had been taught in the French capital since 1470, and he also attached himself to the leader of the Paris realists, John à Lapide, a really worthy and learned man, whom he presently followed to the vigorous young university of Basel (1474). At Basel Reuchlin took his master's degree (1477), and began to lecture with success, teaching a more classical Latin than was then common in German schools, and also explaining Aristotle in Greek. His studies in this language had been continued at Basel under Andronicus Contoblacas, and here too he formed the acquaintance of the bookseller Amorbach, for whom he prepared a Latin lexicon (*Vocabularius Breviloquus*, 1st ed. 1475–76), which did good service in its time and ran through many editions. This first publication and Reuchlin's account of his teaching at Basel in a letter to Cardinal Hadrian, February 1518, show that he had already found the work which in a larger sphere occupied his whole life. He was no original genius, but a born teacher. He had neither brilliant literary power like Erasmus nor epoch-making ideas like Luther, but he was the great master of all Germany, guiding his countrymen to sound learning, first in Latin and then in Greek and in Hebrew. But this work of teaching was not to be done mainly from the professor's chair. Reuchlin soon left Basel to seek further Greek training with George Hieronymus at Paris, and learn to write a fair Greek hand that he might support himself by copying MSS. And now he felt that he must choose a profession. His choice fell on law, and he was thus led to the great school of Orleans (1478), and finally to Poitiers, where he became licentiate in July 1481, and so could look forward to honourable office in his native country, where he could pursue his scholarly tastes in an independent position. From Poitiers Reuchlin came in December 1481 to Tübingen. There he found friends to recommend him to Count Eberhard of Würtemberg, who was about to journey to Italy and required an interpreter. Reuchlin was selected, and in February 1482 left Stuttgart for Florence and Rome. The journey lasted but a few months, but it brought the German scholar into contact with several learned Italians, and his connexion with the count became permanent. On his return to Stuttgart he was named Geheimrath, and soon after he became doctor of laws and assessor in the high court. About this time he appears to have married, but little is known of his married life. He left no children; but in later years his sister's grandson Melanchthon was almost as a son to him till the Reformation estranged them. Reuchlin's life at Stuttgart was often broken by important missions, and in 1490 he was again in Italy. Here he saw Pico, to whose Cabbalistic doctrines he afterwards became heir, and also made the friendship of the pope's privy secretary, Questemberg, which was of service to him in his later troubles. Again in 1492 he was employed on an embassy to the emperor at Linz, and here he began to read Hebrew with the kaiser's Jewish physician Loans. He knew something of this language before, but Loans's instruction laid the basis of that thorough knowledge which he afterwards improved on his third visit to Rome in 1498 by the instruction of Obadiah Sforno of Cesena.

In 1496 Count Eberhard died, and enemies of Reuchlin had the ear of the new prince. He was glad therefore hastily to follow the invitation of John of Dalburg the scholarly bishop of Worms, and flee to Heidelberg, which was then the seat of the "Rhenish Society," a lively and active circle of humanists under Dalburg's presidency, equally zealous in the service of Apollo and Bacchus. In this court of letters Reuchlin's appointed function was to make translations from the Greek authors, in which his reading was already extremely wide. Many of these versions were never printed, but a considerable number of pieces were given to the press at intervals down to the year 1519, and formed an important element in his efforts to spread a knowledge of Greek. For, though Reuchlin had no public office as teacher, and even at Heidelberg was prevented from lecturing openly, he was during a great part of his life the real centre of all Greek teaching as well as of all Hebrew teaching in Germany. No young man of promise who came to him for help was rejected; he taught many and found teachers for others, or gave direction and solution of difficulties to more advanced scholars. Thus he was a sort of unofficial general director of the studies of Germany, and to carry out this work he found it necessary to provide a series of helps for beginners and others. He never published a Greek grammar, though he had one in MS. for use with his pupils, but he put out several little elementary Greek books; and these with the series of translations were in fact the text books of the German youth. Reuchlin, it may be noted, pronounced Greek as his native teachers had taught him to do, *i.e.*, in the modern Greek fashion. This pronunciation, which he defends in *Dialogus de Recta Lat. Græcique Serm. Pron.*, 1519, came to be known, in contrast to that used by Erasmus, as the Reuchlinian.

At Heidelberg Reuchlin had many private pupils, among whom Franz von Sickingen is the best known name; and all his relations, except with the monks who stopped his attempt to lecture on Hebrew, were very pleasant. With the monks he had never been well; at Stuttgart also his great enemy was the Augustinian Holzinger. On this man he took a scholar's revenge in his first Latin comedy *Sergius*, a satire on worthless monks and false relics which his young Heidelberg friends were eager to act. But, Dalburg thinking this unsafe, he wrote for them a new piece, *Scenica Progymnasmata* or *Henno*, based on the old French play of *Maître Pathelin*, which is not without humour and sparkle of language, and much better constructed than the French piece.

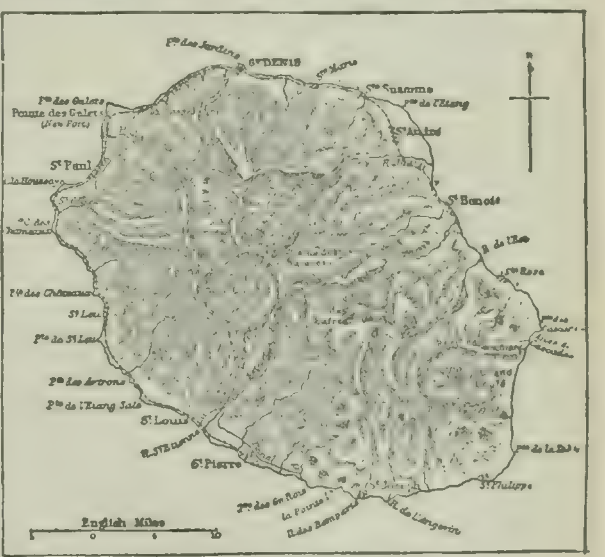
Through Dalburg, Reuchlin came into contact with Philip of the Pfalz, who employed him to direct his son's studies, and in 1498 gave him the mission to Rome which has been already noticed as fruitful for Reuchlin's progress in Hebrew. He came back laden with Hebrew books, and found when he reached Heidelberg that a change of Government had opened the way for his return to Stuttgart. His wife had remained there all along; so that we may assume that he never looked on his exile as more than temporary. His friends were the party of order and good government, who could not long remain powerless. They had now again the upper hand, and knew Reuchlin's value. In 1500, or perhaps in 1502, he was named "triumvir of Swabia," a very high judicial office in the Swabian League, which he held till 1512, when he retired to a small estate near Stuttgart. By this time the long conflict which gives Reuchlin's life its chief interest had already begun.

For many years Reuchlin had been increasingly absorbed in Hebrew studies, which had for him more than a mere philological interest. Though he was always a good Catholic, and even took the habit of an Augustinian monk when he felt that his death was near, he was too thorough a humanist to be a blind Catholic. He knew the abuses of monkish religion, and was interested in the reform of preaching (*De Arte Predicandi*, 1503—a book which became a sort of preacher's manual); but above all as a scholar he was eager that the Bible should be better known, and could not tie himself to the authority of the Vulgate. To him the Old Testament Scriptures meant the Hebrew text, and this he was determined to study with an independent love for truth: "I honour St Jerome as an angel; I value Lira as a master; but I worship truth as my God." The key to the *Hebræa veritas* was the grammatical and exegetical tradition of the mediæval rabbins, especially of Kimhi, and when he had mastered this himself he was resolved to open it to others. In 1506 appeared his *Rudimenta Hebraica*—grammar and lexicon—mainly after Kimhi, yet not a mere copy of one man's teaching. The edition was costly and sold slowly. In 1510 he was glad to offer Amorbach seven hundred and fifty copies at the reduced price of a florin for three copies. Even then Amorbach could hardly find purchasers, but Reuchlin bade him be patient, "for if I live Hebrew must with God's help come to the front." One great difficulty was that the wars of Maximilian in Italy prevented Hebrew Bibles coming into Germany. But for this also Reuchlin found help by printing the Penitential Psalms with grammatical explanations (1512), and other helps followed from time to time. But Reuchlin had yet another interest in Hebrew letters. His Greek studies had interested him in philosophy, and not least in those fantastical and mystical systems of later times with which the Cabbala has no small affinity. Following Pico, he seemed to find in the Cabbala a profound theosophy which might be of the greatest service for the defence of Christianity and the reconciliation of science with the mysteries of faith—an unhappy delusion indeed, but one not surprising in that strange time of ferment, when the old and the new intellectual life had not yet clearly discriminated themselves, and when men of progress sought less to free themselves from mere tradition than to find an ancient tradition of truth which had been lost in the darkness of mediæval ignorance. Reuchlin's mystico-cabbalistic ideas and objects were expounded in the *De Verbo Mirifico*, 1494, and finally in the *De Arte Cabbalistica*, 1517. We see therefore that not only the philological tradition but the most esoteric wisdom of the rabbins was in his eyes of the greatest value.

Unhappily many of his contemporaries held other views, and thought that the first step to the conversion of the Jews was to conquer their obstinacy by taking from them their books. This view had for its chief advocate the bigoted John Pfefferkorn, himself a baptized Hebrew. Pfefferkorn's plans were backed by the Dominicans of Cologne; and in 1509 he got from the emperor authority to confiscate all Jewish books directed against the Christian faith. Armed with this mandate, he visited Stuttgart and asked Reuchlin's help as a jurist and expert in putting it into execution. Reuchlin evaded this demand, mainly because the mandate lacked certain formalities, but he could not long remain neutral. The execution of Pfefferkorn's schemes led to difficulties and to a new appeal to Maximilian. It was resolved to call in the opinion of experts, and in 1510 Reuchlin was summoned in the name of the emperor to give his formal opinion on the suppression of the Jewish books. His answer is dated from Stuttgart, November 6, 1510; in it he divides the books into six classes—apart from the Bible which no one proposed to destroy—and, going through each class, he shows that the books openly insulting to Christianity are very few and viewed as worthless by most Jews themselves, while the others are either works necessary to the Jewish worship, which was licensed by papal as well as imperial law, or contain matter of value and scholarly interest which ought not to be sacrificed because they are connected with another faith than that of the Christians Instead of destroying a whole literature, which was what Pfefferkorn proposed, he proposed that the emperor should decree that for ten years there be two Hebrew chairs at every German university for which the Jews should furnish books. The other experts and all the universities consulted, except Heidelberg, proposed that all books except Bibles should be taken from the Jews to be investigated by a commission: and, as the emperor still hesitated, the bigots threw on Reuchlin the whole blame of their ill success. Pfefferkorn circulated at the Frankfort fair of 1511 a gross libel (the *Handspiegel*) declaring that Reuchlin had been bribed; and Reuchlin, burning with the indigation of a man of unsullied integrity, retorted as warmly in the *Augenspiegel* (1511). His adversary's next move was to declare the *Augenspiegel* a dangerous book; the Cologne faculty, with their dean the grand inquisitor Hochstraten, took up this cry, and, encouraged perhaps by some signs of timidity in letters from Reuchlin to two of the Cologne theologians, they called on him to recant not a few dangerous utterances and misapplications of Scripture. Reuchlin was timid, but he was honesty itself. He was willing to receive corrections in theology, which was not his subject, but he could not unsay what he had said; and as his enemies tried to press him into a corner he at length turned and met them with open defiance in a *Defensio contra Calumniatores*, 1513. The universities were now appealed to for opinions, and were all against Reuchlin. Even Paris (August 1514) condemned the *Augenspiegel*, and called on Reuchlin to recant. Meantime a formal process had begun at Mainz before the grand inquisitor, but Reuchlin by an appeal succeeded in transferring the question to Rome. It is needless to follow the long windings of ecclesiastical process; judgment was not finally given till July 1516; and then, though the decision was really for Reuchlin, the trial was simply quashed. The result had cost Reuchlin years of trouble and no small part of his modest fortune, but it was worth the sacrifice. For far above the direct importance of the issue was the great stirring of public opinion which had gone forward. All who loved learning and progress were banded together as they had never been before against the bigots and the stupid universities; and all humanists felt that the victory was theirs. And if the obscurantists escaped easily at Rome, with only a half condemnation, they received a crushing blow in Germany. No party could survive the ridicule that was poured on them in the *Epistolæ Obscurorum Virorum*. Reuchlin did not long enjoy his victory in peace. In 1519 Stuttgart was visited by famine, civil war, and pestilence. From November of this year to the spring of 1521 the veteran statesman, whom the universal respect felt for his scholarship could not secure against the dangers involved in his political relations, sought refuge in Ingolstadt and taught there for a year as professor of Greek and Hebrew. It was forty-one years since at Poitiers he had last spoken from a public chair; but the old man of sixty-five had not lost his gift of teaching, and hundreds of scholars crowded round him. This gleam of autumn sunshine was again broken by the plague; but now he was called to Tübingen and again spent the winter of 1521–22 teaching in his own systematic solid way. But he was now in shaken health; in the spring he found it necessary to visit the baths of Liebenzell, and here he was seized with jaundice, of which he died 30th June 1522, leaving in the history of the new learning a name only second to that of his younger contemporary Erasmus.

The authorities for Reuchlin's life are enumerated in L. Geiger, *Johann Reuchlin*, 1871, which is the standard biography. The controversy about the books of the Jews is well sketched by Strauss, *Ulrich von Hutten*. Some interesting details about Reuchlin are given in the autobiography of PELLICANUS (*q.v.*), which was not published when Geiger's book appeared. (W. R. S.)

RÉUNION, formerly **BOURBON**, an island in the Indian Ocean, belonging to France and considered one of her more important colonies. St Denis, the capital, stands on the north side in 20° 51′ S. lat. and 53° 9′ E. long. Physically it may be described as the southmost subaerial summit of the great submarine ridge which, running north-east by Mauritius, Albatross Island, &c., and curving round by the Seychelles, connects with the platform of Madagascar at its north-eastern extremity. The great submarine valley which is thus enclosed between Madagascar and the Mascarene-Seychelles ridge has a depth of from 2000 to 2400 fathoms. In a straight line Réunion lies 115 miles from the east coast of Madagascar; and Mauritius, with which it communicates by optic signalling since 1882, is 115 miles to the north-east. The island has an area of 721,314 acres or 1127 square miles. It is usual to regard it as divided into a windward and a leeward district by a line, practically the watershed, running in the direction of the greater axis. The whole island is the result of a double volcanic action. First there arose from the sea a mountain whose summit is approximately represented by Piton des Neiges (10,069 feet), and at a later date another crater opened towards the east, which, piling up the mountain mass of Le Volcan, turned what was till then a circle into an ellipse 44 miles by 31. In the older upheaval the most striking features are now three areas of subsidence—the *cirques* of Salazie, Rivière des Galets, and Cilaos—which lie north-west and south of the Piton des Neiges and form the gathering grounds respectively of the Rivière du Mât, the Rivière des Galets, and the Rivière de St Étienne. The first, which may be taken as typical, is surrounded by high almost perpendicular walls of basaltic lava, and its surface is rendered irregular by hills and hillocks of debris fallen from the heights. Towards the south lies the vast stratum of rocks (150 to 200 feet deep) which, on the 26th November 1875, suddenly sweeping down from the Piton des Neiges and the Gros Morne, buried the little village of Grand Sable and nearly a hundred of its inhabitants. A considerable piece of ground, with its trees,



Island of Réunion.

crops, and houses practically intact, along with the proprietor, who was seated at his own door, was carried a distance of nearly 1½ miles. Along the whole eastern side of the cirque between the village of Salazie and Hellbourg is a series of waterfalls issuing at a great height from above a vast bank of lava. They are probably the overflow of a subterranean basin connected, it may be, with the sources, on the other side of the wall, of the Rivière du Bras de Caverne. At the source of the Rivière du Mât, which escapes from the cirque by a narrow and precipitous gorge, is a magnificent sheaf of basaltic columns boldly curving out over the bed of the torrent. Having climbed up the eastern side of the cirque, the traveller reaches the well-wooded plain of the Salazes; farther east, and separated from it by ridges of rock is the Plaine des Caffres at a height of 5250 feet above the sea, and by a descent of 1500 feet this dips north-eastward into the Plaine des Palmistes. The eastern summit or Piton de Fournaise is cut off from the rest of the island by two curious enclosures, each about 500 or 600 feet deep. The traveller approaching the present craters from the west has consequently to descend upwards of 1000 feet by two abrupt stages before he begins the ascent of the cones. The outer "enclosure" runs across the island in a north and south direction; but the inner forms a rude kind of parabola with its arms (Rempart du Tremblet on the south and Rempart du Bois Blanc on the north) stretching eastwards to the sea and embracing not only the volcano proper but also the great eastward slope known as the Grand Brûlé. There are two principal craters, each on an elevated cone,—the more westerly, now extinct, known as the Bory Crater after Bory de St Vincent, the eminent geologist, and the more easterly, simply called the Burning Crater or Fournaise. The latter is partially surrounded by an "enclosure" on a small scale with precipices 200 feet high. Eruptions, though not infrequent (thirty were registered between 1735 and 1860) are seldom serious; the more noteworthy are those of 1745, 1778, 1791, 1812, 1860, 1870, 1881. Basaltic or vitreous lavas rich in chrysolite are the usual products, and it is hardly possible to conceive of a discharge sufficient in volume to overflow the "ramparts" and carry destruction to the rest of the island.[1] Besides the Piton des Neiges (10,069 feet high), the Bory Peak (8612 feet), and the Burning Peak (8294), the principal summits in Réunion are the Grand Bénard (9490), Morne L'Angevin (7845), and Cimandef (7300). The streams which radiate out in all directions from the central highlands are for the most part comparatively small except during the rainy season, when they become impetuous and destructive torrents. Hot mineral springs are found in various parts of the island: the Source de Salazie (discovered in 1831) lies 2860 feet above sea-level, has a temperature of 90°, and discharges 200 to 220 gallons per hour of water impregnated with bicarbonate of soda, and carbonates of magnesium and lime, iron, &c.; that of Cilaos (discovered in 1826) is 3650 feet above the sea with a temperature of 100°, and that of Mafate 2238 feet and 87°. At the first there are a military hospital and a group of dwelling houses and villas.

Vertically Réunion may be divided into five zones. The first or maritime zone contains all the towns and most of the villages, built on the limited areas of level alluvium occurring at intervals round the coast (128 miles). In the second, which lies between 2600 and 4000 feet, the sugar plantations make a green belt round the island and country houses abound. The third zone is that of the forests; the fourth that of the plateaus, where European vegetables can be cultivated; and above this extends the region of the mountains, which occupies more space than any of the others.

The following statements in regard to climate refer more particularly to the lower zones. The year divides into two seasons—that of heat and rain from November to April, that of dry and more bracing weather from May to October.

According to observations taken at St Denis between 1863 and 1870, and reduced to sea-level, the mean monthly temperature varies as follows:—January, 80°·36; February, 80°·36; March, 80°·12; April, 78°·62; May, 75°·30; June, 72°·53; July, 71°·22; August, 70°·59; September, 71°·6; October, 73°·43; November, 76°·62; December, 78°·92; and the rainfall was distributed thus:—January, 8·2 inches; February, 10·9; March, 5·17; April, 4·78; May 2·9; June, 6·1; July, 0·27; August, 1·7; September, 0·80; October, 1·67; November, 3·09; December, 5·25; making an annual average of 45·57 inches, falling in 79·7 days. The prevailing winds are from the south-east, sometimes veering round to the south, and more frequently to the north-east; the west winds are not so steady (three hundred and seven days of east to fifty-eight of west in the course of the year). It is seldom calm during the day, but there is usually a period of complete repose before the land wind begins in the evening. Several years sometimes pass without a cyclone visiting the island; at other times they occur more than once in a single "winter." From April till October there is little fear of them. That of March 1879 was particularly destructive. The *raz de marée* occasionally does great damage. On the leeward side of the island the temperature is higher than at St Denis. The winds are generally from the west and south-west, and bring little rain. Mist hangs almost all day on the tops of the mountains, but usually clears off at night. The mean annual temperature at Salazie is 66° and at the Plaine des Palmistes 61°·7.

Animals. The fauna of Réunion is not very rich in variety of species; it lies midway between the Indian and the African type. The mammals are a brown maki (*Lemur mongoz*, Linn.) from Madagascar, *Pteropus edwardsii* now nearly extinct, several bats, a wild cat, the tang or tamec (*Centetes setosus*, Denn.), several rats, the hare, and the goat. Among the more familiar birds are the "oiseau de la vierge" (*Muscipeta borbonica*), the tec-tec (*Pratincola sybilla*), *Certhia borbonica*, the cardinal (*Foudia madagascariensis*), various swallows, ducks, &c. The visitants from Madagascar, Mauritius, and even India, are very numerous. Lizards and frogs of more than one species are common, but there is only one snake known in the island. Various species of *Gobius*, a native species of mullet, *Nestis cyprinoides*, *Osphronamus olfax*, and *Doules rupestris* are among the freshwater fishes.

Vegetation. In the forest region of the island there is a belt, 4500–5000 feet above the sea, characterized by the prevalence of *Bambusa alpina*; and above that is a similar belt of *Acacia heterophylla*. Besides this last the best timber-trees are *Casuarina laterifolia*, *Fœtida mauritiana*, *Imbricaria petiolaris*, *Elæodendron orientale*, *Calophyllum spurium* (red tacamahac), *Terminalia borbonica*, *Parkia speciosa*. The gardens of the coast districts display a marvellous wealth of flowers and shrubs, partly indigenous and largely gathered from all parts of the world. Fruits grown in the island are—the banana, the cocoa-nut, bread-fruit, and jack-fruit, the bilimbi, the carambola, the guava, the litchi, the Japanese medlar, the mangosteen, the tamarind, the *Abelmoschus esculentus*, the chirimoya, the papaya, &c.

Industries. Sugar, introduced in 1711 by Pierre Parat, is now the staple crop in Réunion, a greater proportion of the soil being devoted to it than to all other objects of cultivation. The methods employed in growing and manufacturing are not up to the Mauritius standard, and since 1878 the ravages of the phylloxera have ruined many of the plantations. In the 18th century the first place belonged to coffee (introduced from Arabia in 1715) and to the clove tree, brought from the Dutch Indies by Poivre at the risk of his life. Both are now cultivated on a very limited scale. Vanilla, introduced in 1818, though it occupies only about 1500 acres, sometimes produces a crop worth from £40,000 to £65,000. The average produce of the sugar crop in the five years 1873–77 was 35,493 tons of sugar with 777,710 gallons of syrup and treacle; from 1878 to 1883 the averages were 35,580 tons (40,176 in 1883) and 816,455 gallons. Rum is largely distilled, and is the favourite drink of all classes.

While potatoes, beans, manioc, sweet potatoes, and yams of local growth furnish a considerable amount of food, the far more important article rice has to be imported from India and Madagascar. India also sends castor-oil, wheat, and lard; Australia, flour and wheat; England, coals; the Cape and Muscat, salt fish; Buenos Ayres and Montevideo, mules and horses; the United States petroleum (largely used throughout the island), lard, pork, and pitch-pine.

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[1] The geology and volcanoes of Réunion were the object of elaborate study by Bory de St Vincent in 1801 and 1802 (*Voyages dans les quatre principales îles des Mers d'Afrique*, Paris, 1804), and have recently been examined by Drasche (see *Bericht K-K Geol Reichsanstalt*, Vienna, 1875-76) and Velain (thesis presented to the Faculté des Sciences, Paris, 1878

Harbour. **Railway.** The complete absence of natural harbours has all along been a great hindrance to the commercial development of Réunion. Whenever a storm is observed to be brewing an alarm gun is fired, and the vessels in the roadsteads make off from the dangerous coast. Since 1848 an artificial harbour capable of containing forty vessels has been constructed at Pointe des Galets at the north-west corner of the island. The port is connected by rail with La Possession on the one hand and with the Rivière des Galets on the other, and thus communicates with the railway which was completed in 1881 round the coast from St Pierre, by St Paul, St Denis, &c., to St Benoît, a distance of 83½ miles. This line is carried through a tunnel nearly 6½ miles long between La Possession and St Denis.

The windward arrondissement or division of Réunion comprises the eight communes of St Denis, Ste Marie, Ste Suzanne, St André, St Benoît, Salazie, Ste Rose, and Plaine des Palmistes, and the leeward division the six communes of St Paul, St Leu, St Louis, St Pierre, St Joseph, and St Philippe. St Denis, the capital of the island, lies on the north coast. It is built in the form of an amphitheatre and presents a most attractive appearance from the sea. Covering as a commune an area of 37,065 acres, it has a population of 30,835 according to the census of 1881, an increase of 18,000 since 1837. It has an abundant supply of pure water. Though the harbour is only an open roadstead, it has hitherto been the most frequented in the island. St Pierre, the chief town of the leeward arrondissement, has a communal area of 98,190 acres and a population of 27,748. Its artificial harbour, commenced in 1854 but afterwards interrupted, and resumed in 1881, has room for five or six vessels besides coasting craft.

Population. The population was 185,179 in 1872, 183,529 in 1878, and 170,734 in 1882. The males are largely in excess of the females (97,961 to 72,773 in 1882), owing to the number of agricultural labourers introduced from abroad for a term of years. Among the whites born on the island an infusion of alien blood is so common that in Mauritius the phrase Bourbon white is applied to linen of doubtful cleanness; the original settlers frequently married Malagasy wives. The name Petits Blancs is in Réunion given to a class of small farmers who lead an independent kind of life in the upper districts, supporting themselves by their garden-plots and hunting. By the beginning of the 18th century the number of Negro slaves in the island was 64,000, four times that of their masters; they were all (to the number of 20,000) emancipated in 1848, and have gradually acquired a large measure of social equality with the creoles. Various elements have been added to the population since the middle of the century—coolies from India in large numbers, Africans from the east coast, Chinese and Anamites, Malays, &c. The immigration of the Indian coolies is controlled by a convention between the British and French Governments of date July 1, 1881.

Réunion is usually said to have been first discovered in April 1513 by Mascarenhas, whose name is still applied to the archipelago of which it forms a part; but it seems probable that it must be identified with the island of Santa Apollonia discovered by Diego Fernandes Pereira on February 9, 1507. When in 1638 the island was taken possession of by Captain Gaubert or Gobert of Dieppe, it was still uninhabited; a more formal annexation in the name of Louis XIII. was effected in 1643 by Pronis, agent of the "Compagnie des Indes" in Madagascar; and in 1649 Flacourt, Pronis's more eminent successor, repeated the ceremony at La Possession, and changed the name from Mascarenhas to Bourbon. By decree of the Convention in 1793, Bourbon in turn gave place to Réunion, and, though during the empire this was discarded in favour of Île Bonaparte, and at the Restoration people naturally went back to Bourbon, it has remained the official designation since 1848. Between July 8, 1810, and April 6, 1815, the island was in the possession of England. It is now practically almost a department of France, sends a representative to the chamber of deputies, is governed by means of laws and not of decrees, and possesses a council-general and municipal councils elected by universal suffrage. In the general budget for 1881 the expenditure amounted to 6,866,272 francs, including 1,916,143 contributed by the home Government; in 1883 the total was 7,468,426, upwards of 3,420,000 being for communal expenses.

See, besides the works already mentioned, Demanet, *Nouv. hist. de l'Afrique française*, 1767; Thomas, *Essai de statistique de l'île Bourbon*, 1828; Dejean de la Batie, *Notice sur l'île Bourbon*, 1847; J. Mauran, *Impressions dans un voy. de Paris à Bourbon*, 1850; Maillard, *Notes sur l'île de la Réunion*, 1862; Azéma, *Hist. de l'île Bourbon*, 1862; Roussin, *Album de l'île de la Réunion*, 1867-69, and 1879; an elaborate article in *Encyclopédie des Sciences Médicales*; Bionne, "La Réunion," in *Exploration*, 1879. Most maps are based on Maillard's, one by Paul Lepervanche in four sheets was published in 1885 by Dufrenoy. (H. A. W.)

RÉUS, a town of Spain, in the province of Tarragona, is situated at the foot of a chain of hills in a fertile plain about four miles from the sea. It is connected by rail with Tarragona, 9½ miles to the east, and with Lerida, 64½ miles to the north-west. It consists of two parts, the old and the new, separated by the boulevard-like Calle Arrabal, which occupies the site of the old wall, some vestiges of which still remain: the old town centres in the Plaza del Mercado, from which narrow and tortuous lanes radiate in various directions; the new dates from about the middle of the 18th century, and its streets are wide and straight. The public buildings have no special architectural or historical interest, but the view from the tower of the church of San Pedro is exceptionally fine. Réus, next to Barcelona itself, is the most flourishing manufacturing centre in Catalonia, the staples being silk and cotton; imitations of French wines are also extensively made, and the miscellaneous industries include tanning, distilling, and the like. The cotton factories exceed eighty in number, and one of them employs upwards of six hundred hands. Most of the traffic of Réus passes through the comparatively sheltered port of Salou, four miles distant. The population of Réus in 1877 was 27,595.

The earliest records of Réus date from about the middle of the 13th century. Its modern prosperity is traced to about the year 1750, when a colony of English settled there and established a trade in woollens, leather, wine, and spirits. The principal incidents in its political history arose out of the occurrences of 1843, in connexion with which the "villa" became a "ciudad" and Generals Zurbano and Prim each received the title of count of Réus.

REUSS is the name of two small sovereign principalities of the German empire, with a joint area of 440 square miles, forming part of the complex of Thuringian states, and consisting, roughly speaking, of two principal masses of territory, separated by the Neustadt district of the duchy of Saxe-Weimar. The more southerly and much the larger of the two portions belongs to the bleak mountainous region of the Frankenwald and the Voigtland, while the northern portion is hilly but fertile. The chief rivers are the Elster and Saale. About 37 per cent. of the total surface is occupied by forests, while 40 per cent. is under tillage and 19 per cent. in meadow and pasture. Since 1616 the lands of Reuss have been divided between an elder and a younger line (*Reuss älterer Linie* and *Reuss jüngerer Linie*) of the ancient princely house. The male members of both branches of the family all bear the name of Henry (Heinrich), the individuals being distinguished by numerals. In the older line the enumeration begins again when the number one hundred is reached, while in the younger house it opens and closes with the century. Thus the reigning prince of Reuss jüngerer Linie, born in 1832, is styled Henry XIV., and he succeeded his father Henry LXVII., born in 1789. The princes of Reuss are very wealthy, and their private domains comprise great part of the territory over which they rule. In the event of the extinction of either line, its possessions fall to the other. The troops of Reuss furnish a few companies to the seventh regiment of Thuringian infantry.

REUSS-GREIZ, or REUSS ÄLTERER LINIE, with an area of 122 square miles, belongs to the larger of the two main divisions above mentioned, within which it consists of three large and several smaller parcels of land, bordering on Saxony, Reuss jüngerer Linie, Schwarzburg-Rudolstadt, and the Prussian exclave of Ranis. The soil is on the whole little favourable for agriculture, but cattle-rearing is carried on with some success. No less than 63 per cent. of the inhabitants are supported by industrial pursuits, the chief products of which are the woollen fabrics of Greiz, the capital, and the stockings of Zeulenroda, both largely exported. The population of the principality in 1880 was 50,782, of whom only 450 were Roman Catholics and 60 Jews. The constitution of Reuss-Greiz dates from 1867, and provides for a representative chamber of twelve members, of whom three are appointed by the prince, while two are elected by the nobles, three by the towns, and four by the rural districts.

The revenue and expenditure for 1885 were each estimated at £36,254, while the public debt in 1884 was £46,886.

Reuss-Schleiz, or Reuss jüngerer Linie, with an area of 318 square miles, includes part of the southern and the whole of the northern of the two main divisions above indicated, touching Bavaria on the south and Prussian Saxony on the north. The former portion is known as the Oberland, the latter as the Unterland. Owing to the fertility of the Unterland, agriculture is carried on here with greater success than in Reuss-Greiz, fully one quarter of the population being supported by tillage and cattle-breeding. The industrial activity is, however, also large, supporting one-half of the population. The principal product consists, as in Reuss-Greiz, of woollen goods, and the manufacture centres in the capital, Gera, a busy town with 27,118 inhabitants. A considerable trade is carried on in the products of the manufactories, and in timber, cattle, and slate. The iron mining of the Oberland is limited by the want of sufficient railway communication. Large quantities of salt are yielded by the brine springs of Heinrichshall. In 1880 Reuss-Schleiz contained 101,330 inhabitants, including 442 Roman Catholics and 69 Jews. The annual revenue and expenditure for 1885–1886 were calculated at £66,060; the public debt in 1884 was £61,780.

The history of Reuss stretches back to the times when the German emperors appointed voigts, or bailiffs, to represent them in lands conquered from the Serbs or other Slavonic races. The forefathers of the present princes of Reuss appear in this capacity at an early period, and the historical head of the family is generally recognized in Henry, voigt of Weida, who flourished about the middle of the 12th century. The name of Reuss came to be applied to the territory ruled over by his descendants from the sobriquet of "Der Russe," or the Russian, which one of them acquired about 1280 from the nationality of his mother. The district embraced by the name was at one time much more extensive than at present, taking in the Bavarian town of Hof and the whole of the Saxon Voigtland. Of the numerous lines and sub-lines into which the family was divided nearly all became sooner or later extinct, till in 1616 none were left except the two that still subsist. Since 1616 numerous subdivisions have again taken place within these families, and it was not till 1848 that Reuss jüngerer Linie became again a united whole. The rulers of Reuss were created counts of the German empire in 1671 and sovereign princes in 1778. In 1807 both principalities joined the Confederation of the Rhine, and in 1866 Reuss-Greiz had to atone for its active sympathy with Austria by the payment of a fine. Since 1871 both principalities have been members of the German empire, each sending one member to the federal council and one representative to the Reichstag.

REUTER, Fritz (1810–1874), the greatest writer in Platt Deutsch, was born on the 7th November 1810, at Stavenhagen, in Mecklenburg-Schwerin, a small country town which had few means of communication with the rest of the world. His father was burgomaster and sheriff (Stadtrichter), and in addition to his official duties carried on the work of a farmer. Until his fourteenth year Reuter was educated at home by private tutors. He was then sent to the gymnasium at Friedland, in Mecklenburg-Strelitz, and afterwards he passed through the higher classes of the gymnasium at Parchim. He had a considerable talent for drawing, and wished to become an artist; but, as his father decided that he should be a lawyer, he began in 1831 to attend lectures on jurisprudence at the university of Rostock. In the following year he went to the university of Jena. The German Governments, alarmed by the revolutionary agitation of 1830, were on the alert to detect symptoms of popular discontent; and a formidable riot at Frankfort in 1833 gave them an excuse for treating the universities with great harshness. Reuter, as a member of the Burschenschaft "Germania" at Jena, was arrested by the Prussian Government; and, although the only charge which could be proved against him was that he had been seen wearing the German colours, he was condemned to death for high treason. This monstrous sentence was commuted by King Frederick William III. of Prussia to imprisonment for thirty years in a Prussian fortress. Reuter accepted his fate calmly, and he had need of all his courage, for during the next few years he was taken from one Prussian fortress to another, in each of which he was kept in close confinement. In 1838, through the personal intervention of the grand-duke of Mecklenburg, he was delivered over to the authorities of his native state, but on condition that he should still be a prisoner. The next two years he spent in the fortress of Dömitz. In 1840 to his great joy he was set free, an amnesty having been proclaimed after the accession of Frederick William IV. to the Prussian throne.

Although Reuter was now thirty years of age, he went to Heidelberg to resume his legal studies; but he soon found it necessary to return to Stavenhagen, where he aided in the management of his father's farm. During his imprisonment he had studied many works on agriculture and on the sciences related to it, and he was able to make good use of the knowledge he had thus obtained. After his father's death, however, he was compelled by want of capital to abandon farming, and in 1850 he settled as a private tutor at the little town of Treptow in Pomerania. Here he married Luise Kunze, the daughter of a Mecklenburg pastor. They had been betrothed when Reuter was at Stavenhagen, and their union proved to be one of uninterrupted happiness.

At Treptow he had to work hard as a private tutor for small pay, but in the evenings he found time to amuse himself by writing, in Platt Deutsch, in prose and verse, a number of tales and anecdotes. This collection of miscellanies was published in 1853 in a volume entitled *Läuschen und Riemels*. The book contains many lively sketches of manners in North Germany, and it was received with so much favour that Reuter was encouraged to make new ventures in literature. Fortunately he decided to go on writing in Platt Deutsch. There are so many abstract terms in High German that few writers succeed in the attempt to use it as a vehicle for the powerful utterance of simple and natural feeling. Platt Deutsch, on the contrary, although limited in its range, is fresh and vigorous, and in direct contact with the motives which give unfading charm to old popular songs and ballads. All the resources of this strong and expressive dialect were at Reuter's service. He thought in Platt Deutsch, and in his greatest efforts was always able to find the right word for that exquisite blending of humour and pathos which is one of the most characteristic notes of his writings.

The work which succeeded *Läuschen und Riemels* was *Polterabendgedichte*, and in the same year (1855) appeared *De Reis nach Belligen*, a humorous poem describing the adventures of some Mecklenburg peasants who resolve to go to Belgium (which they never reach) to learn the secrets of an advanced civilization. These writings attracted much attention, and Reuter was so confident of success that in 1856 he left Treptow and established himself at Neubrandenburg, resolving to devote his whole time to literary work. His next book (published in 1858) was *Kein Hüsung*, a poem in which he presents with great force and vividness some of the least attractive aspects of village life in Mecklenburg. This was followed, in 1859, by *Hanne Nüte un de lütte Pudel*, the best of the works written by Reuter in verse. The qualities of those who have a part to play in the story are brought out with remarkable distinctness, and the action provides the poet with many opportunities of giving free expression to his ardent love of nature.

In 1861 Reuter's popularity was largely increased by *Schurr-Murr*, a collection of tales, some of which are in

High German, but this work is of slight importance in comparison with the series of stories which he had already begun, and by which he was to establish his fame as one of the foremost writers of his age. To this series he gave the general title *Olle Kamellen.* The first volume, *Zwei Lustige Geschichte*, published in 1860, contained *Woans ik tau 'ne Fru kamm* and *Ut de Franzosentid. Ut mine Festungstid* (1861) formed the second volume; *Ut Mine Stromtid* (1864) the third, fourth, and fifth volumes; and *Dörchläuchting* (1866) the sixth volume. *Woans ik tau 'ne Fru kamm* is a bright little tale, in which Reuter tells, in a half serious half bantering tone, how he wooed the lady who became his wife. In *Ut de Franzosentid* he undertook a more difficult task, which enabled him for the first time to do full justice to his genius. The scene is laid in and near Stavenhagen (Platt Deutsch, Stemhagen) in the year 1813, and the principal complications spring from the disappearance of a Frenchman, which gives rise to suspicions of foul play. In this powerful tale the characters are depicted by means of a few bold and rapid strokes, and our interest in them is heightened by the fact that their personal fortunes are associated with the great events which at the beginning of the 19th century stirred the heart of Germany to its depths. *Ut mine Festungstid* is of less general interest than *Ut de Franzosentid*, but it is not less vigorous either in conception or in style. It contains a narrative of Reuter's hardships during the term of his imprisonment, and it awakens sympathy all the more effectually because it is brightened by many a gleam of kindly and humorous feeling. *Ut mine Stromtid* is by far the greatest of Reuter's writings, and ranks with the most famous masterpieces of modern fiction. He records few incidents which might not happen in the lives of ordinary men and women, yet he never loses his hold over the imagination of his readers, so full of vitality are the characters of his story, and so deep is his insight into the enduring facts of human nature. The most original character in the book is Bräsig, an eccentric old bachelor, fond of gossip and apt to interfere too much in the affairs of his neighbours, but humorous, loyal to the core, and coming out most brightly when his good qualities are put to the severest test. There is a touch of romance, too, in this simple and genial nature, for he retains to the last his love for the woman who had fascinated him in his youth, and is always at hand to serve her when she needs his help. Another powerfully conceived character is Havermann, a man of solid and serious judgment, calm and undemonstrative, of sterling rectitude, and revealing at the great crises of life infinite depths of love and pity. Equally attractive in their own way are the good pastor and his wife, who bring up Havermann's daughter, Louise, in their quiet parsonage; and we come to know intimately every member of the pleasant household in which Havermann's frank and comely sister (whom Bräsig secretly loves) is the central figure. In this great book Reuter displays imaginative power of the highest order in the expression of every mood and passion within the proper range of his art; and he fails, or at least does not perfectly succeed, only when he deals with characters belonging to classes he had never had an opportunity of studying closely. As in *Ut de Franzosentid* he describes the deep national impulse in obedience to which Germany rose against Napoleon, so in *Ut mine Stromtid* he presents many aspects of the revolutionary movement of 1848. He shows little sympathy with some of the most characteristic aspirations of the period, but in many passages he indicates by slight but significant touches the strength of the forces which had begun to make for social as distinguished from merely political reorganization.

In 1863 Reuter transferred his residence from Neubrandenburg to Eisenach; and here he died on the 12th June 1874. In the works produced at Eisenach he did not maintain the high level of his earlier writings. *Dörchläuchting*, although it contains some striking passages, lacks the freshness and spontaneity of the other tales of the series to which it belongs; and admirers of his genius found little to interest them in *Die Montechi und Capuleti in Konstantinopel*, which he wrote after a visit to the Turkish capital.

Reuter is the most realistic of the great German writers. To the dreamers of the romantic school he has not the faintest resemblance, nor does he ever attempt to describe ideally perfect characters. The men and women of his stories are the men and women he knew in the villages and farmhouses of Mecklenburg, and the circumstances in which he places them are the circumstances by which they were surrounded in actual life. His fidelity to facts is as exact as that of the Dutch school of painters, and, like them, he thinks nothing too minute for his use, if by small details he can give variety and animation to his pictures. But he does not merely glide over the surface of life; he penetrates to the inmost springs of feeling, and in simple peasant folk finds characteristics which in his hands become types of universal qualities. The sources of tears and the sources of laughter he touches with equal ease; but, while his humour is sometimes rather extravagant, his pathetic passages are always marked by perfect truth and delicacy. His description of the death of the old pastor in *Ut mine Stromtid* is one of the gems of modern literature, and the scene in which Bräsig dies, holding the hand of the woman he has loved all his life, is in a different way not less impressive. Reuter's only serious defect as an artist is that he fails to maintain the due proportion between the different parts of his stories. If an idea attracts him, he cannot resist the temptation to unfold its full significance, whether or not it is in organic relation with his scheme as a whole. To some extent, however, the reader is compensated for these interruptions by happy strokes of humour which would have been rendered impossible had Reuter forced himself to adopt a more rigid method.

Reuter's *Sammtliche Werke* in thirteen volumes (edited by Ad. Wildbrandt) were published in 1863-68. To these were added in 1875 two volumes of *Nachgelassene Schriften*, with a biography; and in 1878 a comedy, *Die drei Langhanse*. See Glagau, *Fritz Reuter und Seine Dichtungen*, 1866; Ebert, *Fritz Reuter*, 1874; and Zell, "Fritz Reuter," in *Unsere Zeit*, 1875. (J. Si.)

REUTLINGEN, a manufacturing town of Würtemberg, situated in a fertile and pretty district on the Echatz, an affluent of the Neckar, near the base of the Achalm, and 20 miles to the south of Stuttgart. It is a quaint but well-built town, with numerous picturesque houses and a fine Gothic church of the 13th and 14th centuries, overtopped by a lofty spire. The tanneries of Reutlingen are extensive, producing large quantities of leather; and its other industrial products are very multifarious, including cotton, woollen, and knitted goods, lace, ribbons, hats, shoes, paper, machinery, hardware, and lime. To fruit-growers Reutlingen is interesting as the seat of a celebrated pomological institute, while the Christian-socialist refuges of Pastor Werner are widely known in philanthropic circles. In 1880 the town contained 16,609 inhabitants, of whom 809 were Roman Catholics and 44 Jews.

Reutlingen was made a free imperial town by Frederick II. in 1240, and was unflinching in its loyalty to the emperors of his line. It successfully resisted a siege by Heinrich Raspe, the rival of Conrad IV., and in 1377 its citizens defeated Count Ulrich of Würtemberg at the Achalm. At a later period Reutlingen became a member of the Swabian League, and it was among the first Swabian towns to embrace the Reformation. It was annexed to Würtemberg in 1802.

REVAL, or REVEL (Russian *Revel*, formerly *Kolywañ*; Esthonian *Tallina*), a seaport of Russia, capital of Esthonia, is situated in a bay on the southern coast of the Gulf of Finland, in 59° 27′ N. lat. and 24° 45′ E. long., 230 miles west of St Petersburg by rail. The city consists of two parts—the "Domberg" or "Dom," which occupies a hill, and the lower town on the beach—and is surrounded by pleasant suburban houses with gardens. The "Dom" contains the castle, where the provincial administration has its seat, and the slopes of the hill are covered with the well-built houses of the German aristocracy. It has its own administration, separate from that of the lower town. This last retains a mediæval character, with narrow tortuous streets and high tile-roofed houses often enclosing large storehouses within their thick walls. Reval has more interesting antiquities than any other town of the Russian Baltic provinces. The old church of St Nicholas, built in 1317, contains many antiquities of the old Catholic times and old German paintings, of which a Dance of Death is especially worthy of notice. It contains also the graves of Holstein Beck and of the Duc de Croy, who was denied burial for his debts, and whose mummy, dressed in velvet and fine lace, was exposed until 1862. The "Domkirche" contains many interesting shields, as also the graves of the circumnavigator Krusenstern, of Pontus-de-la-Gardie, Henry Matthias, Karl Horn, &c. The church of St Olai, first erected in 1240, and often rebuilt, was completed in 1840 in Gothic style; it has a bell tower 429 feet high. The oldest church is the Esthonian, built in 1219. Water is brought from Lake Järväkylä by an aqueduct. The pleasant situation of the town, surrounded by beautiful parks, attracts in summer thousands of people for sea-bathing.

The population of Reval has increased rapidly since it has been connected by rail with St Petersburg and with Baltic Port, 30 miles distant; it reached 50,490 in 1881, against 27,325 in 1867, of whom one-third are Germans, the remainder Esthonians, with a few Russians and Jews. Nearly 15,000 inhabitants belong to the Greek Church. The manufactures are not important, but trade grows steadily. In 1882 the exports (grain, spirits, &c.) were £1,746,244, the imports (coal, iron, chemicals, &c.) £6,858,247. In 1882 Reval was visited by 589 foreign ships (291,450 tons), mostly English, German, and Scandinavian, and by 802 coasters (103,000 tons). It has regular steam communication with St Petersburg, Helsingfors, Königsberg, &c.

The high Silurian crag now known as Domberg was early occupied by an Esthonian fort, Lindanissa. In 1219 or 1233 the Danish king Waldemar II. erected there a strong castle and founded the first church of the Holy Ghost. In 1228 the castle was taken by the Livonian knights, but nine years later it returned to the Danes. About the same time Lübeck and Bremen merchants settled there under the protection of the castle, and their settlement soon became an important seaport of the Hanseatic League. It was fortified early in the 14th century, and in 1343 sustained the siege of the revolted Esthonians. Waldemar III. sold Reval and Esthonia to the Livonian knighthood for 19,000 silver marks, and the town belonged to the knighthood till its dissolution in 1561, when Esthonia and Reval surrendered to the Swedish king Erik XVI. A great conflagration in 1433, the pestilence of 1532, the bombardment by the Danes in 1569, and still more the Russo-Livonian War, broke down its formerly wealthy trade. The Russians not only devastated the neighbouring country but also besieged Reval twice, in 1570 and 1577. It was still, however, an important fortress, the forts and walls having been enlarged and fortified by the Swedes. In 1710 the commander Patkull surrendered it to Peter I., who immediately began there the erection of a military port for his Baltic fleet. The successors of Peter I. continued to fortify the access to Reval from the sea, large works being undertaken especially in the first part of the present century. During the Crimean War the suburb Reperbahn, situated on a low slip of coast, was destroyed in view of a possible landing of the allies.

REVELATION, Book of. The book of the New Testament called "Revelation of John" (Ἀποκάλυψις Ἰωάννου) so long passed for the most obscure and difficult document of early Christianity that scholars hesitated to apply to it the historico-critical method of investigation. Since this hesitation has been overcome, it appears that the matter of the book is neither obscure nor mysterious, although many special points still remain to be cleared up. Without being paradoxical we may affirm that the Apocalypse is the most intelligible book in the New Testament, because its author had not the individuality and originality of Paul or of the author of the Fourth Gospel, and because historically we can trace and comprehend its author's position much better than we can, for instance, the theology of Paul. But all interpretations not strictly historical must be excluded. The ethico-spiritualistic, rationalistic, and dogmatic explanations, such as were first attempted by the Alexandrine theologians, are fatal to the understanding of the book, as are also the explanations drawn from church history which were first put forward by mediæval sects. To see with Hengstenberg "demagogy" in "Gog and Magog" (xx. 8), to identify "Apollyon" (ix. 11) with "Napoleon," or in antichrist to detect the emperor or the pope or Mohammed or Luther or Calvin—these interpretations are not a bit worse than those which turn the book into a compendium of morality or dogma wherein is set forth by means of imagery and allegories the triumph of virtue over vice or of orthodoxy over heterodoxy. The justification of the interpretation which explains the book entirely in the light of the historical circumstances attending its origin and of the views current amongst primitive Christians follows, above all, from observing that as a literary production the Revelation of John is by no means unique, but belongs to a class of literature (comp. APOCALYPTIC LITERATURE, vol. ii. p. 174) which then had a very wide currency amongst the Jews, and the numerous remains of which even the most orthodox theologians do not hesitate to interpret by the help of the history of the time. The apocalyptic literature, in the strict sense of the word, began with the Jews in the 2d century B.C.; in fact it developed as an aftergrowth of the prophetical literature, from which it differs less in kind than in degree. For more than three centuries it had sought to revive the drooping spirit of the people by revelations of a near future when, after one last dreadful onset of a hostile world, Jahveh would appear in the person of His Messiah to conquer the nations of the world and to set up the kingdom of glory for Israel. Every time the political situation culminated in a crisis for the people of God the apocalypses appeared, stirring up the believers. In spirit, form, plan, and execution they closely resembled each other. Their differences sprang only from the difference of the times, for every apocalyptic writer painted the final catastrophe after the model of the catastrophes of his day, only on a vaster scale and with deepened shadows. They all spoke in riddles; that is, by means of images, symbols, mystic numbers, forms of animals, &c., they half concealed what they meant to reveal. The reasons for this procedure are not far to seek:—(1) clearness and distinctness would have been too profane—only the mysterious appears divine; (2) it was often dangerous to be too distinct. The apocalyptic writers in their works supplied revelations on all possible questions, but their principal achievement was regularly a revelation of the history of mankind in general and of the people of Israel in particular: in their most essential features the apocalypses are political manifestos. It is characteristic of all apocalypses that they pass under false names, being attributed to the most celebrated persons of the Old Testament; thus we still possess apocalypses under the names of Daniel, Baruch, Ezra, Moses, and Enoch. These old heroes are represented in the respective works as speaking in the first person, and exhorting their readers to await with hope and patience the coming of the Messiah. Usually the apocalypse contains a brief summary of history, beginning with the time of the nominal and ending with that of the actual author, in order that the reader, perceiving how much of the prophecy has already been fulfilled to the letter, may look with assured confidence for the fulfilment of the rest. Lastly, the particular features in the descriptions as well as the images and metaphors are usually borrowed in great measure from the books of the old prophets, but they are painted in heightened colours on an ampler canvas. "The imagery is alive with the burning breath of the East; a luxuriant fancy sacrifices beauty to boldness and sets proportion at defiance; all that is sweet and human yields to all that is monstrous and repulsive. A flow of metaphors, an interminable personification of abstractions, animates these strange creations with the weird and awful life of some fantastic resurrection scene. At the same time none of the descriptions are clear and intelligible; the outlines of the pictures melt and fade away in tremulous lines despite the coarseness of the material on which they are drawn."

As Jesus Christ had promised to come again, the Jewish expectations of a Messiah who should be revealed continued unabated among many of His disciples; that which as Jews they had hoped from the first and only advent they now deferred till the second. True, the kingdom of God which He had promised did not tally with the materialistic hopes of the people, but on the other hand He had not infrequently Himself employed the figurative language of the prophets and apocalyptic writers; and, after He had left the earth, many sayings borrowed from the Jewish apocalypses were put in His mouth by a vitiated tradition.[1] In the expectations of Christians of the 1st century spiritual and material elements were strangely blent. Hence not only were the Jewish apocalypses, the genuineness of which no one doubted, read in the Christian communities and transmitted to the Gentile converts, but soon there appeared new apocalypses written by Christians. We cannot wonder at this, for all conditions favourable to the production of such writings were to be found in the churches also; above all, men were conscious of possessing the spirit of prophecy in a far fuller measure than ever before, and this spirit necessarily manifested itself not only in signs and wonders but also in revelations and predictions. Of the Christian apocalypses written between 70 and 170 A.D. only a very small portion is known to us; for the later church viewed them as dangerous and got rid of them. Even of the apocalypse of Peter, written in the 1st century and regarded as canonical in some provinces as late as the 3d, only a very few fragments have come down to us.[2] But the great Apocalypse which bears the name of John has been preserved. It is to its reception into the canon that we owe the preservation of this precious, indeed unique, monument of the earliest Christian times.

Form, Contents, and Purpose.—If we leave out of view chapters i. to iii. the Apocalypse of John does not differ very materially in form from the Jewish apocalypses; but undoubtedly its arrangement is better, and its execution simpler and grander, and therefore more tasteful.[3] In its contents, however, the distinction between this Christian apocalypse and its Jewish fellows is marked; for, while the latter have not and could not have any actual knowledge of the Messiah whom they promise, the Apocalypse of John centres round the crucified and risen Jesus, the Lamb that was slain. The author knows whom he and the Christian community have to expect; to him Jesus Christ is the alpha and the omega, the first and the last; he is the Lord of the world and of history. And this faith gives to the Apocalypse of John a tone of assured confidence and hope such as is not to be found in the Jewish apocalypses. On the other hand, however firm and sure the Christian faith of the author appears, he was still completely hide-bound in the old forms; it is really a case of new wine in old bottles. But this very circumstance gives to the book its peculiar charm, for in no other early Christian writing are new and old to be found so completely mingled as in this. The author's attitude towards the world and the state is still entirely the Jewish attitude of surly hate—this disciple of the gospel has not yet learned that we are bound to love our enemies; but his attitude towards God and his view of the value of a man's own works show no longer the Jewish but the new Christian belief, for he sees God in Christ, he has accepted the doctrine of the forgiveness of sins through the blood of the Lamb, and regards himself as a priest and king before God. Hence too he lives and moves no longer in the law but in the prophets and the psalms. From them, especially from the prophets Ezekiel, Zechariah, and Daniel, he borrowed most of his imagery and symbols. What he has done in his book is to create a great apocalyptic painting or rather a drama worked out in different acts. Impatient longing for the end, a deep abhorrence of the heathen state, a firm faith in Christ and His second coming, a minute and painstaking study of the old prophecies—these are the sources from which the description of the future are drawn. The purpose is the same as that of all apocalypses—to confirm and strengthen the little family of believers in their patience, their courage, and their confidence, by pointing out that the sufferings of the time will last but a brief span and that the present troubles are already the beginning of that end when sorrow and suffering will in a moment be transformed into glory unspeakable.[4]

The revelation proper begins with iv. 1,—the first three chapters forming an introduction (the seven letters to the seven churches of Asia Minor, which are prefixed, are marked by poetical beauty and power of language). The future is written in a book with seven seals, which the Lamb opens one after the other (iv., v.). The opening of each seal brings a plague upon the earth (vi.). Before the seventh seal is opened, the church of the latter days is itself sealed that it may be preserved harmless from the assaults of the powers of hell (vii.). At the opening of the seventh seal seven angels with trumpets appear on the scene, each of whom blows a trumpet-blast as a prelude to new horrors on the earth (viii., ix.). With the sixth trumpet the preliminary judgments are at an end (hence the episode, ch. x.). The judgment proper begins with the fall of Jerusalem (xi.). Then the seventh trumpet sounds as the signal for the last dread horrors and for the final judgment of the world and of all wickedness. This is preceded, however, by a description of the preservation of the church of the latter days (xii.), forming one of those pauses in the narrative which give the reader breathing time and relieve the horror of the description by the introduction of scenes of peace and words of comfort. The power of the world that opposes Christ (the Roman empire) is described along with all its devilish accomplices (xiii.). and (xiv.) its destruction is by anticipation set forth in figures. The seven angels follow with the seven vials of wrath, which are poured forth and represent the beginning of the final catastrophe (xv., xvi.). This final catastrophe, involving the imperial city, the antichristian emperor, his governors, and. last of all, the devil himself, is described in xvii.-xx. 3,—xix. 11 *sq.* forming the climax, when Christ himself appears on a white horse and vanquishes all his foes. The devil is chained in the bottomless pit for a thousand years; during this time the saints of the latter days—not all believers—reign with Christ.[5] After the devil has been released once more and has made war on the holy city he is for ever overthrown and the last judgment follows (xx.). In xxi.–xxii. 5 the glory of the heavenly and eternal Jerusalem is set forth. In xxii. 6–21 several epilogues may be detected.

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[1] *E.g.*, the saying of Jesus handed down by Papias in Iren. v. 33; compare with it *Apoc. Baruch*, 29. In the eschatological speeches of Jesus reported by the synoptical writers there is no doubt that sayings are introduced which are derived not from Jesus but from the Jewish apocalyptic writers. See the discussions in Weiffenbach, *Der Wiederkunftsgedanke Jesu*, 1873.

[2] See Hilgenfeld, *Nov. Test. extra Can. recept.*, fasc. iv.

[3] The literary value of the Apocalypse of John is much higher than that of any of the Jewish apocalypses. The author possessed the art of keeping his readers enthralled and excited from first to last; by a suitable arrangement he has really reduced his motley material to order. and by skilful description he has contrived to make even the repulsive endurable.

[4] The way in which the author has given expression to this practical purpose by means of scenes and images reveals the great artist.

[5] This idea, germs of which are to be found in the Jewish apocalypses, is easily explained when we remember that two different views of the resurrection and of the future kingdom prevailed amongst the Jews. According to the one view only favoured persons, according to the other every one would rise from the dead; according to the one view the future kingdom would have only a limited duration, according to the other it would be eternal. In the Revelation of John the two suppositions are combined.

Unity and Integrity.—The above analysis will have shown the essential unity of the book. The more attentively we scan the connexion of the descriptions with each other the more clearly do we perceive the unity, the artistic and systematic arrangement, of the book. This is completely overlooked by those who fancy that in the seven seals, the seven trumpets, the seven vials of wrath, the whole course of the judgment is simply repeated in ever new imagery. Leaving all other objections out of account, this supposition is refuted by the simple observation that the author has not merely placed the different scenes side by side but has linked them together in such a way that each scene follows as a consequence from the scene before. A correct perception of the plan of the book further negatives the opinion of older scholars and of Völter in modern times (*Die Entstehung der Apokalypse*, 1882) that the book consists of different parts by different authors.[1] But it is probable enough that the work has been interpolated and touched up in various places (certainly in i. 1–3); and several verses of the epilogue (xxii. 6–21) are not by the author of the book, as indeed the language itself is sufficient to prove. Unless we are utterly deceived, the book underwent systematic if not very radical revisions even before the middle of the 2d century.[2] To the additions then made belong, amongst others, the famous words (xix. 13) *καὶ κέκληται τὸ ὄνομα αὐτοῦ ὁ λόγος τοῦ θεοῦ*, which do not fit into the passage. An exact investigation of the extent of the alterations and additions would be a very useful work.[3]

Language.—The language is more Hebraic than that of any other New Testament book. The author thought in Hebrew and wrote in Greek. But the gross violations of Greek grammar are not to be explained from ignorance. "In the language of the Apocalypse there is nothing of the bungling and happy-go-lucky style of a beginner; indeed it bears the stamp of consistency and purpose." The author writes, *e.g*, *χάρις καὶ εἰρήνη ἀπὸ ὁ ὢν καὶ ὁ ἦν καὶ ὁ ἐρχόμενος καὶ ἀπὸ τῶν ἑπτὰ πνευμάτων . . . καὶ ἀπὸ Ἰησοῦ Χριστοῦ, ὁ μάρτυς, ὁ πιστός* (i. 4, 5), although he has shown in a hundred passages that he knew very well the rules which he has here broken. He must have deliberately intended to break them in order to give to the words of his greeting a certain elevation and solemnity. Of course only to a foreigner could it have occurred to employ those means for this end.

Author's Standpoint.—That the book is not written by a disciple of the apostle Paul, that its author is filled with Jewish hatred and abhorrence of the heathen state, that in other ways traces of the Jewish spirit crop up here and there in the Apocalypse, is beyond question. But many critics, especially the so-called Tübingen school, as well as Renan, Mommsen, and others, have gone still farther; the author of the Apocalypse, say they, was an Ebionite and a decided opponent of the apostle Paul. In support of this hypothesis, which they put forward as if it were an established truth, they appeal chiefly to the following observations:—(1) in ch. vii. only 144,000 Jews are sealed, therefore the author regarded only born Jews as full members of the Messiah's kingdom; consequently (ver. 9 *sq.*) the multitude which is not numbered forms a wider circle, viz., the proselytes, who are not counted and also not sealed, and are therefore of lower rank; (2) in ii.–iii. the author displays the greatest abhorrence of those who eat meat which has been offered to idols and who practise "fornication"; by these none but disciples of Paul can be meant; (3) in xxi. 14 the author speaks only of twelve apostles, and thereby undoubtedly excludes Paul; (4) the author praises (ii. 2) the Ephesians because they have found the false apostles to be liars and have rejected them, but by these false apostles only Paul could be meant; (5) the author cannot conceive (xi. 1, 2) that the temple at Jerusalem should ever be destroyed, and proves by this how much he himself still clung to the temple worship.

The point in dispute is of the highest importance for the proper understanding of the history of primitive Christianity. If the Tübingen school is right, the Pauline epoch was followed in Asia Minor by an Ebionitic epoch, and in this case catholicism may very well be the product of a compromise between Paulinism and Jewish Christianity. But on this very point it can be clearly shown that the Tübingen school is in the wrong; for the above arguments amount to nothing.

(1) The 12 × 12,000 (vii. 4 *sq.*) can only, like James i. 1, be interpreted allegorically and referred to Christians generally without respect of nationality; the twelve tribes are the Christians. This interpretation is the only possible one, because (*a*) in xiv. 3 it is said of the 144,000 that they are bought from the earth, and because (*b*) besides the 144,000 who are sealed no one survives the horrors of the last time. We must not overlook the fact that in ch. vii. two entirely different visions are presented, which are not to be fused into a single vision: the 144,000 are on earth, the unnumbered multitude (ver. 9 *sq.*) are not a supplement of these 144,000, but are already in heaven and represent the sum of all the children of God from the beginning. Thus, if the 144,000 were exclusively Jews, in the last time there would be no Christian at all from among the heathen; that is, no heathen would be saved. But that this is the author's meaning not even the Tübingen critics can maintain. Thus the "twelve tribes" are to be understood allegorically. As Abraham is the father of all believers, so all believers make up the nation of the twelve tribes. (2) The polemic against the eating of meat offered to idols and against "fornication" is not peculiar to the author, but is to be found in several early Christian writings. It is not a polemic against Paul; at most it is a polemic against lax disciples of Paul; further it is no sign of Ebionitism, for very many Gentile Christian writers of the 2d century (*e.g.*, Justin) combated the eating of meat offered to idols. The rule mentioned in Acts xv. 29 may really have been made between 58 and 70 A.D., and may have been a condition of intercourse between Jewish and Gentile Christians. After that time it gradually prevailed all over Christendom. (3) In the ideal description of the new Jerusalem it would have been impossible for the author to speak of thirteen apostles. (4) The plural *ἀπόστολοι* (ii. 2) shows that Paul is not meant, and the comparison with ii. 9 and iii. 9 makes it probable that Jewish emissaries are intended. But, apart from this, we see better than heretofore by the newly discovered *Teaching of the Apostles* that the name "apostle" was not confined to the twelve apostles and Paul. If the author had wished to express abhorrence of Paul he could not have done it more obscurely than he has done it in ii. 2. (5) The author says expressly (xxi. 22) that he saw no temple in the new Jerusalem, "for the Lord is her temple and the Lamb"; hence he felt that the temple worship was no longer needed to satisfy his religious wants; in excepting the temple buildings from the universal destruction (xi. 1) he follows a Jewish notion, to which in his heart he has already risen superior.

The arguments to prove the Ebionitism of the Apocalypse are therefore insufficient; rather, we should say, the Apocalypse shows us a Christianity free from the law, free from national prejudices, universal, and yet a Christianity which is quite independent of Paul. It is this that constitutes the high importance of the book. The author speaks not at all of the law—the word does not occur in his work; he looks for salvation from the power and grace of God and

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[1] See *Theol. Lit.-Zeitung*, 1882, No. 24.

[2] The redaction of the Apocalypse took place long before Irenæus (before 185 A.D.), for it can be shown that the *σπουδαῖα καὶ ἀρχαῖα ἀνάγραφα* to which he appeals already exhibited the Apocalypse in the form in which we now read it (Iren., v. 30).

[3] The state of the text is much more uncertain than in most of the New Testament books, because there are far fewer uncial MSS. of our book than of the Gospels and Epistles; in fact there are only five, of which only three are complete. The best MSS. are the Sinaitic, the Alexandrine, and the Ephraemi Parisiensis (incomplete). The so-called *textus receptus* of the Apocalypse is especially bad, owing to causes which Delitzsch was the first to point out (*Handschriftliche Funde*, 1861–62).

Christ alone, and knows that to be clean a man must wash his robes in the blood of the Lamb; nowhere has he made a distinction between Gentile and Jewish Christians; in this respect he is even more liberal than Paul, for Paul believes in a continued preference accorded to the people of Israel, while our author knows of no such thing; in his view preference is given only to the martyrs and confessors of the latter days; they alone shall reign with Christ a thousand years;[1] the people of Israel, so far as it has rejected Christ, is to our author simply a "synagogue of Satan" (ii. 9; iii. 9). In this respect it clearly appears that the author of the Apocalypse has cast aside all national religious prejudices.[2] Accordingly to him Jesus is not the Messiah of the Jews—of this there is no mention in the book—but the Saviour of the world, the Lord of heaven and of earth, the disposer and director of history. The Christology of the Apocalypse is nowhere Ebionitic; rather it stands midway between that of Paul and that of the Fourth Gospel, and is more elevated than the former: Christ is made almost equal with God and has the same predicates and names as God.[3]

The Apocalypse teaches us that even in the apostolic age the conceptions of Paulinism and Ebionitism do not explain everything; it is neither Pauline nor Ebionitic. It shows us that at the close of the apostolic age there was a Christianity which was free from the law and universal, and yet continued to adhere to Jewish modes of expression; it shows us that it was possible to think and feel like a Jew in politics, and yet in religious thoughts and feelings to be evangelical and superior to all earthly limitations. These, however, are glaring contradictions which could not last. But the fact that in the Apocalypse we possess a document exhibiting these contradictions imparts to the book its high importance. From Paul's epistles we can only learn how a great mind has worked its way from the letter of the law up to freedom; from the Apocalypse we can learn how from the Jewish fusion of religion, nationality, and politics thousands were gradually led upwards to the gospel, and we can further learn that the step from the premises to the conclusion is one of the hardest to take. The author of the Apocalypse has in many points not yet drawn the conclusions.

Date and Historical Position.—All impartial scholars are now agreed that in chapters xiii. and xviii. of the Apocalypse we must look for the key to the comprehension of the book as well as to the question of the date of its composition. That the beast (xiii. 1 *sq.*; xvii. 3 *sq.*) is the Roman empire, that the seven heads are seven emperors, that the woman (xvii. 3–9) is the city of Rome, that the ten horns (xiii. 1; xvii. 3, 12 *sq.*) are imperial governors—all this is now beyond dispute.[4] Also it is settled that a Roman emperor will be the antichrist, and that the author abhorred nothing so much as the worship of the emperor. Hence it is very probable, and has been maintained by Mommsen especially on good grounds, that the second beast (xiii. 11) is meant to describe the imperial representatives in the provinces, especially the Roman governors in the Asiatic continent. Finally, almost every one regards the year 64 as the *terminus a quo* of the composition of the book, inasmuch as the bloody persecution of the Christians in Rome (xiii. 7; xvii. 6; xviii. 20–24) is presupposed in the narrative.[5]

But, while scholars are at one on these points, they still differ on the question of the person of antichrist. The one side affirm that the author regarded Nero returned from the grave as antichrist (so Ewald, Lücke, De Wette, Credner, Reuss, Volckmar, Mommsen, Renan, &c.); the other side deny this (so Weiss, Düsterdieck, Bruston, &c.), and try to identify antichrist either with Domitian or with an emperor not defined. But the grounds on which they combat the former hypothesis are of little moment. That the antichrist of the Apocalypse is Nero returned to life results from the following considerations:—

(1) In ch. xiii. 3 it is said that one of the heads of the beast received a deadly wound but was afterwards healed to the astonishment of the world. Now if it is settled that the beast is the Roman empire, and that by the heads are designated the emperors, the statement is only applicable to Nero, in whose death it is well known that the people did not believe, many persons expecting that he would return from the East.[6] (2) In xvii. 8, 11 one head is identified with the whole animal, and of the animal it is said that "it was and is not and will come again," meaning that the eighth head is not a new one but one of the seven. From this it necessarily follows that in the author's view the antichrist will be an emperor who has reigned once already and who represents the whole wickedness of the empire (the beast) concentrated and embodied in himself; but this can only be Nero, for of no other emperor was the report current in the empire that he would come again, and no emperor but Nero had instituted a persecution of the Christians. (3) In xiii. 18 it is said that the number of the beast—that is, according to the Hebrew art of Gematria, the sum of the numerical values of the letters of his name—is the number of a man, and is 666. Down to 1835 this saying was a riddle which no man could read, though Irenæus (v. 30) had attempted an explanation: he thought of Teitan, Evanthes, Lateinos. But in 1835 Fritzsche, Benary, Reuss, and Hitzig discovered simultaneously that the numerical values of the words קסר נרון ("Emperor Neron") = 100 + 60 + 200 + 50 + 200 + 6 + 50 = 666. The old variant 616 must be regarded as a confirmation of this explanation, for 616 is = קסר נרו ("Emperor Nero"). It may certainly appear strange that the calculation is made according to the numerical value of the Hebrew letters, while the book is written in Greek; but, as there is no doubt that the author has thought as a Semite from first to last, it is not surprising that he has set forth his great secret in Hebrew letters (comp. Ἀρμαγεδών, xvi. 16). (4) Down to the 5th century it was believed by Western Christians that Nero would come again and be the antichrist or his precursor.[7] In the East also this belief can be shown (see the Sibylline oracles) to have still existed in the 2d century.

For these four reasons it is certain that the author of the Apocalypse believed that Nero would come again, and regarded him as the antichrist. He wrote under the impression of the story current in the East that Nero had gone to the Parthians and would return with them to reclaim his empire.

Hence the Apocalypse was written after the summer of 68 A.D.,[8] but the question still remains whether it was written under Galba or Vespasian or Domitian. Most of the scholars who accept the right explanation of the antichrist suppose it to have been written under Galba; the beginning of Vespasian's reign is preferred by Lücke (whose earlier opinion was different), Bleek, Böhmer, and also Düsterdieck and Weiss; Mommsen upholds the later years of Vespasian; but the old tradition of the church represents the work as written under Domitian and even towards the close of his reign. This tradition rests on very ancient testimony, that of Irenæus,[1] but has met with no approval from critics of the present century; only the traditionalists who reject the historical interpretation accept it. It is the only case in the whole range of the New Testament where criticism assigns to a writing a higher antiquity than is allowed it by tradition. Whether criticism has not been too hasty in setting aside the statement of Irenæus will appear in the sequel.

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[1] Observe that in his brief description of the millenium (ch. xx.) the author neither speaks of the Jewish people nor introduces any grossly material conception. This is the strongest proof that he was not an Ebionite.

[2] Compare also xi. 8, where Jerusalem is called "Sodom and Egypt."

[3] The Christological conceptions and formulas which occur in the book are not always consistent. This is not, however, in itself a proof of interpolation.

[4] Düsterdieck alone regards the ten horns as emperors.

[5] The statement of Epiphanius (*Hær.*, li. 12) that the Apocalypse was written under Claudius is untenable.

[6] Bruston refers the wounded head to Cæsar; but what could have induced the author to mention and put in the foreground an event which had taken place about one hundred years before?

[7] See the *Carm. Apolog.* of Commodian; the commentary of Victorinus on the Apocalypse; Lactantius, *De Mort. Persec.*, 2; Martin of Tours in Sulp. Severus, *Dial.*, ii. 14; Sulp. Sev., *Chron.*, ii. 28, 29, &c.

[8] Against Bruston, who supposes that it was written between 64 and 68 A.D., by reckoning the emperors (xvii. 10) from Cæsar, and hence taking the reigning emperor to be Nero. But Bruston is thus compelled to reject the explanation that the returned Nero is the antichrist, and he cannot account for the mention in the Apocalypse of numerous martyrs at Rome.

In support of the supposition that the Apocalypse was written before August 70 A.D., the chief argument adduced is that ch. xi. assumes that Jerusalem and the temple are still uninjured. Mommsen (*Röm. Gesch.*, v. 521) has not succeeded in satisfactorily disposing of this argument. The Apocalypse is cognizant of the flight of the Jewish Christians into the country beyond Jordan towards Pella (ch. xii.); it expects the partial destruction of Jerusalem in the immediate future.[2] But this very expectation as well as the confidence that the temple would remain uninjured shows that at that time city and temple were still standing. Hence, as ch. xi. was written before August 70, most critics, assuming that the whole book dates from one and the same time, conclude that it was composed under Galba,—that is, between autumn 68 and spring 69. In their view the five emperors who have fallen are Augustus, Tiberius, Claudius, Caligula, and Nero, therefore the reigning emperor is Galba,[3] and the reason why the author does not make antichrist (the returning Nero) immediately succeed Galba is a wish to carry on the number seven, and because "even a prophet owes some consideration to the powers that be"; but he allows this unknown successor only a short reign, and then comes the returned Nero and the end of the world.[4] Lastly, these critics point to the fact that a false Nero appeared immediately after the death of the real Nero (Tacitus, *Hist.*, ii. 8, 9). This position is very strong, but there are two objections to it,—in the first place, it is uncertain whether Galba should be included in the list of emperors at all—so eminent an authority as Mommsen is against including him, and reckons Vespasian as the sixth, and, secondly, the author of the Apocalypse thinks of a false Nero who will ally himself with the Parthians (see ch. ix. and elsewhere). Therefore his false Nero appears not to be that of Tacitus, but the one who in the last years of Vespasian found a following in the Euphrates district and was acknowledged in the reign of Titus by King Artabanus, who prepared to restore him at Rome by force of arms, but was at last surrendered by the Parthians, about 88, to Domitian (so Mommsen; compare PERSIA, vol. xviii. p. 603). On this view the Apocalypse was written about 75–79. Thus we see that we have here two discrepant calculations (autumn 68 to spring 69; about 75–79); each has much in favour of it, but also at least one strong argument against it:—against the first calculation there is the argument that the false Nero who best suits the case did not appear till about 75, while against the second calculation there is the argument that according to ch. xi. the destruction of Jerusalem had not yet taken place.[5] In these circumstances it appears perhaps best to assume that the Apocalypse was written under Galba, that is, that the conception and the first draught of it date from this time, but that the seventeenth chapter was afterwards revised in the last years of the reign of Vespasian, about 75–79. Now it is to be remembered that Irenæus asserts most explicitly that it was revealed in the last years of Domitian. Such a statement is not to be simply set aside, especially when it seems to make a writing later, and not earlier, and when there is internal evidence that the book underwent revisions. Further exact investigation of the details of the Apocalypse will perhaps supply positive proofs; at present the following can be put forward merely as an hypothesis, for which only a certain probability is claimed:—the Apocalypse was written under Galba, but afterwards underwent revisions under Vespasian, about 75–79, and perhaps in Domitian's reign of terror, about 93–96 (compare what has been said above on the unity and integrity).

Place of Composition—Authorship.—That the Apocalypse was written at some place on the west coast of Asia Minor has never, so far as known to the present writer, been doubted by any critic of note.

The tradition of the church ascribes the Apocalypse to the apostle John,[6] and the Tübingen school has felt bound in this case to agree with tradition. Within the last twenty years or so the question has been much complicated by being mixed up with the question of the origin of the Fourth Gospel; all, however, agree that the book was written by a born Jew. At present the following views are maintained:—(1) the Gospel and the Apocalypse of John are by the apostle John (Ebrard, Hengstenberg and his school, Hofmann and his school, Kliefoth); (2) the Gospel is by an unknown author, the Apocalypse is by the apostle John (Baur, Schwegler, Kostlin, Hilgenfeld); (3) the Gospel is by the apostle John, the Apocalypse is by a man called John, the otherwise known presbyter, who had no wish to be taken for the apostle (Lücke, Bleek, Ewald, Credner, De Wette, Neander, Reuss, Düsterdieck, Keim, Holtzmann, &c.);[7] (4) the Apocalypse is by another John, one of the apostle's disciples, who afterwards received the tacit approval of the apostle, so that the Revelation passed in the church as a work of the apostle (Renan); (5) the Apocalypse was foisted on the apostle John without his knowledge (Volckmar, &c.). Of these views the first and fourth may be summarily dismissed, the latter because Renan has not brought forward even the shadow of a proof, the former because the differences between the Apocalypse and the Gospel in language and opinions are too great to allow us to suppose that the books are by the same author.[8] It is true that on the other hand both writings have much in common, nay, even that there is a profound affinity between them, but this only proves that their authors lived in the same country, and were to some extent subject to the same intellectual influences. Even Hase, who formerly thought it possible to refer Gospel and Apocalypse to the apostle John (see his work, *Die Tübinger Schule*, 1855), has renounced this view. But what is to prevent us from ascribing at least the Apocalypse to the apostle

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[1] Iren. v. 30, 3: ἡ ἀποκάλυψις οὐ πρὸ πολλοῦ χρόνου ἑωράθη, ἀλλὰ σχεδὸν ἐπὶ τῆς ἡμετέρας γενεᾶς, πρὸς τῷ τέλει τῆς Δομιτιανοῦ ἀρχῆς.

[2] The three and a half years in xi. 2, xii. 14, xiii. 5 are taken from the Apocalypse of Daniel, and no deeper meaning is to be sought in them.

[3] Hildebrand regards the sixth as Vitellius (*Ztsch. f. wiss. Theol.*, 1874, p. 76 *sq.*).

[4] So Reuss, Volckmar, Credner, De Wette, also Renan (*Antechrist*), but the last-mentioned, though he put the Apocalypse in the reign of Galba, begins the enumeration of the heads with Julius Cæsar, and hence gets into difficulties.

[5] The view that the Apocalypse was written between the spring of 69 and August 70, hence in the beginning of Vespasian's reign, has least to recommend it. Some of the critics who have maintained it are much biased. Thus Dusterdieck regards the sixth emperor (xvii. 10) as Vespasian, the seventh, who is to remain for only a short time, as Titus, and the eighth as Nero. But, as the book was written, according to Düsterdieck, shortly before 70, it follows that "we have here a prophecy which definitely announces certain historical events beforehand." Thus the claim of the Apocalypse to be an actual prophecy is justified, though only in one verse.

[6] So Justin; see *Dial. c. Tryph.*, 81.

[7] Some of these scholars also deny that the Gospel is by John.

[8] This was observed by Dionysius of Alexandria (in Euseb., *H. E.*, vii. 27).

John? Certainly the external testimony is very good,[1] the doubts entertained by the Alexandrians, by Eusebius, and by Byzantine theologians as to the apostolic authorship of the book have not much weight, the book being little to their mind, and the substance of the Revelation would in many respects suit John Boanerges. But the following considerations speak against the apostle John as author:—(1) the so-called "Alogi" (Epiph., *Hær.*, li.) denied that the work was by the apostle, and declared that it came from Corinth and hence was a forgery; but the Alogi were in Asia Minor about 160 and their negative, if not their positive, evidence has therefore great weight;[2] (2) the author of the Apocalypse does not style himself an apostle, and nowhere does he designate himself as a personal disciple of Jesus or as an eye-witness; (3) the author speaks (xxi. 14) in such an objective way of the twelve apostles of the Lamb that it is scarcely credible that he himself belonged to them; (4) the descriptions of Christ in the Apocalypse are psychologically scarcely intelligible on the assumption that they were written by a personal disciple of the Lord. On these grounds we must say that, though not quite impossible, it is very improbable that the apostle John was the author of the Apocalypse. But not less improbable is the supposition that the real author wished to pass for the apostle John and fathered the work on him. It is true that amongst the Jews apocalypses were fathered by their authors on famous men; but the fraud is always very patent. But in this case the name of John occurs only four times (i. 1, 4, 9; xxii. 8), and in the whole book there is nothing that reveals the author's intention to pass for the apostle John. And we have further to remember that, according to trustworthy evidence, the apostle John was still living at the time in Asia Minor. It is at least improbable that another dweller in Asia Minor should have fathered a book on him under his very eyes.

In these circumstances only one hypothesis seems left—that started by the Alexandrians in order to get rid of the inconvenient authority of the Apocalypse—that the book is from the pen of another John in Asia Minor, namely, the presbyter. But, though this hypothesis has had much acceptance in our time, it is far from probable; for—and here Zahn and Renan are right—the existence of a conspicuous presbyter John in distinction from the apostle is very uncertain. The Apocalypse, as the traditional text of the first chapter now runs, is certainly not the work of any ordinary person of the name of John: it is by a John who enjoyed the highest consideration in the churches (see i. 1, 4). If besides the apostle John there was no second John who possessed such authority in Asia Minor in the 1st century, and if it is impossible that the Apocalypse can be the work either of the apostle John or of a literary forger, the only supposition left is that the name of John was interpolated in the last revision (after the death of the apostle John). Observe once more that this name occurs only in the first verses of the first chapter, and in a verse of the last. No hypothesis solves the problem so well as this. Whether originally a different name appeared in i. 9, and how ch. i. gradually arose, are questions into which we cannot enter here. In this difficult subject absolute certainty is unattainable, but the supposition that the Revelation was written by an unknown Christian of Asia Minor, and that the name of John is a later addition in order to ascribe the Revelation to the apostle John, labours under fewer difficulties than any other that has hitherto been started. That, thus introduced, John is not expressly designated as apostle need not surprise us, for at the beginning of the 2d century every one in Asia Minor knew who "John the servant of God" was. The epistles also with the heading "the elder" are meant to be regarded as written by the apostle John, although they do not contain the title apostle.[3]

Authority in the Church.—The Apocalypse, which as early as the time of Justin and Papias enjoyed a high reputation as the work of the apostle John, was admitted into the canon of the New Testament (see Murat. fragm., Irenæus, Tertullian). In the West it has always been retained in the canon, but in the East it was discredited through Montanism, and the spiritualistic Alexandrians who gave the tone threw more and more doubts upon it, so that towards the end of the 3d century it began to be omitted from the New Testament. For nearly a thousand years the Apocalypse was not recognized by the majority of the Greek Church as a canonical book (and hence it is that we possess so few ancient Greek MSS. of the Apocalypse), but, as no formal condemnation was pronounced against it, the book was never suppressed, and regained its footing towards the end of the Middle Ages, the Greek Church following the example of the Latin. At present the Apocalypse forms part of the New Testament all over Christendom, and rightly so, for it is one of the most instructive documents of early Christianity. Narrow or dogmatic spirits, it is true, will never be able to value it aright, and will therefore either reject it or seek to correct it by false interpretations.

Literature.—Lücke, *Versuch einer vollständigen Einleitung in die Offenb. Joh.*, 2d ed., 1852; comp. the introductions to the New Testament by Reuss, Credner, Bleek-Mangold, Hilgenfeld, Davidson, &c.; Gebhardt, *Der Lehrbegriff der Apok.*, 1873; Renan, *L'Antechrist*, 1873; Mommsen, *Röm. Geschichte*, v. p. 520 *sq.* Commentaries by Ewald, 1828, 1862; De Wette, 1848, 1862; Hengstenberg, 1861, 1863; Ebrard, 1859; Düsterdieck, 1865; Volckmar, 1862; Bleek, 1862; Lange, 1871; Füller, 1874; Kliefoth, 1874-75; Bisping, 1876. Schneckenburger, *De Falsa Neronis Fama*, 1846; Weiss, "Apokal. Studien," in *Studien und Kritiken*, 1869, i.; Bruston, *Le chiffre 666 et l'hypothèse du retour de Néron*, 1880; Boehmer, *Verfasser u. Abfassungszeit der joh. Apoc.*, 1855; Hilgenfeld, "Nero der Antichrist," in *Zeitschrift f. wissensch. Theol.*, 1869, iv.; Hildebrandt, "Das röm. Antichristenthum zur Zeit der Offenb. Joh.," in *Zeitschr. f. wiss. Theol.*, 1874, i.; Ronsch, "Gematrisches zu Apoc. xiii. 18," in *Zeitschr. f. wiss. Theol.*, 1873, p. 258 *sq.*; *Tübing. Theol. Quartalschr.*, 1872, i. Hausrath in Schenkel's *Bibellexicon*, i. p. 153 *sq.* (A. HA.)

REVERSION. See REMAINDER.

REVIVAL OF LEARNING. See RENAISSANCE.

REWAH, the principal native state in Básghelkhand, under the political superintendence of the Bághelkhand and Central India Agencies. It has an area of about 10,000 square miles, and lies between 22° 39′ and 25° 12′ N. lat., and between 80° 46′ and 82° 51′ E. long.; it is bounded on the N. by the British districts of Banda, Allahabad, and Mirzapur in the North-Western Provinces; on the E. by Mirzapur district and by native states in Chutia-Nagpur; on the S. by the districts of Chhatisgarh, Mandla, and Jabalpur in the Central Provinces; and on the W. by other native states of Bhágelkhand. Rewah state is divided into two well-defined portions. The northern and smaller division is the plateau lying between the Kaimur range of hills and that portion of the Vindhyas known as Binjh, which overlook the valley of the Ganges. This plateau is for the most part cultivated and well peopled; the soil varies from a rich black loam to a sandy laterite; but in the greater part of this area good land predominates, and rich harvests both of kharif and rabi crops are generally obtained. Water is plentiful, and the country is full of large tanks and reservoirs, which, however, are not used for irrigation purposes; the only system of wet cultivation which has any favour with the villagers is that of bandhs, or mounds of earth raised at the lower ends of sloping fields to retain the rain water for some time after the monsoon rains cease. The Rewah plateau is reported to possess every natural advantage, and the whole of its area could be brought under rich cultivation. The country to the south of the Kaimur Hills comprises by far the largest portion of the state; but here cultivation is restricted to the valley between the hills and the Sone river, and to a few isolated patches in scattered parts of the wild and magnificent forest wastes. Rewah is rich in minerals and forests. Operations lately undertaken to determine the extent of its coal fields have proved highly successful. Until very recently Rewah possessed no roads to speak of or means of internal communication; but good progress is now being made, and by this means it is anticipated that the state will soon develop its rich resources. The principal river is the Sone, which, receiving the Mahanadi from the south, flows through the state in a north and north-easterly direction into Mirzapur district; another important river is the Tons; but none of the rivers are navigable. The average rainfall at Rewah is about 57½ inches.

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[1] Appeal, however, must not be made to the fact that according to tradition the apostle John was banished to Patmos, and that the author of the Apocalypse says of himself (i. 9), "I was in the isle that is called Patmos for the word of God," for the tradition is based on the Apocalypse, and, what is more, on a misunderstanding of it.

[2] From Eusebius, *H. E.*, iii. 28, 1 many have assumed that the Roman presbyter Caius (about 200 A.D.) was of the same opinion as the Alogi, but this is improbable.

[3] The view here put forward as to the author of the Apocalypse is further recommended by its agreement with the general history of early Christian literature in the church. Originally writings derived their authority from the nature of their contents, afterwards from their author. When writings by obscure persons were intended to attract attention, it was necessary to pass them off under the names of celebrities; see Harnack, *Die Lehre der 12 Apostel*, p. 106 *sq.*

The population of the state in 1881 was 1,305,124 (654,182 males, 650,942 females); Hindus in the same year numbered 971,788, Mohammedans 31,107, and aboriginals 302,107. The inhabitants of Rewah are reported to be a singularly simple, pleasant, and well-disposed race, and they greatly appreciate the efforts which are now being made to benefit them. The revenue of the state in 1882–83 amounted to £110,946, of which the land contributed £71,798. The chief town is Rewah, situated in 24° 31′ 30″ N. lat. and 81° 20′ E. long., and containing in 1881 a population of 22,016.

The state came under British influence in 1812, when the first formal treaty was made with Jai Sinh Deo, by which he was acknowledged as ruler of his dominions and was brought under the protection of the British Government. The raja, however, failed to fulfil his obligations, and a second treaty was made confirming the first and defining more clearly his relations with the British Government. The administration of Rewah is now entirely in the hands of the British owing to the death of the maharaja Raghuraj Sinh and the succession of his infant son.

REYNOLDS, Sir Joshua (1723–1792), English portrait-painter, was born at Plympton Earl, in Devonshire, on July 16, 1723. He was educated by his father, a clergyman and the master of the free grammar school of the place, who designed his son for the medical profession. But the boy showed a distinct preference for painting. He was constantly copying the plates in Dryden's *Plutarch* and Cat's *Emblems*, and poring over Jonathan Richardson's *Treatise on Art*. At the age of eight, aided by the instructions in *The Jesuit's Perspective*, he made a sufficiently correct drawing of the Plympton schoolhouse, which greatly astonished his father. It was at length decided that the lad should devote himself to art, and in October 1741 he proceeded to London to study under Thomas Hudson, a mediocre artist, a native of Devonshire, who was popular in the metropolis as a portrait painter. Reynolds remained with Hudson for only two years, acquiring with uncommon aptitude the technicalities of the craft, and in 1743 he returned to Devonshire, where, settling at Plymouth Dock, he employed himself in portrait painting. By the end of 1744 he was again in London. He was well received by his old master, from whom he appears previously to have parted with some coldness on both sides. Hudson introduced him to the artists' club that met in Old Slaughters, St Martin's Lane, and gave him much advice as to his work. Reynolds now painted his portraits of Captain Hamilton, father of the marquis of Abercorn, of Mrs Field, of Alderman Tracey, now in the Plymouth Athenæum, and of the notorious Miss Chudleigh, afterwards duchess of Kingston. To this period, or perhaps to one slightly later, is referable the artist's excellent oval bust portrait of himself, which was included in the Grosvenor Gallery Exhibition of 1884. At Christmas 1746 he was recalled to Plympton to attend the last hours of his father, after whose death he again established himself, now with two of his sisters, at Plymouth Dock, where he painted portraits, and, as he has himself recorded, derived much instruction from an examination of some works by William Gandy of Exeter, whose broad and forcible execution must have been an excellent corrective to the example of Hudson's dry and hard method.

Meanwhile the pleasant urbanity of manner which distinguished Reynolds throughout life had been winning for him friends. He had made the acquaintance of Lord Edgcumbe, and by him was introduced to Captain (afterwards Viscount Keppel), who was to play an important and helpful part in the career of the young painter. Keppel was soon made aware of Reynolds's ardent desire to visit Italy; and, as he had just been appointed to the command of the Mediterranean squadron, he gracefully invited the artist to accompany him in his own ship, the "Centurion." The offer was gladly accepted. While Keppel was conducting his tedious negotiations with the dey of Algiers, relative to the piracy with which that potentate was charged, Reynolds resided at Port Mahon, the guest of the governor of Minorca, painting portraits of the principal inhabitants; and, in December 1749, he sailed for Leghorn, and thence, with all eagerness, made his way to Rome.

He has confessed that his first sight of the works of Raphael was a grievous disappointment, and that it required lengthened study before he could appreciate the correctness and grace of the master. By the dignity and imagination of Michelangelo he was deeply impressed; to the end of life the great Florentine remained for Reynolds the supreme figure in art; his name was constantly upon his lips, and, as he had wished, it was the last that he pronounced to the students of the Royal Academy. Of the influence of Correggio, of his sweetness of expression, of his method of chiaroscuro, we find frequent traces in the works of Sir Joshua, especially in his paintings of children; but after all it was from the Venetians that the English painter learned most. His own strongest instincts were towards richness and splendour of colour, and in these qualities he found unsurpassable examples in the productions of Titian and Veronese.

While in Rome he avoided, as far as possible, the temptation to spend his time in copying specific pictures, which he considered "a delusive kind of industry," by which "the student satisfies himself with an appearance of doing something, and falls into the dangerous habit of imitating without selecting." His method of becoming acquainted with the old masters, and of assimilating their excellences, was by diligent examination and comparison, aided by studies of general effect and of individual parts. His knowledge of the Roman art treasures was dearly purchased. While working in the corridors of the Vatican he caught a severe cold, which resulted in the deafness that clung to him for the rest of his life, and rendered necessary the ear-trumpet which he used in conversation.

After a residence of two years in Rome, Reynolds, in the spring of 1752, spent four months in visiting Parma, Florence, Venice, and other important cities of Italy; and, after a brief stay in Devonshire, he established himself as a portrait painter in St Martin's Lane, London, whence he afterwards removed to Great Newport Street, and finally, in 1760, to Leicester Square, where he continued to paint till his death.

His first reception on his return was hardly a favourable one. Hudson called to see his productions and told him, "Reynolds, you don't paint so well as when you left England." Ellis, another accepted portrait painter of the time, who had studied under Kneller, exclaimed, "This will never answer. Why, you don't paint in the least like Sir Godfrey,"—adding, as he abruptly left the room, "Shakespeare in poetry, Kneller in painting." The verdict of the public, however, was all on the side of the young innovator. Lord Edgcumbe played the part of the generous patron, and exerted himself to obtain commissions for his protégé, of whose ability the portraits which he now produced—of the duchess of Hamilton, the countess of Coventry, Lord Holderness, and especially of his old friend Keppel—were sufficient guarantee. The artist's painting-room was thronged with the wealth and fashion of London, "with women who wished to be transmitted as angels, and with men who wished to appear as heroes and philosophers"; and he was already afloat upon that tide of prosperity which never ebbed till the day of his death. Various other artists contested with him for popular applause. First the Swiss Liotard had his moment of popularity; and at a later period there was Opie, and the more formidable and sustained rivalry of Gainsborough and of Romney; but in the midst of all, then as now, Reynolds maintained an admitted supremacy. And, if the magic of his brush brought him crowds of sitters, his charm of manner gathered round him numerous friends. During the first year of his residence in London he had made the acquaintance of Dr Johnson, which, diverse as the two men were, became a friendship for life. To him Burke and Goldsmith, Garrick, Sterne, Bishop Percy, and, it seems, Hogarth, were before long added. At the hospitable dinner table of Reynolds such distinguished men enjoyed the freest and most unconstrained companionship, and most of them were members of the "Literary Club," established, at the painter's suggestion, in 1764.

In 1760 the London world of art was greatly interested by the novel proposal of the Society of Artists to exhibit their works to the public. The hall of the society was at their disposal for the purpose; and in the month of April an exceedingly successful exhibition was opened, the precursor of many that followed. To this display Reynolds contributed four portraits. In 1765 the association obtained a royal charter, and became known as "The Incorporated Society of Artists"; but much rivalry and jealousy was occasioned by the management of the various exhibitions, and an influential body of painters withdrew from the society, and proceeded to consider the steps that should be taken in order that their corporate existence might be recognized. They had access to the young king, George III., who promised his patronage and help. In December 1768 the Royal Academy was founded, and Reynolds was elected, by acclamation, its first president, an honour which more than compensated for his failure to obtain the appointment of king's painter, which, the previous year, had been bestowed on Allan Ramsay, a more courtly but more commonplace artist. In a few months the king signified his approval of the election by knighting the new president, and intimating that the queen and himself would honour him with sittings for portraits to be presented to the Academy.

Reynolds was fitted for his new position no less by his urbane and courteous manner and by his wide general culture than by his eminence as an artist. With unwearied assiduity, with unfailing tact, he devoted himself to furthering the interests of the new Academy. It was at his suggestion that the annual banquet was instituted. To the specified duties of his post he added the delivery of a presidential address at the distribution of the prizes, and his speeches on these occasions form the well-known "discourses" of Sir Joshua. Expressed as they are with simple elegance and perspicuous directness, these discourses alone would be sufficient to entitle their author to literary distinction; indeed, when they were first delivered, it was thought impossible that they could be the production of a painter, and Johnson and Burke have been credited with their composition, in spite of the specific denials of both, and of Dr Johnson's indignant exclamation—"Sir Joshua, sir, would as soon get me to paint for him as to write for him!"

In the unwearied pursuit of his art, and in the calm enjoyment of his varied friendships, Sir Joshua's life flowed on peacefully and happily enough. He was too prosperous and successful an artist altogether to escape the jealousy of his less fortunate and less capable brethren, and he suffered in this way sometimes, especially from the attacks of Barry, a painter who lived long enough to regret and, so far as he was able, to rectify his fault. In 1784, on the death of Ramsay, Reynolds was appointed painter to the king. Two years previously he had suffered from a paralytic attack; but, after a month of rest, he was able to resume his painting with unabated energy and power. In the summer of 1789 his sight began to fail; he was affected by the *gutta serena*, but the progress of the malady was gradual, and he continued occasionally to practise his art till about the end of 1790. His last years were embittered by a most unfortunate disagreement with the Royal Academy, relative to the appointment of a professor of perspective. Under the impression that there was a conspiracy against him among the various members, he signified his intention of leaving the presidential chair, a resignation which he was afterwards induced to withdraw, and his final discourse was delivered on the 10th December 1790. He was still able to enjoy the companionship of his friends, and he exerted himself in an effort to raise funds for the erection of a monument in St Paul's to Dr Johnson, who had died in 1784. Towards the end of 1791 it was evident to the friends of Reynolds that he was gradually sinking. For a few months he suffered from extreme depression of spirits, the result of a severe form of liver complaint, and on the 23d February 1792 this great artist and blameless gentleman passed peacefully away.

Reynolds's first discourse deals with the establishment of an academy for the fine arts, and of its value as being a repository of the traditions of the best of bygone practice, of "the principles which many artists have spent their lives in ascertaining." In the second lecture the study of the painter is divided into three stages,—in the first of which he is busied with processes and technicalities, with the grammar of art, while in the second he examines what has been done by other artists, and in the last compares these results with nature herself. In the third discourse Reynolds treats of "the great and leading principles of the grand style"; and succeeding addresses are devoted to such subjects as "Moderation," "Taste," "Genius," and "Sculpture." The fourteenth has an especial interest as containing an appreciative but discriminating notice of Gainsborough, who had died shortly before its delivery; while the concluding discourse is mainly occupied with a panegyric on Michelangelo.

The other literary works of the president comprise his three essays in *The Idler* for 1759-60 ("On the Grand Style in Painting," and "On the True Idea of Beauty"), his notes to Du Fresnoy's *Art of Painting*, his *Remarks on the Art of the Low Countries*, his brief notes in Johnson's *Shakespeare*, and two singularly witty and brilliant fragments, imaginary conversations with Johnson, which were never intended by their author for publication, but, found among his papers after his death, were given to the world by his niece, the marchioness of Thomond.

But the literary works of Reynolds, excellent as these are, were the occupation of his mere bye hours and times of leisure. The main effort of his life was directed to painting, a pursuit which, as he was never weary of impressing on younger artists, was enough to occupy a man's whole time, even were it longer than it is, and to call forth his utmost energy. The unceasing application, perseverance, and assiduity which form the recurrent burden of Reynold's discourses found the most complete illustration in his own career. He laid it down as a distinct principle that each fresh portrait to which he set his hand should excel the last, and no effort was wanting to realize this aim In his search for perfection he would paint and repaint a subject; when a visitor asked how a certain portion of the infant Hercules had been executed, he replied, "How can I tell! There are ten pictures below this, some better, some worse." A method like this contrasts curiously with the swift certainty of Gainsborough's practice, but it must be confessed that the productions of Reynolds have an abiding charm that is wanting in the exquisite but slighter and more mannered work of his great rival. In range, too, of subject, as well as of method, the art of Sir Joshua has by far the wider reach. "How various the man is," said Gainsborough once, after he had been examining the president's portraits hung in an Academy exhibition; and the remark gains an added point and emphasis when we compare the paintings of Reynolds with Gainsborough's own.

In the work which the painter produced shortly after his return from Italy—in the Lady Cathcart and her Daughter of 1755, the Lady Elizabeth Montague and the George, Earl of Warwick, of 1756, and the Countess of Hyndford of 1757—we find a certain dignity and elegance of pose and arrangement which bears witness to his foreign studies, joined to some coldness of colour, hardness of execution, and insistance on definiteness of outline, which contrasts with the sweet felicity and tenderness of his fully developed manner, with its perfect colour, and its form which is lost and found again in an exquisite mystery. But soon all that is tentative and immature disappears from his works. In 1758 we have the gracious and winning full-length of Elizabeth Gunning, Duchess of Hamilton, and the stately Duke of Cumberland, followed in 1760 by the Kitty Fisher, and a host of admirable portraits in which the men and women and children of the time live still before our eyes, each possessed with a nameless dignity, or grace, or sweetness. As the artist advanced towards old age his hand only gained in power, his colour in richness and splendour; his works show no decadence till the day when he finally laid aside his brush. We have nothing finer from his hand than the Mrs Nesbitt as Circe of 1781, the Mrs Siddons as The Tragic Muse of 1784, the Duchess of Devonshire and her Child of 1786, and the Infant Hercules and the Miss Gawtkin as Simplicity of 1788.

In the midst of his constant practice as a portrait-painter Reynolds was true to his early admiration of "the grand style," to his veneration for the old masters of Italy, to his belief that the imaginative paths which these men pursued were the highest ways of art. At the conclusion of his last Academy discourse, while speaking of Michelangelo, he breaks forth with uncontrollable emotion, "Were I now to begin the world again, I would tread in the steps of that great master; to kiss the hem of his garment, to catch the slightest of his perfections, would be glory and distinction enough for an ambitious man."

From the Italians Reynolds conveyed into his own portrait-subjects a dignity and a grace, along with a power of colour, which were previously unknown in English art; but he essayed also to follow them into their own exalted and imaginative paths, to paint Holy Families and Nativities, to picture the cardinal virtues, and to realize the conceptions of the poets. But the English portrait-painter wanted the visionary power necessary for such tasks; his productions of this class form the least interesting portion of his work. They are most successful when the symbolism and the allegory in them are of the slightest, when the human element is the main attraction, when he paints as cherub faces five different views of the countenance of one living English girl, or titles as "Simplicity" his portrait of Offy Gawtkin or as "Hebe" his portrait of Miss Meyer. His series of "The Virtues," designed for the window of New College, Oxford, show simply studies of graceful women, lightly draped, and pleasantly posed. His Macbeth and his Cardinal Beaufort have no real impressiveness, no true terror; and the finest of the subjects that he painted for Boydell's *Shakespeare* is the Puck, in which the artist's inspiration was caught, not from the realms of imagination or fancy, but from observation of the child nature which he knew and loved.

Much has been said regarding the recklessness and want of care for permanency which characterized the technical methods of Sir Joshua. While he insisted that his pupils should follow only such ways of work as were well known and had been tested by time, he was himself most varying and unsettled in his practice. In his earnest desire for excellence he tried all known processes, and made all kinds of fantastic experiments. He was firmly convinced that the old masters were possessed of technical secrets which had been lost in later times, and he even scraped the surfaces from portions of valuable works by Titian and Rubens in the vain attempt to probe the mystery. In his efforts to attain the utmost possible power and brilliancy of hue he made use of pigments which are admittedly the reverse of stable and permanent, he worked with dangerous vehicles, he employed both colours and varnishes which in combination are antagonistic. Orpiment was mingled with white lead; wax-medium, egg-varnish, and asphaltum were freely used; and, when we read the account of his strangely hap-hazard methods, we are ready to echo Haydon's exclamation—"The wonder is that the picture did not crack beneath the brush!" and are prepared for such a sight of the vanishing ghosts of masterpieces as was afforded by so many works in the Reynolds Exhibition at the Grosvenor Gallery in 1884. Our only consolation lies in the truth expressed by Sir George Beaumont, when his recommendation of Sir Joshua for the execution of a certain work was met by the objection that his colours faded, that he "made his pictures die before the man." "Never mind," said Sir George, "a faded portrait by Reynolds is better than a fresh one by anybody else.'

See Malone, *The Works of Sir Joshua Reynolds, Knight* (3 vols., 1798); Northcote, *Memoirs of Sir Joshua Reynolds, Knight, &c.* (1813); Farington, *Memoirs of the Life of Sir Joshua Reynolds* (1819), Beechy, *Literary Works of Sir Joshua Reynolds* (1835); Cotton, *Sir Joshua Reynolds and his Works* (edited by Burnet, 1856); Leslie and Taylor, *Life and Times of Sir Joshua Reynolds* (2 vols 1865); and Redgrave, *A Century of English Painters*, vol. I. (1866). (J. M. G.)

RHADAMANTHUS, in Greek mythology, a son of Zeus and Europa and brother of Minos, king of Crete. At first he helped his brother to rule his island empire. His justice earned him the admiration of his subjects and the jealousy of his brother, wherefore he fled to Bœotia, where he wedded Alcmene. On account of his inflexible integrity he was made one of the judges of the dead in the other world. According to Plato, Rhadamanthus judged the souls of Asiatics, while Æacus judged those of Europeans, and when they could not agree Minos had a casting vote.

RHÆTIA was the name given in ancient times to a province of the Roman empire, which included a considerable tract of the Alpine regions that separated the great valleys of the Po and the Danube, comprising the districts occupied in modern times by the Grisons and the Austrian province of Tyrol. Before their subjugation by Rome the Rhætians are described as one of the most powerful and warlike of the Alpine tribes; but little or nothing is known as to their origin and history. It is indeed stated distinctly by Livy (v. 33) that they were of Etruscan origin, and a tradition reported by Justin (xx. 5) and Pliny (*H.N.*, iii. 24, 133) affirmed that they were a portion of that people who had been settled in the plains of the Po and were driven into the mountains by the irruption of the Gauls, when they assumed the name of Rhætians from a leader of the name of Rhætus. Very little value can, however, be attached to such traditions, and the attempts of some modern writers to support them by philological researches have led to no satisfactory result. But the ethnical connexion of the Rhætians with the Etruscans has been accepted by Niebuhr, and its general reception by the Romans would seem to prove that they were a distinct race from their neighbours the Ligurians as well as from the Gauls and Germans.

The name of the Rhætians is first mentioned by Polybius, but merely incidentally, and they played no part in Roman history till after the fall of the republic. It is certain, however, that they continued virtually independent until Augustus undertook their subjugation, in common with that of the neighbouring Alpine tribes bordering upon Italy. The importance he attached to this task is shown by his having deputed its execution to his two step-sons, Drusus and Tiberius, who in a single campaign reduced them all to subjection (15 B.C.), so that their territory was shortly after incorporated as a province in the Roman empire and their name never again appears in history. The exploits of the imperial youths on this occasion have been immortalized in two well-known odes of Horace (*Od.*, iv. 4 and 14). In the time of Strabo their territory was considered as extending from the Lakes of Como and Garda to that of Constance (the Lacus Brigantinus), while the allied people of the Vindelici, who had shared in their contest against the Roman arms, as well as in their final subjugation, extended down the northern slope of the Alps as far as the Danube. By far the greater part of this extensive region was occupied by rugged mountains, the inhabitants of which, when compelled to abandon their predatory habits, subsisted principally upon the produce of their flocks. Some of the valleys, however, which extended on the south side down to the plains of Italy, were rich and fertile, and produced excellent wine, which was considered equal to any of those grown in Italy itself The most important of these valleys was that of the Adige, which descends from the high Alps adjoining the Brenner to Verona: of this the upper portions were held by the Breuni, whose name is still perpetuated in that of the Brenner, while the lower and more fertile region was occupied by the Tridentini, whose chief town of Tridentum was the same as the now celebrated city of Trent. The next people towards the west were the Triumpilini, in the valley still known as Val Trompia; the Camuni in Val Camonica; the Orobii, who appear to have occupied the Val Tellina and adjoining districts; and the Lepontii, between the Lago Maggiore and the Pennine Alps. The tribes in the interior and heart of the mountain ranges cannot be for the most part assigned to definite localities. The Genauni, mentioned by Horace as well as by Strabo, are supposed to have occupied the Val di Non, and the Vennones or Venostes the lofty ranges near the source of the Adige.

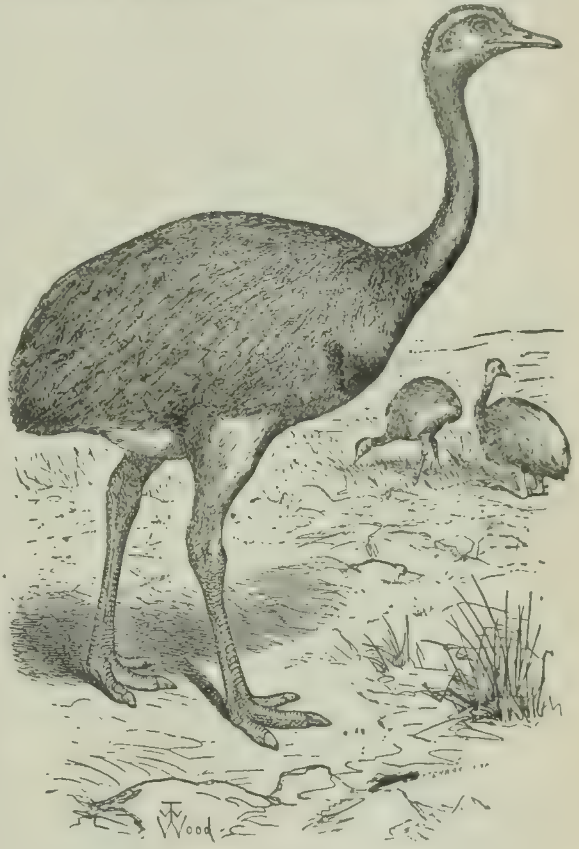
The boundaries of the Roman province were repeatedly changed. At first it appears to have comprised all Vindelicia, so as to have extended to the Danube from its sources to its confluence with the Inn, which constituted its eastern boundary on the side of Noricum. But at a later period this northern tract was separated from the central mountain region, and the two were named Rhætia Prima and Rhætia Secunda, in which form they appear in the *Notitia*. At the same time the southern valleys were gradually incorporated with Italy and assigned to the territory of the neighbouring municipal towns. Thus Tridentum, which was originally a Rhætian town, came to be included in Venetia, and is assigned by Pliny to the tenth region of Italy. The only important town in the northern part of the province was the Roman colony of Augusta Vindelicorum, which still retains the name of Augsburg. The same is the case with Curia, now Chur or Coire, the capital of the Grisons, and Brigantia (Bregenz), which gave name in ancient times to the lake now called the Lake of Constance.

The province of Rhætia was traversed by two great lines of Roman roads,—the one leading from Verona and Tridentum (Trent) across the pass of the Brenner to Innsbruck (Pons Œni), and thence to Augsburg (Augusta Vindelicorum), and the other from Bregenz on the Lake of Constance, by Coire and Chiavenna, to Como and Milan.

RHAPSODIST. See HOMER, vol. xii. p. 109 *sq.*

RHAZES. See MEDICINE, vol. xv. p. 805.

RHEA, the name given in 1752 by Möhring[1] to a South-American bird which, though long before known and described by the earlier writers—Nieremberg, Marcgrave, and Piso (the last of whom has a recognizable but rude figure of it)—had been without any distinctive scientific appellation. Adopted a few years later by Brisson, the name has since passed into general use, especially among English authors, for what their predecessors had called the American Ostrich; but on the European continent the bird is commonly called *Nandu*,[2] a word corrupted from a name it is said to have borne among the aboriginal inhabitants of Brazil, where the Portuguese settlers called it *Ema* (*cf.* EMEU, vol. viii. p. 171). The resemblance of the Rhea to the OSTRICH (vol. xviii. p 62) was at once perceived, but the differences between them were scarcely less soon noticed, for some of them are very evident. The former, for instance, has three instead of two toes on each foot, it has no apparent tail nor the showy wing-plumes of the latter, and its head and neck are clothed with feathers, while internal distinctions of still deeper significance have since been dwelt upon by Prof. Huxley (*Proc. Zool. Society*, 1867, pp 420–422) and the late Mr W. A. Forbes (*op. cit.*, 1881, pp. 784–787), thus justifying the separation of these two forms more widely even than as Families: and there can be little doubt that they should be regarded as types of as many Orders—*Struthiones* and *Rheæ*—of the Subclass *Ratitæ*.[3] Structural characters no less important separate the Rheas from the Emeus, and, apart from their very different physiognomy, the former can be readily recognized by the rounded form of their contour-feathers, which want the *hyporrhachis* or after-shaft that in the Emeus and Cassowaries is so long as to equal the main shaft, and contributes to give these latter groups the appearance of being covered with shaggy hair. Though the Rhea is not decked with the graceful plumes which adorn the Ostrich, its feathers have yet a considerable market value, and for the purpose of trade in them it is annually killed by thousands, so that it has been already extirpated from much of the country it formerly inhabited,[4] and its total



Rhea.

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[1] What prompted his bestowal of this name, so well known in classical mythology, is not apparent.

[2] The name *Touyou*, also of South-American origin, was applied to it by Brisson and others, but erroneously, as Cuvier shews, since by that name, or something like it, the JABIRU (vol. xiii. p. 629) is properly meant.

[3] *Ann. Nat. History*, ser 4, xx. p. 500.

[4] Mr Harting, in his and Mr De Mosenthal's *Ostriches and Ostrich Farming*, from which the woodcut here introduced is by permission copied, gives (pp. 67-72) some portentous statistics of the destruction of Rheas for the sake of their feathers, which, he says, are known in the trade as "Vauteur" to distinguish them from those of the African bird.

extinction as a wild animal is probably only a question of time. Its breeding habits are precisely those which have been already described in the case of other Ratite birds. Like most of them it is polygamous, and the male performs the duty of incubation, brooding more than a score of eggs, the produce of several females—facts known to Nieremberg more than two hundred and fifty years since, but hardly accepted by naturalists until recently. From causes which, if explicable, do not here concern us, no examples of this bird seem to have been brought to Europe before the beginning of the present century, and accordingly the descriptions previously given of it by systematic writers were taken at second hand and were mostly defective if not misleading. In 1803 Latham issued a wretched figure of the species from a half-grown specimen in the Leverian Museum, and twenty years later said he had seen only one other, and that still younger, in Bullock's collection (*Gen. Hist. Birds*, viii. p. 379).[1] A bird living in confinement at Strasburg in 1806 was, however, described and figured by Hammer in 1808 (*Ann. du Muséum*, xii. pp. 427–433, pl. 39), and, though he does not expressly say so, we may infer from his account that it had been a captive for some years. In England the *Report* of the Zoological Society for 1833 announced the Rhea as having been exhibited for the first time in its gardens during the preceding twelvemonth. Since then many other living examples have been introduced, and it has bred both there and elsewhere in Britain, but the young do not seem to be very easily reared.[2]

Though considerably smaller than the Ostrich, and, as before stated, wanting its fine plumes, the Rhea in general aspect far more resembles that bird than the other *Ratitæ*. The feathers of the head and neck, except on the crown and nape, where they are dark brown, are dingy white, and those of the body ash-coloured tinged with brown, while on the breast they are brownish-black, and on the belly and thighs white. In the course of the memorable voyage of the "Beagle," Darwin came to hear of another kind of Rhea, called by his informants *Avestruz petise*, and at Port Desire on the east coast of Patagonia he obtained an example of it, the imperfect skin of which enabled Mr Gould to describe it (*Proc. Zool. Society*, 1837, p. 35) as a second species of the genus, naming it after its discoverer. *Rhea darwini* differs in several well-marked characters from the earlier known *R. americana*. Its bill is shorter than its head; its tarsi are reticulated instead of scutellated in front, with the upper part feathered instead of being bare; and the plumage of its body and wings is very different, each feather being tipped with a distinct whitish band, while that of the head and neck is greyish-brown. A further distinction is also asserted to be shewn by the eggs—those of *R. americana* being of a yellowish-white, while those of *R. darwini* have a bluish tinge. Some years afterwards Mr Sclater described (*op. cit.*, 1860, p. 207) a third and smaller species, more closely resembling the *R. americana*, but having apparently a longer bill, whence he named it *R. macrorhyncha*, more slender tarsi, and shorter toes, while its general colour is very much darker, the body and wings being of a brownish-grey mixed with black. The precise geographical range of these three species is still undetermined. While *R. americana* is known to extend from Paraguay and southern Brazil through the state of La Plata to an uncertain distance in Patagonia, *R. darwini* seems to be the proper inhabitant of the country last named, though M. Claraz asserts (*op. cit.*, 1885, p. 324) that it is occasionally found to the northward of the Rio Negro, which had formerly been regarded as its limit, and, moreover, that flocks of the two species commingled may be very frequently seen in the district between that river and the Rio Colorado. On the "pampas" *R. americana* is said to associate with herds of deer (*Cariacus campestris*), and *R. darwini* to be the constant companion of guanacos (*Lama huanaco*)—just as in Africa the Ostrich seeks the society of zebras and antelopes. As for *R. macrorhyncha*, it was found by Forbes (*Ibis*, 1881, pp. 360, 361) to inhabit the dry and open "sertoēs" of north-eastern Brazil, a discovery the more interesting since it was in that part of the country that Marcgrave and Piso became acquainted with a bird of this kind, though the existence of any species of Rhea in the district had been long overlooked by or unknown to succeeding travellers.

Besides the works above named and those of other recognized authorities on the ornithology of South America such as Azara, Prince Max of Wied, Prof. Burmeister, and others, more or less valuable information on the subject is to be found in Darwin's *Voyage*; Dr Bocking's "Monographie des Nandu" in (Wiegmann's) *Archiv für Naturgeschichte* (1863, i. pp. 213–241); Prof. R. O. Cunningham's *Natural History of the Strait of Magellan* and paper in the Zoological Society's *Proceedings* for 1871 (pp. 105–110), as well as Dr Gadow's still more important anatomical contributions in the same journal for 1885 (pp. 308 *sq.*). (A. N.)

RHEA (or RHEEA) FIBRE is a textile material yielded by one or more species of *Böhmeria* (nat. ord. *Urticaceæ*), plants found over a wide range in India, China, the Malay Peninsula and islands, and Japan. Rhea is also capable of being grown in temperate latitudes, and has been experimentally introduced into the south of France and Algeria. The most important source of rhea fibre, known also very inappropriately as China grass, or by its Malay name Ramie, is *B. nivea*. It is a shrubby plant growing to the height of from 5 to 8 feet with foliage and inflorescence like the common nettle, but destitute of stinging hairs. Some authorities consider the variety cultivated in China to be specifically distinct from the Indian plant. An allied plant called Pooah or Puya, *B. Puya*, found growing wild in the north of India, is also a source of rhea fibre. Among the Chinese much care is bestowed on the cultivation of Chu or Tchou Ma, as rhea is called by them, and they prepare the fibre by a tedious and costly process of selection and manual labour. The plant thrives in hot, moist, shaded situations; propagated from slips or root cuttings, it throws up from three to five crops of stems in the course of a season, although not more than three crops are commonly reckoned on. Each such crop may yield about 250 lb of marketable fibre per acre, that total output being exceeded only by the jute crop. The stems when ripe are cut down, stripped of leaves and branchlets, and, either split or whole, are freed from their cortical layers till the bast layer is exposed. In this state they are made up in small bundles and placed where they receive strong sunlight by day and dews by night for several days, after which the fibrous bast layer is peeled with ease off the woody core, and the separated fibres are thereafter treated with boiling water to remove as far as possible adherent gummy and resinous matter in which the fibres are embedded in the stalks. The fibre so obtained is usually bleached by exposure on the grass, and it comes into the market as brilliant white filaments with a fine silky gloss, having a strength, lustre, and smoothness unequalled by any other vegetable fibre.

The fibre first appeared in the European market in 1810, and a cord then spun from it was found to sustain a weight of 252 lb, while a similar cord of Russian hemp was estimated by Admiralty test not to bear more than 87 lb. A fibre possessed of such strength and beauty immediately attracted great attention, and throughout the early half of the century numerous efforts were made by the East India Company to introduce it as a textile staple. But many diffiulties have been encountered in its working, some of which are not yet overcome. The fibre itself is very difficult of extraction owing to the large amount of adhesive matter in which it is embedded, and it is proportionately so expensive that it practically comes into competition only with silk and wool. Further, rhea is hard and inelastic, and on the machinery adapted for spinning other textiles it can only be spun into a rough, harsh, and hairy yarn, while fabrics into which it is woven are rigid, and show permanent creases at every fold. In the form of cordage, moreover, it cuts and gives way at sharp knots and twists. Notwithstanding all disappointments and drawbacks, the Indian Government considered the fibre of such importance that in 1869 two prizes of £5000 and £2000 and again in 1877 prizes of £5000 and £1000 were offered for machinery or processes by which the fibre could be prepared at such a cost per ton as would render its introduction into the market practicable. Competitive trials were made at Saharanpur in 1872 and 1879, but no machine was found to satisfy the conditions of success, although in 1872 a reward of £1500 was granted to Mr John Greig, jun., of Edinburgh, and in 1879 £500 and £100 respectively were paid to two of the competitors. The extraction of rhea continues to attract attention, and quite recently (1885) it has been announced that Prof. Frémy of Paris, assisted by M. Urbain, has successfully overcome all difficulties. The raw material used by Prof. Frémy is obtained by a process devised by M. Fevier, which consists in submitting the newly cut stems to low-pressure steam for twenty minutes, after which the whole rind is separated in ribands from its woody core with the utmost ease. These ribands are then dried, and on them Prof. Frémy operates with alkaline solutions which are varied in strength according to the appearance of the material dealt with, and a pure fibre in fine working condition is thus obtained. Rhea has yet to establish its position among European textiles, but in the East its value is well recognized. It is extensively used for cordage, fishing nets, &c.; and it is very little affected by water. The Chinese prepare an exceedingly fine "grass cloth" from single filaments of rhea, knotted or gummed end to end in the way they employ the finest filaments of Manila hemp for making "Pina" gauze.

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[1] The ninth edition of the *Companion* to this collection (1810, p. 121) states that the specimen "was brought alive" [? to England].

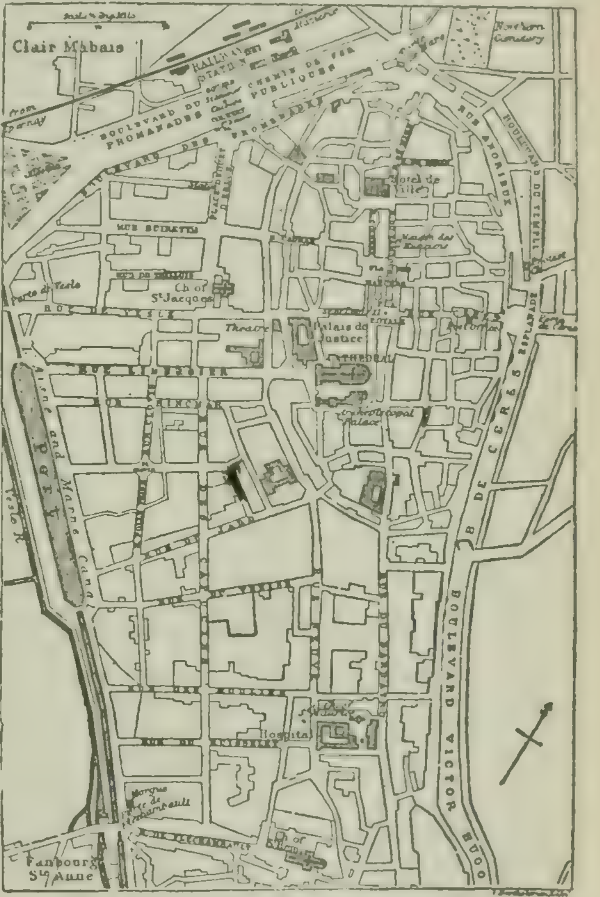
[2] Interesting accounts of the breeding of this bird in confinement are given, with much other valuable matter, by Mr Harting in the work already cited.

RHEGIUM. See REGGIO.

RHEIMS, a city of France, chief town of an arrondissement of the department of Marne, lies 81 miles east-north-east of Paris (99 miles by rail) on the right bank of the Vesle, a tributary of the Aisne, and on the canal which connects the Aisne with the Marne. To the south and west rise the "montagne de Rheims" and the vine-clad hills where the wine is grown which constitutes the chief object of the industry and commerce of the town. Rheims has been, since the last Franco-Prussian War, surrounded with detached forts that render it a great entrenched camp, and it still preserves eleven of the gates of its old enceinte, that of Paris, constructed on occasion of the coronation of Louis XVI., being specially noticeable. Beyond the boulevards the town spreads out in several suburbs—the faubourgs of St Anne on the south, Vesle on the west, Laon on the north-west, and Cérès on the north-east. The town is well planned and built, and its streets are traversed by tramways.

The spinning and weaving of wool is carried on in seventy factories, employs 10,000 hands, and annually turns £3,500,000 worth of the raw material into flannels, merinoes, cloth, blankets, &c. Dyeing and "dressing" are carried on in the outskirts of the town. Fifty firms with 2000 workmen are employed in the champagne manufacture; the cellars are vast excavations in the chalk rock. Rheims is also famous for its biscuits, gingerbread, and dried pears. Machinery, chemical products, candles, soap, stained glass, common glass, and paper are also manufactured. In respect of population (93,683 in 1881) Rheims ranks as the eleventh city of France.

The oldest monument in Rheims is the Mars Gate (so called from a temple to Mars in the neighbourhood), a triumphal arch 108 feet in length by 43 in height erected by the Remi in honour of Cæsar and Augustus when Agrippa made the great roads terminating at the town. In its vicinity a curious mosaic measuring 35 feet by 26, with thirty-five medallions representing animals and gladiators, was discovered in 1861. But by far the most interesting architectural feature of the town is the cathedral of Notre Dame, where the kings of France used to be crowned. It replaced an older church burned in 1211, which had been built on the site of the basilica where Clovis was baptized by St Remigius. The whole cathedral with the exception of the façade was completed by 1231, but it has undergone numerous alterations. The present façade was erected in the 14th century after 13th-century designs,—the nave having in the meantime been lengthened so as to afford room for the vast crowds that attended the coronations. In 1481 a terrible fire destroyed the roof and also the spires, which have never been restored to their original state. In 1875 the National Assembly voted £80,000 for repairs of the façade and balustrades. This façade is the finest portion of the building, and one of the most perfect masterpieces of the Middle Ages. The portals and the rose window are laden with statues and statuettes; the "gallery of the kings" above has the baptism of Clovis in the centre, and also has statues of Charlemagne and his father Pippin the Short. The towers, 267 feet high, were originally designed to rise 394 feet; that on the south contains two great bells, one of which, named by Cardinal de Lorraine in 1570, weighs more than 11 tons. The transepts are also decorated with sculptures,—that on the north with statues of the principal bishops of Rheims, a representation of the last judgment, and a figure of Christ, while that on the south side has a beautiful rose window with the prophets and apostles. Of the four towers which formerly flanked the transepts nothing remains above the height of the roof since the fire of 1481. Above the choir rises an elegant bell-tower in timber and lead, 59 feet high, reconstructed in the 15th century. The interior of the cathedral is 455 feet long, 98½ feet wide in the nave, and 125 feet high in the centre. It has a profusion of statues similar to those of the outside, and is further adorned with stained glass of the 13th century and with tapestries. The rose window over the main portal and the gallery beneath are of rare magnificence. Forty pieces of tapestry bestowed in 1530 by Robert de Lenoncourt, and devoted to the history of the Virgin, are remarkable for the richness of colour and the variety of costume they display. Of six pieces presented by Cardinal de Lorraine in 1570, only three have been preserved; one of them representing the coronation of Clovis and the battle of Soissons affords valuable evidence relating to the military costumes of the 16th century. Archbishop Henry of Lorraine also presented seventeen large pieces of tapestry representing the life of Christ, in 1633; they are called Pepersack's tapestries after the maker, a celebrated tapestry



Plan of Rheims.

weaver of Charleville. The Canticles tapestries, four pieces representing scenes in Louis XIV.'s youth, originally belonged to the castle of Hauteville. In the right transept are two great Gobelins tapestries executed after Raphael's designs, and dealing with the life of St Paul. The left transept contains a fine organ in flamboyant Gothic with 3516 pipes and 53 stops. The choir clock is ornamented with curious mechanical devices. Several paintings, by Titian, Tintoretto, Nicolas Poussin, and others, and the carved woodwork and the railings of the choir, also deserve to be mentioned; and among the numerous objects of antiquarian interest in the cathedral "treasury" is the reliquary of the sacred phial which contained the oil used in anointing the kings, but was broken during the Revolution. The archiepiscopal palace, built between 1498 and 1509, and in part rebuilt in 1675, was occupied by the kings on the occasion of their coronation. The saloon chamber, where the royal banquet was held, has an immense stone chimney of the 15th century, medallions of the archbishops of Rheims, and portraits of fourteen kings crowned in the city. Among the other rooms of the royal suite, all of which are of great beauty and richness, is that now used for the meetings of the Rheims Academy; the building also contains a library of 16,000 volumes. The chapel of the archiepiscopal palace consists of two stories, the upper of which still serves as a place of worship, while the lower is occupied by an antiquarian museum, in which is preserved the marble cenotaph (almost entire) of the consul Jovinus, who in the 4th century led his fellow-townsmen at Rheims to embrace Christianity. After the cathedral the most celebrated church is that of St Remi, built in the 11th and 12th centuries on the site of an older place of worship. The valuable monuments with which it was at one time filled were pillaged during the Revolution, and even the tomb of the saint is a modern piece of work; but there still remain the 13th-century glass windows of the apse and tapestries representing the history of St Remigius. The churches of St Jacques, St Maurice (partly rebuilt in 1867), St André, and St Thomas (erected in 1847, under the patronage of Cardinal Gousset, now buried within its walls), as well as the chapels of the lycée and of several monasteries, are all more or less interesting. There are also in the city two Protestant churches and a synagogue.

The town-house, erected in the 17th century and enlarged in 1880, has a pediment with an equestrian statue of Louis XV. and a tall and elegant campanile. It contains a picture gallery, a natural history museum, and a library of 60,000 volumes and 1500 MSS. Of the many curious old houses which still exist in the town it is enough to mention the House of the Musicians, so called from the seated figures of musicians which decorate the front. Rheims is the seat of an academy of science, arts, and literature, founded in 1841 and composed of forty-five members, a preparatory school of medicine and pharmacy, several hospitals, and a modern theatre. It is the headquarters of one of the divisions of the 6th corps d'armée (Châlons). Colbert's statue adorns the Cours; Louis XV.'s (in bronze) stands in the centre of the handsome Place Royale; and Marshal Drouet d'Erlon's is in another of the public squares.

History.—Rheims (Durocortorum), an important town in the time of Cæsar, made voluntary submission to the Romans and by its fidelity throughout the various Gallic insurrections secured the special favour of its conquerors. Christianity was introduced about the middle of the 4th century. Jovinus, already mentioned as an influential supporter of the new faith, repulsed the barbarians who invaded Champagne in 336; but the Vandals captured the town in 406 and slew St Nicasus, and Attila afterwards put everything to fire and sword. Clovis, after his victory at Soissons (486), was baptized at Rheims in 496 by St Remigius (*q.v.*). From this period the see acquired new lustre. The kings of the second and third dynasties desired to be consecrated at Rheims with the oil of the sacred phial which was believed to have been brought from heaven by a dove for the baptism of Clovis and was preserved in the abbey of St Remi. Historical meetings of Pope Stephen III. with Pippin the Short, and of Leo III. with Charlemagne, took place at Rheims; and there Louis the Debonnaire was crowned by Stephen IV. In the 10th century Rheims had become a centre of intellectual culture, Archbishop Adalberon, seconded by the monk Gerbert (Sylvester II.), having founded schools where the "liberal arts" were taught. Adalberon was also one of the prime authors of the revolution which put the Capet house in the place of the Carlovingians. The archbishops of Rheims held the temporal lordship of the city and coined money till the close of the 14th century. But their most important prerogative was the consecration of the king,—a privilege which was regularly exercised from the time of Philip Augustus to that of Charles X. Louis VII. granted the town a communal charter in 1139. Councils met within its walls in 1119 and 1148. The treaty of Troyes (1420) ceded it to the English, who had made a futile attempt to take it by siege in 1360; but they were expelled on the approach of Joan of Arc, who in 1429 caused Charles VII. to be duly consecrated in the cathedral. A revolt at Rheims caused by the salt tax in 1461 was cruelly repressed by Louis XI. The town sided with the League (1585), but submitted to Henry IV. after the battle of Ivry. In the foreign invasions of 1814 it was captured and recaptured, in 1870-71 it was made by the Germans the seat of a governor-general and impoverished by heavy requisitions.

RHEINGAU. See Rhine.

RHENANUS, Beatus (*c.* 1485–1547), German humanist, was born about 1485 at Schlettstadt in Alsace, where his father, a native of Rheinau, was a prosperous butcher. He received his early education in Schlettstadt, and afterwards (1503) went to Paris, where he came under the influence of Faber Stapulensis; here, among his other learned pursuits, we must include that of correcting the press for Henry Estienne. In 1511 he removed to Basel, where he became intimate with Erasmus, and took an active share in the publishing enterprises of Frobenius. Some time after 1520 he became a comparatively wealthy man through the death of his father; returning to Schlettstadt he devoted himself to a life of learned leisure, enlivened with free epistolary and personal intercourse with Erasmus, Reuchlin, Pirckheimer, Lasky, and many other scholars of his time. He died at Strasburg, while returning from Baden in Switzerland, whither he had gone for his health, in 1547, leaving behind him a high reputation not only for sound learning but also for singular gentleness, modesty, and simplicity.

His earliest publication was a life of Geiler of Strasburg (1510). Of his subsequent works the principal are *Rerum Germanicarum Libri III.* (1531), and editions of Velleius Paterculus (ed. princeps, from a MS. discovered by himself, 1520); Tacitus (1533, exclusive of the *Historics*); Livy (1535); and Erasmus (with a life, 9 vols. fol., 1540-41).

RHENISH PRUSSIA. See Prussia, Rhenish.

RHETICUS, or Rhæticus, a surname given to George Joachim (1514–1576) from his birth at Feldkirch in that part of Tyrol which was anciently the territory of the Rhæti. Born in 1514, he was appointed professor of mathematics at Wittenberg in 1537. His first appearance before the public was in the character of an enthusiastic convert to the newly broached opinions of Copernicus. No sooner had he adopted these opinions than, resigning his chair, he repaired to Frauenberg to sit at the feet of their great promulgator. All his energy was forthwith devoted to the new system, and, as has been mentioned under Copernicus, it was he who superintended the printing of the *De Orbium Revolutione.* Rheticus now commenced his great treatise, *Opus Palatinum de Triangulis*, and continued to work at it while he occupied his old chair at Wittenberg, while he taught mathematics at Leipsic, while he travelled over different parts of the Continent, and indeed up to his death in Hungary in 1576. The *Opus Palatinum* of Rheticus was published by Otho in 1596. It gives tables of sines and cosines, tangents, &c., for every 10 seconds, calculated to ten places. He had projected a table of the same kind to fifteen places, but did not live to complete it. The sine table, however, was afterwards published on this scale under the name of *Thesaurus Mathematicus* (Frankfort, 1613) by Pitiscus, who himself carried the calculation of a few of the earlier sines to twenty-two places.

RHETORIC. A lost work of Aristotle is quoted by Diogenes Laertius (viii. 57) as saying that Empedocles "invented" (εὑρεῖν) rhetoric; Zeno, dialectic. This is certainly not to be understood as meaning that Empedocles composed the first "art" of rhetoric. It is rather to be explained by Aristotle's own remark, cited by Laertius from another lost treatise, that Empedocles was "a master of expression and skilled in the use of metaphor"—qualities which may have found scope in his political oratory, when, after the fall of Thrasydæus in 472 B.C., he opposed the restoration of a tyranny at Agrigentum. The founder of rhetoric as an art was Corax of Syracuse (*c.* 466 B.C.). In 466 Thrasybulus the despot of Syracuse was overthrown, and a democracy was established. One of the immediate consequences was a mass of litigation on claims to property, urged by democratic exiles who had been dispossessed by Thrasybulus, Hiero, or Gelo. If, twenty years after the Cromwellian settlement of Ireland, an opportunity had been afforded to aggrieved persons for contesting every possession taken under that settlement in the ten counties. such persons being required to plead by their own mouths, the demand for an "art" of forensic rhetoric in Ireland would have been similar to that which existed in Sicily at the moment when Corax appeared. If we would understand the history of Greek rhetoric before Aristotle, we must always remember these circumstances of its origin. The new "art" was primarily intended to help the plain citizen who had to speak before a court of law. "Ten years ago," a Syracusan might urge, "Hieron banished me from Syracuse because I was suspected of popular sympathies, and gave my house on the Epipolæ to his favourite Agathocles, who still enjoys it. I now ask the people to restore it." Claims of this type would be frequent. Such a claim, going many years back, would often require that a complicated series of details should be stated and arranged. It would also, in many instances, lack documentary support, and rely chiefly on inferential reasoning. The facts known as to the "art" of Corax perfectly agree with these conditions. He gave rules for arrangement, dividing the speech into five parts,—proem, narrative, arguments (ἀγῶνες), subsidiary remarks (παρέκβασις), and peroration. Next he illustrated the topic of general probability (εἰκός), showing its two-edged use: *e.g.*, if a puny man is accused of assaulting a stronger, he can say, "Is it likely that I should have attacked him?" If *vice versa*, the strong man can argue, "Is it likely that I should have committed an assault where the presumption was sure to be against me?" This topic of εἰκός, in its manifold forms, was in fact the great weapon of the earliest Greek rhetoric. It was further developed by Tisias, the pupil of Corax, as we see from Plato's *Phædrus*, in an "art" of rhetoric which antiquity possessed, but of which we know little else. Aristotle gives the εἰκός a place among the topics of the fallacious enthymeme which he enumerates in *Rhet.* ii. 24, remarking that it was the very essence of the treatise of Corax, and points out the fallacy of omitting to distinguish between abstract and particular probability, quoting the verses of Agatho,—"Perhaps one might call this very thing a probability, that many improbable things will happen to men." Gorgias of Leontini, who visited Athens as an envoy from his fellow-citizens in 427 B.C., captivated the Athenians by his oratory, which, so far as the only considerable fragment warrants a judgment, was characterized by florid antithesis. But he has no definite place in the development of rhetoric as a system. It is doubtful whether he left a written "art"; and his mode of teaching was based on learning prepared passages by heart,—diction (λέξις), not invention or arrangement, being his great object.

The first extant Greek author who combined the theory with the practice of rhetoric is the Athenian Antiphon, the first on the list of the Attic orators. His works belong to the period from 421 to 411 B.C. Among them are the three "tetralogies." Each tetralogy is a group of four speeches, supposed to be spoken in a trial for homicide. Antiphon was the earliest representative at Athens of a new profession created by the new art of rhetoric—that of the λογογράφος or writer of forensic speeches for other men to speak in court. The plain man who had not mastered the newly invented weapons of speech was glad to have the aid of an expert. The tetralogies show us the art of rhetoric in its transition from the technical to the practical stage, from the school to the law-court and the assembly. The four skeleton speeches of each tetralogy are ordered as follows:—A, the accuser states his charge; B, the accused makes his defence; C, the accuser replies; D, the accused rejoins to the reply. The imaginary case is in each instance sketched as slightly as possible; all details are omitted; only the framework for discussion is supplied. The organic lines of the rhetorical pleader's thought stand out in bold relief, and we are enabled to form a clear notion of the logographer's method. We find a striking illustration of the fact noticed above, that the topic of "probability," so largely used by Corax and Tisias, is the staple of this early forensic rhetoric. Viewed generally, the works of Antiphon are of great interest for the history of Attic prose, as marking how far it had then been influenced by a theory of style. The movement of Antiphon's prose has a certain grave dignity, "impressing by its weight and grandeur," as a Greek critic in the Augustan age says, "not charming by its life and flow." Verbal antithesis is used, not in a diffuse or florid way, but with a certain sledge-hammer force, as sometimes in the speeches of Thucydides. The imagery, too, though bold, is not florid. The structure of the periods is still crude; and the general effect of the whole, though often powerful and impressive, is somewhat rigid.

As Antiphon represents what was afterwards named the "austere" or "rugged" style (αὐστηρὰ ἁρμονία), so Lysias was the model of an artistic and versatile simplicity. But the tetralogies give Antiphon a place in the history of rhetoric as an art, while Lysias, with all his more attractive gifts, belongs only to the history of oratory. Ancient writers quote an "art" of rhetoric by Isocrates, but its authenticity was questioned. It is certain, however, that Isocrates taught the art as such. He is said to have defined rhetoric "as the science of persuasion" (ἐπιστήμην πειθοῦς, Sextus Empir., *Adv. Mathem.*, ii. § 62, p. 301 *sq.*). Many of his particular precepts, both on arrangement and on diction, are cited, but do not suffice to give us a complete view of his method. The φιλοσοφία, or "theory of culture," which Isocrates expounds in his discourses "Against the Sophists", and on the "Antidosis," was in fact rhetoric applied to politics. First came technical expositions: the pupil was introduced to all the artificial resources which prose composition employs (τὰς ἰδέας ἁπάσας αἷς ὁ λόγος τυγχάνει χρώμενος, *Antid.*, § 183). The same term (ἰδέαι) is also used by Isocrates in a narrower sense, with reference to the "figures" of rhetoric, properly called σχήματα (*Panath.*, § 2); sometimes, again, in a sense still more general, to the several branches or styles of literary composition (*Antid.*, § 11). When the technical elements of the subject had been learned, the pupil was required to apply abstract rules in actual composition, and his essay was revised by the master. Isocrates was unquestionably successful in forming speakers and writers. This is proved by the renown of his school during a period of some fifty years, from about 390 to 340 B.C. Among the statesmen whom it could claim were Timotheus, Leodamas of Acharnæ, Lycurgus, and Hyperides. Among the philosophers or rhetoricians were Speusippus, Plato's successor in the Academy, and Isæus; among the historians, Ephorus and Theopompus.

In the person of Isocrates the art of rhetoric is thus thoroughly established, not merely as a technical method, but also as a practical discipline of life. If Plato's mildly ironical reference in the *Euthydemus* to a critic "on the borderland between philosophy and statesmanship" was meant, as is probable, for Isocrates, at least there was a wide difference between the measure of acceptance accorded to the earlier Sophists, such as Protagoras, and the influence which the school of Isocrates exerted through the men whom it had trained. Rhetoric had won its place in education. It kept that place, through varying fortunes, to the fall of the Roman empire, and resumed it, for a while, at the revival of learning.

Aristotle's *Rhetoric* belongs to the generation after Isocrates, having been composed between 330 and 322 B.C. As controversial allusions sometimes hint, it holds Isocrates for one of the foremost exponents of the subject. From a merely literary point of view, Aristotle's *Rhetoric* (with the partial exception of book iii.) is one of the driest works in the world. From the historical or scientific point of view, it is one of the most curious and the most interesting. If we would seize the true significance of the treatise, it is better to compare rhetoric with grammar than with its obvious analogue, logic. A method of grammar was the conception of the Alexandrian age, which had lying before it the standard masterpieces of Greek literature, and deduced the "rules" of grammar from the actual practice of the best writers. Aristotle, in the latter years of the 4th century B.C., held the same position relatively to the monuments of Greek oratory which the Alexandrian methodizers of grammar held relatively to Greek literature at large. Abundant materials lay before him, illustrating, in the greatest variety of forms, how speakers *had* been able to persuade the reason or to move the feelings. From this mass of material, said Aristotle, let us try to generalize. Let us deduce rules, by applying which a speaker shall always be able to persuade the reason or to move the feelings. And, when we have got our rules, let us digest them into an intelligent method, and so construct a true art. Aristotle's practical purpose was undoubtedly real. If we are to make persuasive speakers, he believed, this is the only sound way to set about it. But, for us moderns, the enduring interest of his *Rhetoric* is mainly retrospective. It attracts us as a feat in analysis by an acute mind—a feat highly characteristic of that mind itself, and at the same time strikingly illustrative of the field over which the materials have been gathered.

Rhetoric is properly an art. This is the proposition from which Aristotle sets out. It is so because, when a speaker persuades, it is possible to find out why he succeeds in doing so. Rhetoric is, in fact, the popular branch of logic. Now hitherto, Aristotle says, the essence of rhetoric has been neglected for the accidents. Writers on rhetoric have hitherto concerned themselves mainly with "the exciting of prejudice, of pity, of anger, and suchlike emotions of the soul." All this is very well, but "it has nothing to do with the matter in hand; it has regard to the judge." The true aim should be to *prove* your point, or seem to prove it.

Here we may venture to interpolate a comment which has a general bearing on Aristotle's *Rhetoric.* It is quite true that, if we start from the conception of rhetoric as a branch of logic, the phantom of logic in rhetoric claims precedence over appeals to passion. But Aristotle does not sufficiently regard the question—What, as a matter of experience, is most persuasive? The phantom of logic may be more persuasive with the more select hearers of rhetoric; but rhetoric is not for the more select; it is for the many, and with the many appeals to passion will sometimes, perhaps usually, be more effective than the semblance of the syllogism. And here we seem to touch the basis of the whole practical vice—it was not strictly a theoretical vice—in the old world's view of rhetoric, which, after Aristotle's day, was ultimately Aristotelian. No formulation of rhetoric can correspond with fact which does not leave it absolutely to the genius of the speaker whether reasoning (or its phantom) is to be what Aristotle calls it, the "body of proof" (*σῶμα πίστεως*), or whether the stress of persuading effort should not be rather addressed to the emotions of the hearers. This is a matter of tact, of instinct, of oratorical genius.

But we can entirely agree with Aristotle in his next remark, which is historical in its nature. The deliberative branch of rhetoric had hitherto been postponed, he observes, to the forensic. We have already seen the primary cause of this, namely, that the very origin of rhetoric in Hellas was forensic. The most urgent need which the citizen felt for this art was not when he had to discuss the interests of the city, but when he had to defend (perhaps) his own property or his own life. The relative subordination of deliberative rhetoric, however unscientific, had thus been human. Aristotle's next statement, that the master of logic will be the master of rhetoric, is a truism if we concede the essential primacy of the logical element in rhetoric. Otherwise it is a paradox; and it is not in accord with experience, which teaches that speakers incapable of showing even the ghost of an argument have sometimes been the most completely successful in carrying great audiences along with them. Aristotle never assumes that the hearers of his rhetorician are as *οἱ χαρίεντες*, the cultivated few; on the other hand, he is apt to assume tacitly—and here his individual bent comes out—that these hearers are not the great surging crowd, the *ὄχλος*, but a body of persons with a decided, though imperfectly developed, preference for sound logic.

What is the use of an art of rhetoric? It is fourfold, Aristotle replies. Rhetoric is useful, first of all, because truth and justice are naturally stronger than their opposites. When awards are not duly given, truth and justice must have been worsted by their own fault. This is worth correcting. Rhetoric is then (1) *corrective.* Next, it is (2) *instructive,* as a popular vehicle of persuasion for persons who could not be reached by the severer methods of strict logic. Then it is (3) *suggestive.* Logic and rhetoric are the two impartial arts; that is to say, it is a matter of indifference to them, as arts, whether the conclusion which they draw in any given case is affirmative or negative. Suppose that I am going to plead a cause, and have a sincere conviction that I am on the right side. The art of rhetoric will suggest to me what might be urged on the other side; and this will give me a stronger grasp of the whole situation. Lastly, rhetoric is (4) *defensive.* Mental effort is more distinctive of man than bodily effort; and "it would be absurd that, while incapacity for physical self-defence is a reproach, incapacity for mental defence should be no reproach." Rhetoric, then, is corrective, instructive, suggestive, defensive. But what if it be urged that this art may be abused? The objection, Aristotle answers, applies to all good things, except virtue, and especially to the most useful things. Men may abuse strength, health, wealth, generalship.

Rhetoric defined.

The function of the medical art is not necessarily to cure, but to make such progress towards a cure as each case may admit. Similarly it would be inaccurate to say that the function of rhetoric was to persuade. Rather must rhetoric be defined as "the faculty of discerning in every case the available means of persuasion." Suppose that among these means of persuasion is some process of reasoning which the rhetorician himself knows to be unsound. That belongs to the province of rhetoric all the same. In relation to logic, a man is called a "sophist" with regard to his moral purpose (*προαίρεσις*), *i.e.*, if he knowingly uses a fallacious syllogism. But rhetoric takes no account of the moral purpose. It takes account simply of the faculty (*δύναμις*)—the faculty of discovering any means of persuasion.

The πίστεις classi

The "available means of persuasion," universally considered, may be brought under two classes. (1) First, there are the proofs external to the art,—not furnished by rhetoric,—the "inartificial proofs" (*ἄτεχνοι πίστεις*). Such are the depositions made by witnesses, documents, and the like. (2) Secondly, there are the proofs, *i.e.*, the agents of persuasion, which the art of rhetoric itself provides, the "artificial proofs" (*ἔντεχνοι πίστεις*). These are of three kinds:—(*a*) logical (*λογικὴ πίστις*)—demonstration, or seeming demonstration, by argument; (*b*) ethical (*ἠθικὴ πίστις*), when the speaker succeeds in conveying such an impression of his own character as may lead the hearers to put trust in him; (*c*) emotional (*παθητικὴ πίστις*), when the speaker works persuasively on the feelings of the hearers. It follows that, besides logical skill, the rhetorician should possess the power of analysing character, in order to present himself in the ethical light which will be most effective with his audience. He must also understand the sources of the emotions, and the means of producing them. Hence rhetoric has a double relationship. While in one aspect—the most important to it as an art—it may be regarded as popular logic, in another aspect it is related to ethics. And hence, says Aristotle, political science (*πολιτική*) being a branch of ethical, as the citizen is one aspect of the man, "rhetoric and its professors slip into the garb of political science (*ὑποδύεται τὸ σχῆμα τὸ τῆς πολιτικῆς*), either through want of education, or from pretentiousness, or from other human causes."

Aristotle now proceeds to analyse the first of the "artificial proofs," the logical (*λογικὴ πίστις*). Answering to the strict syllogism of logic, rhetoric has its popular syllogism, to which Aristotle gives the name of "enthymeme" (*ἐνθύμημα*). This term (from the verb *ἐνθυμεῖσθαι*, "to revolve in the mind"), means properly "a consideration" or "reflection." It occurs first in Isocrates, who uses it simply of the "thoughts" or "sentiments" with which a rhetorician embellishes his work (*τοῖς ἐνθυμήμασι πρεπόντως ὅλον τὸν λόγον καταποικῖλαι*, *Or.*, xiii. § 16). Whether the technical sense was or was not known before Aristotle, it is to him at least that the first extant definition is due. He defines the enthymeme as a species of syllogism, namely, as "a syllogism from probabilities and signs" (ἐξ εἰκότων καὶ σημείων). The "probability" (εἰκός) is a general proposition, expressing that which usually happens, as, "wise men are usually just." The "sign" (σημεῖον) is a particular proposition, as, "Socrates is just." The "sign" may be fallible or infallible. If we say, "wise men are just; for Socrates was wise and just," this is an enthymeme from a fallible "sign," the implied syllogism being "Socrates was wise; Socrates was just (σημεῖον); ∴ all wise men are just"; and here the "sign" is, in Aristotle's phrase, "as a particular to a universal," because from the one case of Socrates we draw an inference about all men. If, again, we say,—"Here is a sign that he is ill—he is feverish"; our enthymeme is using an infallible sign, the syllogism being, "All who are feverish are ill; he is feverish (σημεῖον); ∴ he is ill." Here, again, the "sign" is "as a particular to a universal." When the "sign" is thus infallible, it is properly called *tekmerion* (τεκμήριον), the matter having been demonstrated and concluded (πεπερασμένον)—"for tekmar and peras mean the same thing ('limit') in the old language." Sometimes, again, the fallible sign is "as universal to particular," *e.g.*, "Here is a sign that he has a fever—he breathes quick," the syllogism being, "Feverish men breathe quick; he breathes quick (σημεῖον); ∴ he has a fever," where a particular cause is unsoundly inferred from an effect (the "universal") which might have other causes.

When Aristotle thus describes the enthymeme, or rhetorical syllogism, as dealing with "probabilities" and "signs," he is describing its ordinary or characteristic materials, *qua rhetorical* syllogism. He does not mean to say that rhetoric cannot use syllogisms formed with other material. It would be hardly needful to point this out, were it not that, in spite of his own clear words, his meaning has sometimes been misunderstood. "The premises of rhetorical syllogisms," he says, "seldom belong to the class of necessary facts. The subject matter of judgments and deliberations is usually contingent; for it is about their actions that men debate and take thought; but actions are all contingent, no one of them, so to say, being necessary. And results which are merely usual and contingent must be deduced from premises of the same kind, as necessary results from necessary premises. It follows that the propositions from which enthymemes are taken will be sometimes necessarily true, but more often only contingently true." Among the materials of the enthymeme, the "sign" which is infallible (the σημεῖον which is also a τεκμήριον) is so because it is to some necessary truth as part to whole.

Suppression of one premiss not essential

Aristotle did not regard the suppression of one premiss in the statement as essential to the enthymeme. The syllogism, of which the enthymeme is merely a kind, was regarded by him "not in relation to the expression" (οὐ πρὸς τὸν ἔξω λόγον), but to the process in the mind (ἀλλὰ πρὸς τὸν ἐν τῇ ψυχῇ λόγον, *Anal. Post.*, i. 10). As Sir W. Hamilton has justly said, he could not then have intended to distinguish a class of syllogisms by a verbal accident. The distinction of the rhetorical syllogism, in Aristotle's view, was in its matter, not in its form. This is, indeed, made sufficiently clear by his own remark that the enthymeme may "often" be more concisely stated than the full, or normal, syllogism (*Rhet.*, i. 2). There is obviously no reason why the rhetorical reasoner should not state both his premisses, if he finds it convenient or effective to do so. Since, however, one of the premisses is often left to be mentally supplied, some of the later writers on rhetoric came to treat this as part of the essence of the enthymeme. It was then that the word ἀτελής was interpolated after συλλογισμός in Aristotle, *Analyt. Prior.*, ii. 27, where the enthymeme is defined as συλλογισμὸς ἐξ εἰκότων καὶ σημείων.[1] Hence Quintilian says of the enthymeme (v. 10), "alii rhetoricum syllogismum, alii *imperfectum* syllogismum vocant"; hence, too, Juvenal's "*curtum* enthymema."

The example.

The other branch of the "logical proof" in rhetoric corresponds to the induction of strict logic, and consists in giving the semblance of inductive reasoning by the use of one or two well-known examples. As Aristotle calls the enthymeme a rhetorical syllogism, so he calls the example (παράδειγμα) "a rhetorical induction." Thus if a man has asked for a body-guard, and the speaker wishes to show that the aim is a tyranny, he may quote the "examples" of Dionysius and Pisistratus.

Aristotle next distinguishes the "universal" from the "special" topics, or commonplaces of rhetoric. The word τόπος, "place," means in this context "that place in which a proposition of a given kind is to be sought." The τόποι, then, are classifications of propositions and arguments which rhetoric makes beforehand, with a view to readiness in debate. Cicero well illustrates the phrase—"As it is easy to find hidden things when the place has been pointed out and marked, so, when we want to track out an argument, we ought to know the *places*, as Aristotle has called these seats, abodes, as it were, from which arguments are drawn. So a commonplace, or topic, may be defined as the 'seat' of an argument (*licet definire locum esse argumenti sedem*; Cic., *Topica*, ii. 7). So elsewhere he describes the *loci* of rhetoric as "*regiones* intra quas venere et pervestiges quod quæras"—"haunts in which one may hunt and track out the object of quest" (*De Orat.*, ii. 34). The "universal commonplaces" (κοινοὶ τόποι) are general heads of argument applicable to all subjects whatsoever—as, *e.g.*, on the "possibility" or "impossibility" of anything. The special commonplaces (τόποι τῶν εἰδῶν, *Rhet.*, ii. 22, more briefly called εἴδη) are those which are drawn from special branches of knowledge, as from politics, ethics, &c. Here Aristotle observes that the more a rhetorician enters on the subject-matter of any particular science the more will he tend to pass out of the domain which properly belongs to the art of rhetoric.

In that domain three provinces are distinguished. Deliberative rhetoric (συμβουλευτική) is concerned with exhortation or dissuasion, and with future time; its "end" (τέλος)—that which it keeps in view, or its standard—is advantage (or detriment) to the persons addressed. Forensic rhetoric (δικανική) is concerned with accusation or defence, and with time past; its standard is justice or injustice. Epideictic rhetoric—the ornamental rhetoric of "display" (ἐπιδεικτική)—is concerned with praise or blame, and usually with time present; its standard is honour or shame.

1. Let us begin with deliberative rhetoric, says Aristotle, and see what things a deliberative speaker ought to know. The subjects with which, in a public assembly, he will have to deal are mainly these five:—(1) finance, (2) foreign war, (3) home defence, (4) commerce, (5) legislation. Under all these heads, he ought to be provided with some εἴδη, or special commonplaces. Further, all his suasion or dissuasion has reference to the happiness of those whom he addresses. Hence he must be acquainted with the popular notions of happiness which are actually prevalent. Here Aristotle gives a series of popular definitions of happiness, and a list of the elements which are generally regarded as constituting it. A similar analysis of "good" (ἀγαθόν) follows.

The scientific spirit of the rhetoric is strongly accentuated by the unscientific character of these and subsequent analyses. Aristotle never forgets that his rhetorician wants to know, not what a thing is, but what it is generally thought to be. There is nothing of cynicism or sarcasm in all this. He is simply going through his prescribed task. He is making rhetoric, as such, into a method. But suppose the question arises—"Of two good things which is the better?" Our deliberative speaker must be able to treat the "universal commonplace" of degree (μᾶλλον καὶ ἧττον). Then, he must also know something about the chief forms of government,—democracy, oligarchy, aristocracy, monarchy,—not as they are or should be, but as they are popularly conceived.

2. The ornamental rhetoric (ἐπιδεικτική), which is taken next, is somewhat briefly dismissed. It might be conjectured, in explanation of its place in the treatment—we should have expected it to come third—that Aristotle was the first writer who recognized it as an independent kind, and that he viewed it as an offshoot from the deliberative branch. The epideictic speaker must know what most men think "honour" or "shame," "virtue" or "vice." At this point a verbal distinction of some interest occurs:—praise (ἔπαινος) implies moral approbation; but an "encomium" (ἐγκώμιον) is given to "achievements" (ἔργα) as such. The most generally useful "topic" for the ornamental speaker is αὔξησις (magnifying),—as the rhetorical induction (παράδειγμα) most helps the deliberative speaker, and the rhetorical syllogism (ἐνθύμημα) is most useful to the forensic.

3. In forensic rhetoric, we must begin by analysing injustice. And first, "What are the motives and aims of wrong-doing?" Actions are either voluntary from habit, reason, anger, lust, or involuntary from chance, nature, force. In reference to the voluntary actions, it is needful to know the popular conception of pleasure. Secondly, "What is the character which disposes a man to do wrong, or which exposes him to suffering it?" These topics must be familiar, in a popular way, to the forensic speaker. He must also know the general grounds on which actions are classed as just or unjust. Actions must be considered, first, in reference to law, which is either special (ἴδιος), whether written or unwritten, the law of particular places and communities, or else universal (κοινός), the law of nature. The second question about an "unjust" action is whether it hurts an individual or the community. The definition of "being wronged" (ἀδικεῖσθαι) is, "to be unjustly treated by a voluntary agent." Further, the definition of a particular offence (ἐπίγραμμα) sometimes raises a legal issue. A man may admit an act, and deny that it corresponds to the description given of it by the accuser. It is needful, then, to know the definitions of the principal crimes. It may be noticed that Aristotle here anticipates a topic which played a large part in the later rhetoric. The contested issues which he calls ἀμφισβητήσεις (*Rhet.*, iii. 16) were the στάσεις (constitutiones or status) of later days. Thus the issue as to the proper definition of an offence, to which he refers here (*Rhet.*, i. 13), coincides with the later

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[1] On this interpolation, see Sir W. Hamilton's *Discussions*, p. 154.

στάσις ὁρική. The distinction between justice and equity (*τό δίκαιον* and *τὸ ἐπιεικές*) is noticed. Equity is "a kind of justice, but goes beyond the written law," as in the *Ethics* (v. 10) equity is said to be a corrective of the law, where the latter fails through generality,—*i.e.*, through the lawmaker's inability to frame a general rule which should precisely fit the circumstances of every particular case. True to his conception of a method, Aristotle next applies "the topic of degree" to injustice,—as, in an earlier chapter (*Rhet.*, i. 7) he had applied it to the idea of "good."

The analysis of the three branches of rhetoric—deliberative, epideictic, forensic—is now finished. In the closing chapter of his first book, Aristotle briefly considers and dismisses the "inartificial proofs,"—the means of persuasion, that is, which arise from matters external to the art itself, though the art uses them. These, having regard to the actual circumstances of his time and country, he declares to be five: (1) laws; (2) witnesses; (3) evidence given under torture—*βάσανος*; (4) documents; (5) oaths, meaning chiefly treaties between states. With regard to (3) it may be remarked that the rhetorical theory of torture in the ancient world was, that a person under torture will tell the truth because it is his interest to do so. This is stated, *e.g.*, in the *Rhetorica ad Alexandrum*, xv. § 1. Among the Attic orators, Isæus gives his emphatic adhesion to this view (*Or.*, viii. § 12). On the other hand, the common-sense view of the matter is very well put by another Attic orator, Antiphon, in his speech *De Cæde Herodis* (§§ 31–33), when he remarks that "in the torturers is the hope of the tortured." "So long, then," Antiphon proceeds, "as the slave felt that his prospects in slandering were hopeful, he was obstinate in the calumny; but, when he saw that he was to die, then at last he told the truth, and said that he had been persuaded by the persecutors to slander me." It would have been interesting if Aristotle had given some indication of his view on this, his third, *ἄτεχνος πίστις*; but he simply accepts it as a fact of his day, and, taking it along with the rest, gives a number of general arguments which may be used on either side, according as the particular *ἄτεχνος πίστις* is for us or against us. Here the first book ends.

At the beginning of the second book, Aristotle returns to the "artificial proofs" (*ἔντεχνοι πίστεις*)—those which rhetoric itself provides. Of these, the logical proof has already been in part discussed (i. 2). He therefore turns to the "ethical" proof. The speaker's character may be so indicated by his speech as to prepossess the hearers; and this result depends chiefly on three things. He should make them feel that he possesses (1) *φρόνησις*—intelligence; (2) *ἀρετή*—virtue; and (3) *εὔνοια*—good-will to them. Aristotle then proceeds to furnish the speaker with the materials for seeming intelligent and good, referring for these to his previous analysis of the virtues (i. 9). As to the means of seeming friendly, these will be furnished by an analysis of the affections (*πάθη*). Here we are already on the boundary line between the "ethical proof" and the third of the *ἔντεχνοι πίστεις*, the "emotional proof." In regard to each affection (*πάθος*), we have to see (1) what it is; (2) what things predispose men to it; (3) the objects and conditions of its manifestation. The next ten chapters of the second book (2–11) are accordingly devoted to an analysis of those emotions which it is most important for the rhetorician to understand:—viz. (1) anger, and its opposite, mildness; (2) love and hatred; (3) fear and boldness; (4) compassion, envy, emulation; (5) shame and shamelessness; (6) gratitude (*χάρις*); (7) righteous indignation (*νέμεσις*). But, in appealing to these various emotions, the speaker must have regard to the general character of his audience, according, *e.g.*, as they are young or old, rich or poor, &c. Hence it is necessary to know the characteristics of the various periods and conditions of life. Aristotle therefore delineates the chief traits of the young, of the old, and of men in their prime; of the well-born, the rich, and the powerful. With regard to the well-born, he makes a remark which seems equally true of the rich: "the possessor of good birth is the more ambitious; for all men, when they have got anything, are wont to add to the heap" (ch. 12–17). The analysis of the "ethical" and the "emotional" proof is now finished.

After a concise retrospect, Aristotle passes to the treatment of a subject barely indicated in the first book (ch. 2). The *κοινοὶ τόποι*, or "universal commonplaces," applicable to all materials, are mainly four:—(1) *τὸ δυνατόν* and *τὸ ἀδύνατον*—possibility and impossibility; (2) *τὸ γεγονός* and *τὸ μέλλον*—past and future; (3) *τὸ αὔξειν καὶ μειοῦν* (or *μέγεθος* and *μικρότης*)—great and small; (4) *τὸ μᾶλλον καὶ ἧττον*—greater and less. Aristotle means that all subjects whatsoever admit of arguments into which these ideas enter. The first comes into play when we argue, "since this is possible, that must be so also", the second, when we say, "if this has been, that has been also," or "if this is to happen, that will happen also." For the third and fourth of the *κοινοὶ τόποι*, magnitude and degree, we are referred back to bk. i. ch. 7 and 8, where they have already been handled. The second book is completed by a sort of appendix, intended to supplement the sketch of the "logical proof" given in bk. i. ch. 2. The "example," or rhetorical induction, had been rather cursorily treated there, and is now illustrated more fully (ii. 20). There are two kinds of "example"—the historical (*τὸ πράγματα λέγειν*) and the artificial (*τὸ αὐτὸν ποιεῖν*). The artificial example, again, has two species—(1) comparison, *παραβολή*,—as when Socrates said that magistrates ought not to be chosen by lot, for this is like choosing athletes by lot, rather than for athletic power; (2) fiction, or fable in the special sense—*λόγοι*; as when Stesichorus warned the people of Himera against establishing a despot by telling them the fable of the horse who asked the man to help him against a deer. If you have no arguments of a logical kind (enthymemes), says Aristotle, the "example" must do duty as proof; if you have enthymemes, it can serve as illustration.

The use of *γνῶμαι*, or general moral sentiments, next claims attention (ch. 21). These are of two classes—those which are self-evident, and those which, not being so obviously true, require some confirmatory comment (*ἐπίλογος*), as when Medea says that no sensible man should allow his children to be exquisitely educated, because it makes them fastidious and unpopular. Such maxims with an "epilogue" are, in fact, virtually enthymemes. Apropos of *γνῶμαι*, Aristotle remarks that spurious generalization is particularly useful in the utterance of bitter complaint (*e.g.*, "frailty, thy name is woman"). Then it is often effective to controvert received maxims, *e.g.*, "It is not well to 'know oneself'; for if this man had known himself, he would never have become a general" (ch. 21).

Some precepts on the enthymeme follow. The rhetorical reasoner must not have too many links in the chain of his argument; and he must omit those propositions which his hearers can easily supply. Also, it is highly important to know the special topics (*εἴδη*) from which enthymemes can be drawn in each subject. The enthymeme is either (1) *δεικτικόν*, demonstrative, establishing a point, or (2) *ἐλεγκτικόν*, refutative, destroying a position by a comparison of conflicting statements (*τὸ τὰ ἀνομολογούμενα συνάγειν*). Aristotle now gives (ii. 23) an enumeration of classes or heads of argument (*ἐνθυμηματικοὶ τόποι*) from which enthymemes can be constructed. These apply nominally to all three branches of rhetoric, but in fact chiefly to the deliberative and the forensic. The demonstrative enthymeme is almost exclusively treated, since the refutative form can, of course, be inferred from the other. A chapter (24), answering to the treatise on fallacies in logic (*περὶ σοφιστικῶν ἐλέγχων*), is devoted to the fallacious (*φαινόμενον*) enthymeme, of which ten "topics" are explained and illustrated. Another chapter is given to the two general types of *λύσις*, or refutation (ch. 25), viz., (1) direct counter-argument (*τὸ ἀντισυλλογίζεσθαι*), opposing one enthymeme to another; (2) objection to a particular point in the adversary's case (*τὸ ἐνίστασθαι*). The second book then concludes with some supplementary remarks, meant, seemingly, to correct errors made by previous writers on rhetoric (ch. 26).

In his first two books Aristotle has thus dealt with invention (*εὕρεσις*)—the discovery of means of persuasion. In the third book he deals with expression and arrangement (*λέξις* and *τάξις*). The subject is prepared by some remarks on the art of delivery (*ὑπόκρισις*), which Aristotle defines as the management of the voice. "It is the art of knowing how to use the voice for the expression of each feeling, of knowing when it should be loud, low, or moderate, of managing its pitch—shrill, deep, or middle—and of adapting the cadences to the theme." Aristotle says nothing on gesture or play of feature, which Cicero and Quintilian recognize as important. He includes them by implication, however, in saying that the art of delivery, whenever it is reduced to method, "will perform the function of the actor's art," adding that "the dramatic faculty is less a matter of art than of nature."

But verbal expression, at least, is clearly in the province of art, and to that he now turns. He deals first with diction (*λέξις*) in the proper sense, as concerned with the choice of words and phrases. The first excellence of diction is clearness (*σαφήνεια*), which is attained by using words in their proper sense (*κύρια*). Next, the diction must be "neither too low nor too grand, but suitable to the subject." In prose (*ἐν τοῖς ψιλοῖς λόγοις*) there is less scope for ornament than in poetry, though in the latter, too, much depends on the speaker or the theme. And here Aristotle remarks that Euripides was the first poet who produced a happy illusion by taking his words from the language of daily life (*ἐκ τῆς εἰωθυίας διαλέκτου*). With a view to adorning prose, and giving it "distinction" (the term which best represents Aristotle's phrase *ξένον* or *ξενικὸν ποιεῖν*), nothing is more important than the judicious use of metaphor. Aristotle admits that "the art of metaphor cannot be taught"; but he gives some sensible hints on the subject, and on the use of epithets. The poet Simonides, he tells us, when the winner of a mule race offered him a small fee, declined to write an ode on "half-asses," but, when the price was raised, sang "Hail, daughters of windswift steeds." The perceptions which made the best Greek prose so good are illustrated by Aristotle's next chapter (iii. 3) on *ψυχρά*, "frigidities," "faults of style." He traces these to four chief sources,—the use of tawdry or ungainly compounds (διπλᾶ ὀνόματα), the use of rare or obsolete words (γλῶτται), and infelicity of epithet or metaphor.

A simile (εἰκών) is a metaphor with an explanation (λόγος): *e.g.*, in speaking of Achilles, "he sprang on them like a lion" is simile; "the lion sprang on them" is metaphor. Simile is less available than metaphor for prose, being more poetical. The "proportional" metaphor mentioned here requires a passing comment. Aristotle used the term "metaphor" (μεταφορά) in a larger sense than ours. He meant by it "any transference of a word to a sense different from its proper sense." Thus he can distinguish (*Poet.*, c. 21) four classes of metaphor:—(1) "from genus to species;" as when "vessel" means "ship"; (2) from species to genus, as when "the lilies of the field" stand for "flowers" generally. These two kinds are not what we call "metaphors," but are examples of the figure which was afterwards named "synecdoche." Aristotle's third class of metaphor is (3) "from species to species," under which head come almost all familiar metaphors, as to "scent a plot,"—the generic notion, "find out," being common to the special terms, "scent" and "detect"; (4) then lastly there is the "proportional" metaphor (ἡ ἀνάλογον), when A is not simply compared with B (on the strength of something obviously common to both), but A's relation to C is compared with B's relation to D. To call old age "the evening of life" implies that old age is to life as the evening to the day. Obviously a "proportion" of this kind is implicit in the metaphors of Aristotle's third class; but in the fourth class proportion is expressly indicated by the mention of the second term ("life" in our example).

The first four chapters having thus dealt with expression in the narrower sense of diction (λέξις proper), Aristotle devotes the next eight (iii. 5–12) to composition, which would be properly called σύνθεσις. After remarks on the first requisites—grammatical correctness, and purity of idiom (τὸ ἑλληνίζειν)—we have some hints on "dignity" of style (ὄγκος). "Propriety" (τὸ πρέπον) is defined as depending chiefly on three qualities:—(1) expression of the feelings which it is desired to move in the hearer; (2) fitness to the character and position of the speaker; and (3) congruity with the level of the subject. A certain "rhythm" (ῥυθμός), or harmonious movement, should be sought in prose; but this must not be so precise as to give the effect of metre. The elements of rhythm are "times," *i.e.*, in writing, long or short syllables, the short syllable being the unit. Here, following the early writers on music (comp. Plato, *Rep.*, 400 B), Aristotle recognizes three "rhythms": (1) the "heroic" or dactylic, —⏑⏑, which is in the ratio of equality, since — = ⏑⏑, or 1 : 1; (2) the iambic or trochaic (⏑— or —⏑), which has the ratio of 2 to 1; (3) the pæonic, —⏑⏑⏑, which has the ratio of 3 : 2. Of these, the heroic is too grand for prose; the iambic is too commonplace, being the very cadence of ordinary talk (αὐτή ἐστιν ἡ λέξις τῶν πολλῶν); the trochee is too comic. The pæon remains. It is the best rhythm for prose, since it will not, by itself, produce a metrical effect (μᾶλλον λανθάνει). The "first" pæon (—⏑⏑⏑) is most suitable to the beginning of sentences, the "fourth" pæon (⏑⏑⏑—) to the close. Rhythm having been attained, a framework is supplied by the period (περίοδος). A "compact" or periodic style (κατεστραμμένη λέξις) is so called in contrast with that "running" style (εἰρομένη λέξις) which simply strings clause to clause, "having no necessary end until the thought is finished," and is unpleasing because it is unlimited; "for all men wish to descry the end." The periodic style pleases for the opposite reason, because the hearer always fancies that he has grasped something and has got something defined. The period may consist of several parts or members (κῶλα), or it may be "simple," forming a unit (ἀφελής, μονόκωλος). The rhetorical use of antithesis is then noticed in its application to the period. Two kindred figures are also mentioned,—*parisosis*, a parallelism of structure between clauses of equal length,—and *paromoiosis*, a resemblance in sound, when the last (or first) word of one clause has an echo, as it were, in the same place of the next clause.

Two chapters (10, 11) are now given to the sources of vivacity in speaking. Those "smart sayings" (τὰ ἀστεῖα) which win applause "must be invented by the clever or practised man; the business of this treatise is to point out their use." They come chiefly from (1) metaphor, (2) antithesis, and (3) vividness—*i.e.*, placing the thing described "before the eyes of the hearer" (τὸ πρὸ ὀμμάτων ποιεῖν). This is called by Aristotle ἐνέργεια, "actuality" (which must be carefully distinguished from ἐνάργεια, another term for "vividness"), since things are represented not merely in their potentiality (δύναμις), but as living and moving. One of the most effective kinds of point (says Aristotle) is "a metaphor with a surprise," *i.e.*, with the disclosure of a likeness not perceived before, the source of the pleasure being the same as in riddles.

The whole subject of expression is concluded by a chapter on the general types of style, in their relation to the three branches of rhetoric (ch. 12). There is a literary style (γραφικὴ λέξις) and a style suited to oral contest or debate (ἀγωνιστική). The literary style is that which admits of the highest finish (ἀκριβεστάτη), and is best suited to the epideictic branch of rhetoric, since the latter is properly addressed to readers. The other, or "agonistic," style is best adapted to delivery (ὑποκριτικωτάτη). It is so mainly through two things—adaptation to the character of speaker and hearer, and skilful appeals to feeling. Forensic and deliberative rhetoric both use it; but the forensic branch admits of higher finish, and so far approximates to the literary style. Deliberative rhetoric, on the other hand, is like drawing in light and shade (without colours), σκιαγραφία—like scene-painting, we should rather say, *i.e.*, it is meant to produce its effects at a distance, and will not bear looking at too closely.

From expression we now pass to the other subject announced at the opening of the third book, arrangement (τάξις), which occupies the last seven chapters (13–19). The received system, which had been popularized, if not originated, by Isocrates, recognised four divisions of a speech: (1) exordium (or proem), προοίμιον, (2) narrative, διήγησις; (3) proof, πίστεις; (4) peroration, ἐπίλογος. Aristotle adopts this fourfold partition as his basis,—with the preliminary remark, however, that only two elements are necessarily present in every case, viz., "statement" of one's subject, πρόθεσις, and "argument" in its support, πίστεις. He then takes the four divisions in order. The contents of the proem usually come under one of two heads—(1) exciting or allaying prejudice; (2) amplifying or detracting. In epideictic rhetoric the connexion of proem with sequel may be comparatively loose; it is like a flute-player's prelude (προαύλιον), which he deftly links on to the key-note (ἐνδόσιμον) of his principal theme. The forensic proem, on the other hand, may be likened to the prologue of an epic or a tragedy (ch. 14, 15). **2. Narrative.** Narrative is least needed in deliberative speaking, since this deals chiefly with the future. In forensic narrative, the object must be to bring out clearly the issues on which accuser or accused relies, with an effective colouring of ethos and pathos. In the epideictic branch, the narrative should not form a continuous whole, but should be divided and varied by comments (ch. 16). **3. Proof.** The rhetorician's proofs (πίστεις) will, in the forensic branch, be relevant to one of four issues:—(1) fact: was the alleged act done, or not? (2) damage: if done, was it hurtful? (3) criminality: if hurtful, was the hurt justifiable? (4) quantity or degree. Aristotle's four "issues" (ἀμφισβητήσεις) here correspond with the στάσεις, "positions" or "questions," usually three, of later legists and rhetoricians: (1) στάσις στοχαστική, *status conjecturalis*, the question of fact; (2) στάσις ὁρική, *status definitivus*, *nomen*, or *finitio*, the question of legal definition; (3) στάσις ποιότητος *status qualitatis* or *juridicialis*, the question of justice or injustice. Thus Cicero says, "res (controversiam facit) aut de vero (1), aut de recto (3), aut de nomine" (2), *Orat.*, xxxiv. 121. In deliberative rhetoric, the four "issues" can be applied to the future, since, if a speaker anticipates certain results from a course of a policy, his adversary can deny their (1) probability, (2) expediency, (3) justice, or (4) importance. The enthymeme is most useful in the deliberative branch, as the "example," or rhetorical induction, is most useful in the forensic. The "ethical" proof from the speaker's indicated character is always a most important adjunct to the logical proof (ch. 17). A chapter is now given to one special resource by which a proof can often be enforced, viz., interrogation of the adversary (ἐρώτησις), which has usually one of two objects—(1) *reductio ad absurdum*, or (2) to entrap him into a fatal admission (ch. 18). The last chapter of the book, and of the treatise, deals with the peroration or "epilogue" (ἐπίλογος). This aims usually at one of four things:—(1) to conciliate the hearers; (2) to magnify or lower the importance of topics already treated; (3) to excite emotion in the hearers; (4) to refresh their memories by a short recapitulation. Remarking that asyndeton gives force to the close of an epilogue, Aristotle ends his rhetoric with the last words (not quite accurately quoted) of the great speech in which Lysias denounced Eratosthenes—παύσομαι κατηγορῶν. ἀκηκόατε, ἑωράκατε, πεπόνθατε, ἔχετε, δικάζετε.

Aristotle's *Rhetoric* is incomparably the most scientific work which exists on the subject. It may also be regarded as having determined the main lines on which the subject was treated by nearly all subsequent writers. The extant treatise on rhetoric entitled Ῥητορικὴ πρὸς Ἀλέξανδρον was undoubtedly by Anaximenes of Lampsacus, and was probably composed about 340–330 B.C., a few years before Aristotle's work. The introductory letter prefixed to it is a late forgery. If the treatise of Anaximenes is compared with that of Aristotle the distinctive place of the latter in this field becomes clearer. Anaximenes, who knew the treatise of Isocrates, and could profit by all the preceding Greek "arts," is, for us, the sole representative of *technical* rhetoric before Aristotle, and probably represents it at its best. We miss the intellectual power, the grasp of principles, and the subtle discrimination which belong to the work of Aristotle. On the other hand, the practical character is more strongly marked. It might, indeed, be said of Aristotle's treatise that it is rather a Philosophy of Rhetoric than a Rhetoric proper. It is a body of abstract principles and general rules. These will enable the student to dissect a good speech; but, by themselves, they will not go far towards enabling him to make one. Aristotle's purpose was to annex rhetoric to the realm of science. He succeeded, as far as success was possible. But the new province was somewhat of a Poland. The rigid system which was found necessary for holding the unruly dependency did not leave much scope for spontaneous vigour or native exuberance.

During the three centuries from the age of Alexander to that of Augustus the fortunes of rhetoric were governed by the new conditions of Hellenism. Aristotle's scientific method lived on in the Peripatetic school. Meanwhile, however, the fashion of florid declamation or strained conceits prevailed in the rhetorical schools of Asia, where, amid mixed populations, the pure traditions of the best Greek taste had been dissociated from the use of the Greek language. The "Asianism" of style which thus came to be contrasted with "Atticism" found imitators at Rome, among whom must be reckoned the orator Hortensius (*c.* 95 B.C.). Hermagoras of Temnos in Æolis (*c.* 110 B.C.) claims mention as having done much to revive a higher conception. Using both the practical rhetoric of the time before Aristotle and Aristotle's philosophical rhetoric, he worked up the results of both in a new system,—following the philosophers so far as to give the chief prominence to "invention." He thus became the founder of a rhetoric which, as distinguished from the practical and the philosophical, may be called the scholastic. Through the influence of his school, Hermagoras did for Roman eloquence very much what the school of Isocrates had done for Athens. Above all, he counteracted the view of "Asianism," that oratory is a mere knack founded on practice, and recalled attention to the study of it as an art.[1]

Cicero's rhetorical works are to some extent based on the technical system to which he had been introduced by Molon at Rhodes, and by other contemporary teachers. But Cicero further made an independent use of the best among the earlier Greek writers, as Isocrates, Aristotle, and Theophrastus. Lastly, he could draw, at least in the later of his treatises, on a vast fund of reflection and experience. Indeed, the distinctive interest of his contributions to the theory of rhetoric consists in the fact that his theory can be compared with his practice. The result of such a comparison is certainly to suggest how much less he owed to his art than to his genius. Some consciousness of this is perhaps implied in the idea which pervades much of his writing on oratory, that the perfect orator is the perfect man. The same thought is present to Quintilian, in whose great work, *De Institutione Oratoria*, the scholastic rhetoric receives its most complete expression (*c.* 90 A.D.). Quintilian treats oratory as the end to which the entire mental and moral development of the student is to be directed. Thus he devotes his first book to an early discipline which should precede the orator's first studies, and his last book to a discipline of the whole man which lies beyond them. Some notion of his comprehensive method may be derived from the circumstance that, in connexion with precepts for storing the speaker's mind, he introduces a succinct estimate of the chief Greek and Roman authors, of every kind, from Homer to Seneca (bk. x. §§ 46–131). After Quintilian, the next name which deserves to be signalized in the history of the art is that of Hermogenes, who about 170 A.D. made a complete digest of the scholastic rhetoric from the time of Hermagoras of Temnos (110 B.C.). It is contained in five extant treatises, which are remarkable for clearness and acuteness, and still more remarkable as having been completed before the age of twenty-five. Hermogenes continued for nearly a century and a half to be one of the chief authorities in the schools. Longinus (*c.* 260 A.D.) published an *Art of Rhetoric* which is still extant; and the more celebrated treatise *On Sublimity* (περὶ ὕψους), if not his work, is at least of the same period. About 315 A.D. Aphthonius composed the "exercises" (προγυμνάσματα) which superseded the work of Hermogenes. At the revival of letters the treatise of Aphthonius once more became a standard text-book. Much popularity was enjoyed also by the exercises of Ælius Theon (380 A.D.). Space would fail if we attempted to enumerate the writers on rhetoric who, during these centuries, attained to more or less repute. In the editions of the *Rhetores Græci* by Spengel and by Walz the fecundity of the literature can be seen.

Practice of rhetoric under the empire.

The "sophists."

The theory of rhetoric engaged this industry, because the practice of the art was in greater vogue than ever before or since. During the first four centuries of the empire several causes contributed to this result. First, there was a general dearth of the higher intellectual interests; politics gave no scope to energy; philosophy was stagnant, and literature, as a rule, either arid or frivolous. Then the Greek schools had poured their rhetoricians into Rome, where the same tastes which revelled in coarse luxury welcomed tawdry declamation. The law-courts of the Roman provinces further created a continual demand for forensic speaking. Asia, Gaul, and Africa are now the regions which supply the largest proportion of successful orators. The passion for rhetoric was everywhere. "Thule talks of engaging an orator," says Juvenal. "You call a man a thief," says Persius; "he answers you with finished tropes." Athens, Smyrna, Rhodes, Tarsus, Antioch, Alexandria, Massilia, and many other cities had seats of learning at which rhetoric was taught by professors who enjoyed the highest consideration. The public teacher of rhetoric was called "sophist," which was now an academic title, similar to "professor" or "doctor." In the 4th century B.C. Isocrates had taken pride in the name of σοφιστής, which, indeed, had at no time wholly lost the good, or neutral, sense which originally belonged to it. The academic meaning which it acquired under the early empire lasted into the Middle Ages (see Ducange, *s.v.*, who quotes from Baldricus, "Egregius Doctor magnusque Sophista Geraldus"). While the word *rhetor* still denoted the faculty, the word *sophistes* denoted the office or rank to which the rhetor might hope to rise. So in Lucian's piece (160 A.D.), the "Teacher of Rhetoricians" says (§ 1),—"You ask, young man, how you are to become a rhetor, and attain in your turn to the repute of that most impressive and illustrious title, sophist."

Vespasian (70–79 A.D.), according to Suetonius, was the first emperor who gave a public endowment to the teaching of rhetoric. But it was under Hadrian and the Antonines (117–180 A.D.) that the public chairs of rhetoric were raised to an importance which made them objects of the highest ambition. The complete constitution of the schools at Athens was due to Marcus Aurelius. The Philosophical School had four chairs (θρόνοι),—Platonic, Stoic, Peripatetic, Epicurean. The Rhetorical School had two chairs, one for "sophistic," the other for "political" rhetoric. By "sophistic" was meant the academic teaching of rhetoric as an art, in distinction from its "political" application to the law-courts. The "sophistical" chair was superior to the "political" in dignity as it emolument, and its occupant was invested with a jurisdiction over the youth of Athens similar to that of the vice-chancellor in a modern university. Thus it is said of Theodotus, the first holder of the chair of sophistic as constituted by Marcus Aurelius, *προέστη δὲ καὶ τῆς τῶν Ἀθηναίων νεότηros πρῶτος* (Philostr., *Vit. Soph.*, II. ii. p. 566). The Antonines further encouraged rhetoric by granting immunities to its teachers. Three "sophists" in each of the smaller towns, and five in the larger, were exempted from taxation (*Dig.*, xxvii. 1, 6, § 2). The wealthier sophists affected much personal splendour. One of them, Polemon (*c.* 130 A.D.), was attended on his journeys by an enormous retinue—slaves, beasts of burden, horses, and hounds—while he himself drove in a costly equipage. Another, Adrian of Tyre (*c.* 170 A.D.), was drawn to his lectures by horses "with silver bits," wore the richest attire and the rarest jewels, and endeared himself to the Athenian students by the entertainments which he provided for them. In all this foppery there was calculation. The aim of the sophist was to impress the multitude. Popular applause was the breath of life to him. His whole stock in trade was style, and this was directed to astonishing by *tours de force*. The scholastic declamations were chiefly of two classes. (1) The *suasoriæ* were usually on historical or legendary subjects, in which some course of action was commended or censured; thus Juvenal, alluding to his school-days, cries—

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[1] See Professor Jebb's *Attic Orators*, vol. ii. p. 445.

Declamations.

> "I, too, have counselled Sulla to resign,
> And taste those joys for which dictators pine."

These *suasoriæ* belonged to deliberative rhetoric (the *βουλευτικὸν γένος*, *deliberativum genus*). (2) The *controversiæ* turned especially on legal issues, and represented the forensic rhetoric (*δικανικὸν γένος*, *judiciale genus*). But it was the general characteristic of this period that all subjects, though formally "deliberative" or "forensic," were treated in the style and spirit of that third branch which Aristotle distinguished, the rhetoric of *ἐπίδειξις* or "display." The oratory produced by the age of the academic sophists can be estimated from a large extant literature. It is shown under various aspects, and presumably at its best, by such writers as Dion Chrysostom at the end of the 1st century, Ælius Aristides in the 2d, Themistius, Himerius, and Libanius in the 4th. It would be unjust to deny that, amid much which is tawdry or vapid, these writings occasionally present passages of true literary beauty, while they constantly offer matter of the highest interest to the student of the past.

In the mediæval system of academic studies, grammar, logic, and rhetoric were the subjects of the trivium, or course followed during the four years of undergraduateship. Music, arithmetic, geometry, and astronomy constituted the quadrivium, or course for the three years from the B.A. to the M.A. degree. These were the seven liberal arts. According to Hallam (*Lit. Eur.*, vol. i.), the idea of a trivium and quadrivium dates from the 6th century. The well-known memorial couplet can be traced to *c.* 1420 A.D. :—

> *Gram.* loquitur, *Dia.* vera docet, *Rhet.* verba colorat :
> *Mus.* canit, *Ar.* numerat. *Geo.* ponderat, *As.* colit astra.

A shorter formula was—"lingua, tropus, ratio; numerus, tonus, angulus, astra." In the Middle Ages the chief authorities on rhetoric were the latest Latin epitomists, such as Martianus Capella (5th century), Cassiodorus (5th century), or Isidorus (7th century).

After the revival of learning, the better Roman and Greek writers gradually returned into use. Some new treatises were also produced. Leonard Cox (died 1549) wrote *The Art or Craft of Rhetoryke*, partly compiled, partly original, which was reprinted in Latin at Cracow. The *Art of Rhetorique* by Thomas Wilson (1553), afterwards secretary of state, embodied rules chiefly from Aristotle, with help from Cicero and Quintilian. About the same time, treatises on rhetoric were published in France by Tonquelin (1555) and Courcelles (1557). The general aim at this period was to revive and popularize the best teaching of the ancients on rhetoric. The subject was regularly taught at the universities, and was, indeed, important. At Cambridge in 1570 the study of rhetoric was based on Quintilian, Hermogenes, and the speeches of Cicero viewed as works of art. An Oxford statute of 1588 shows that the same books were used there. In 1620 George Herbert was delivering lectures on rhetoric at Cambridge, where he held the office of public orator. The decay of rhetoric as a formal study at the universities set in during the 18th century. In 1712 Steele regrets that Oxford and Cambridge have "grown dumb in the study of eloquence." The function of the rhetoric lecturer passed over into that of correcting written themes; but his title remained long after his office had lost its primary meaning If the theory of rhetoric fell into neglect the practice however, was encouraged by the public exercises ("acts" and "opponencies") in the schools. The college prizes for "declamations" served the same purpose.

Modern writers on rhetoric.

The fortunes of rhetoric in the modern world, as briefly sketched above, may suffice to suggest why few modern writers of ability have given their attention to the subject. Perhaps one of the most notable modern contributions to the art is the collection of commonplaces framed (in Latin) by Bacon, "to be so many spools from which the threads can be drawn out as occasion serves," a truly curious work of that acute and fertile mind. He called them "Antitheta." A specimen is subjoined :—

UXOR ET LIBERI.

For.	*Against.*
"Attachment to the state begins from the family."	"He who marries, and has children, has given hostages to fortune."
"Wife and children are a discipline in humanity. Bachelors are morose and austere."	"The immortality of brutes is in their progeny; of men, in their fame, services, and institutions."
"The only advantage of celibacy and childlessness is in case of exile."	"Regard for the family too often overrides regard for the state."

This is quite in the spirit of Aristotle's treatise. The popularity enjoyed by Blair's *Rhetoric* in the latter part of the 18th and the earlier part of the present century was merited rather by the form than by the matter. Campbell's *Philosophy of Rhetoric*, which found less wide acceptance than its predecessor, was superior to it in depth, though often marred by an imperfect comprehension of logic. But undoubtedly the best modern book on the subject is Whately's *Elements of Rhetoric*. Starting from Aristotle's view, that rhetoric is "an offshoot from logic," Whately treats it as the art of "argumentative composition." He considers it under four heads:—(1) the address to the understanding (= Aristotle's *λογικὴ πίστις*); (2) the address to the will, or persuasion (= Aristotle's *ἠθική* and *παθητικὴ πίστις*); (3) style; (4) elocution, or delivery. At the outset he makes some judicious remarks on the popular objections to the art. "It has been truly observed that 'genius begins where rules end.' But to infer from this, as some seem disposed to do, that, in any department wherein genius can be displayed, rules must be useless, or useless to those who possess genius, is a very rash conclusion. What I have observed elsewhere concerning logic, that 'a knowledge of it serves to save a waste of ingenuity,' holds good in many other departments also." "A drayman, we are told, will taunt a comrade by saying, 'you're a pretty fellow,' without

Whately

having learnt that he is employing the figure called irony." But when it is thus urged that—

> "All a rhetorician's rules
> "But teach him how to name his tools,"

the assumption is tacitly made that an accurate nomenclature and classification of these tools must be devoid of practical use. The conditions of modern life, and especially the invention of printing, have diminished the importance which belonged in antiquity to the art of speaking. But few would deny that a large measure of value may still be claimed for rhetoric in the more comprehensive sense which Whately gives to it, as the art of argumentative composition. His treatise, the work of an able and also witty man, will be found instructive and entertaining even by those who do not go to it for a discipline. Nor can it fail to suggest a further remark. While abounding in fresh thought and modern illustration, it constantly reminds us that, in almost all essentials, the art of rhetoric must be regarded as the creation of Aristotle (R. C. J.)

RHEUMATISM, a constitutional disease having for its chief manifestations inflammatory affections of the fibrous textures of joints and other parts, together with a liability to various complications. Two forms of rheumatism are recognized, and will be now briefly described, namely, the acute and the chronic, the latter either resulting from the former or arising independently. In addition to these, a disease which has received the name of chronic rheumatic (or rheumatoid) arthritis, and which presents many resemblances to chronic rheumatism, although the relation between them is questionable, may be noticed here.

Acute Rheumatism, frequently called Rheumatic Fever, is mainly characterized by inflammation affecting various joints, with a tendency to spread in an erratic manner, and accompanied with much pain, febrile disturbance, and perspiration.

The nature of this disease has been extensively discussed by pathologists and physicians; but, although numerous, and many of them ingenious, theories have been advanced and supported by evidence drawn from experimentation as well as clinical observation, it cannot yet be said that any one of them has gained general acceptance. It has been held that rheumatism is produced by an excess of lactic acid in the system in connexion with morbid states of the nutritive functions. Support to this view was given experimentally by Dr Richardson, but experiments by others have led to a different conclusion. Again, it has been held that the disease is a textural inflammation due to chill acting upon the parts, either locally through the circulation or through the agency of the nervous system, whereby the nutrition of the joints and other structures is lowered. Another view regards it as arising primarily in a profound disturbance of the heat-regulating mechanism of the body by chill, which specially affects the muscular system, causing heat to be generated without work, one of the consequences being that impressions of pain are conveyed to the brain by the articular nerves instead of those of work performed (see Pathology). The view has been held, too, that rheumatism is to be referred to a germ or parasite, or a miasm analogous to the poison of malaria.

Without attempting to discuss the relative probability of these and other theories, it may be stated that those which point in the direction of a nutritional change in the special tissues affected (the fibrous) as the result of chill or other depressing cause operating through the agency of the nervous system appear more consonant with the pathological evidences of the disease itself than those which would refer the morbid process to the influence of any poison circulating in the blood.

There are certain points of importance in connection with the causation of this form of the disease which are generally agreed upon. Thus an hereditary tendency is recognized as among the causes predisposing to acute rheumatism The extent of this has been variously estimated, but it would appear to be well established that it shows itself in about one-fourth of the cases. Age is another important predisposing condition, the acute form of rheumatism being much more a disease of youth than of later life. The period of adolescence, from sixteen to twenty, is that in which probably the greater number of the cases occur; but even in early childhood the disease may manifest itself, or at any period of life, although it is rarely observed in old age. Persons much exposed to all kinds of weather are specially liable to suffer, and hence the disease is more common among the poorer classes. Any depressing cause acting upon the general health, such as overwork or anxiety, or any habitual drain upon the system, such as overlactation, in like manner has a similar effect. Climate, too, is a factor of great importance, for, although not unfrequently met with in temperate or even warm climates, the disease is unquestionably of more common occurrence in cold and damp regions. Attacks of acute rheumatism are brought on in most instances by exposure to cold, by getting wet through, sometimes also by excessive fatigue such as in walking long distances, especially if in addition there have been overheating of the body and subsequent chill. Persons who have once suffered from this disease are very liable to a recurrence on a renewal of the exciting cause, and even apparently independently of this from such causes as digestive disturbances.

An attack of acute rheumatism is usually ushered in by chilliness or rigors followed with feverishness and a feeling of stiffness or pain in one or more joints, generally those of larger or medium size, such as the knees, ankles, wrists, shoulders, &c., which soon becomes intense, and is accompanied with severe constitutional disturbance and prostration. The patient lies helpless in bed, restless, but afraid to move or to be touched, and unable to bear even the weight of the bed-clothes. The face is flushed, and the whole body bathed in perspiration, which has a highly acid reaction and a sour disagreeable odour. The temperature is markedly elevated (103° to 105°), the pulse rapid, full, and soft; the tongue is coated with a yellow fur; and there are thirst, loss of appetite, and constipation. The urine is diminished in quantity, highly acid, and loaded with urates. At first the pain is confined to only one or two joints, but soon others become affected, and there is often a tendency to symmetry in the manner in which they suffer, the inflammation in one joint being shortly followed by that of the same joint in the opposite limb. The affected joints are red, swollen, hot, and excessively tender. The inflammation seldom continues long in one articulation, but it may return to those formerly affected. In severe cases scarcely a joint large or small escapes, and the pain, restlessness, and fever render the patient's condition extremely miserable.

An attack of acute rheumatism is of variable duration, sometimes passing away in the course of a few days, but more frequently lasting for many weeks. Occasionally, when the disease appears to have subsided, relapses occur which bring back all the former symptoms and prolong the case, it may be for months. Again, after all acute symptoms have disappeared, the joints may remain swollen, stiff, and painful on movement, and the rheumatic condition thus becomes chronic.

After an attack of rheumatism, the patient is much reduced in strength and pale-looking for a considerable time, but should no complication have arisen there may be complete recovery, although doubtless there remains a liability to subsequent attacks. This disease derives much of its serious import from certain accompaniments or complications which are apt to attend its progress. Among these may be mentioned excessive fever (hyperpyrexia), which is sometimes developed in a sudden and alarming manner, the temperature rising quickly to 108°–110° or more, and thus endangering life. Indeed in most of such instances death speedily follows unless prompt treatment be resorted to. Another danger is the occurrence of serious head symptoms in the form of delirium or excitement, which may exist in conjunction with hyperpyrexia or independently. Chorea or St Vitus's dance is also an occasional accompaniment of acute rheumatism. Besides these, other complications pertaining to the respiratory organs, such as pleurisy, pneumonia, bronchitis, &c., sometimes arise in the course of the disease, as well as certain disorders of the skin. But the most frequent and important of all are those affecting the heart. These cardiac affections are regarded by some as an integral part of the rheumatic disease rather than as results of it, especially as it would seem that occasionally they are the only local manifestation of the attack.

Pericarditis (inflammation of the investing membrane of the heart) and endocarditis (inflammation of the lining membrane of the heart) are the two most common forms which these heart complications assume, and it is the latter which is specially important as tending to lay the foundation for valvular heart disease (see Heart). It is the liability to these inflammatory heart affections that causes special anxiety during the earlier stages of an attack of acute rheumatism, when it would appear they are more apt to occur. The risk of cardiac complications seems to be greater the younger the patient, and doubtless the foundation of organic heart disease is often laid in early childhood, when, as is now well known, rheumatism is by no means uncommon.

The name *subacute rheumatism* is sometimes applied to attacks of the disease of less severe type than that now described, but where yet the symptoms exist in a well-marked degree. Cases of this kind may be of even longer duration and more intractable than the more acute variety, although probably the danger to the heart is less.

Chronic Rheumatism appears occasionally to be developed as the result of the acute form, but is more frequently an independent constitutional affection, and is usually a complaint of later life. The causes associated with its occurrence are habitual exposure to cold and damp; hence its frequency among outdoor workers. It is also apt to arise in persons debilitated by overwork or privation. Certain poisons introduced into the system are often attended with symptoms of chronic rheumatism, *e.g.*, lead, syphilis, &c. This disease is often hereditary. It differs from acute rheumatism in being less frequently attended with fever and constitutional disturbance and less liable to dangerous complications, but on the other hand it is much more apt to produce permanent alterations in the joints and parts affected. The joints tend to become swollen both from effusion of fluid and from chronic inflammatory thickening of the textures, and the result is stiffness and sometimes complete immobility. But in addition the sheaths of muscles and of nerves are apt to be affected by chronic rheumatism, causing much suffering. This form of rheumatism is less migratory in its progress than the acute, and tends to remain fixed in a few joints, often in those which are specially exposed to atmospheric influences or to overwork. The chief symptoms are pain and stiffness in movement, more particularly when the efforts begin to be made, becoming less after the limbs and body have been in exercise. Creaking or crackling noises accompany the movements. The pain is apt to be increased during the night, and is besides markedly influenced by the state of the atmosphere, cold and damp aggravating it.

This form of rheumatism, although not directly dangerous to life, tends to lower the health and render the patient more vulnerable to other morbid influences. Besides this, by long continuance it may lead to great deformity and disablement of the frame, in some instances resulting in a condition of utter helplessness.

Treatment.—Few diseases have had so many remedies recommended for their alleviation, and vaunted as specifics, as rheumatism; and, when it is remembered how many are the theories of the nature of the malady, it is obvious that even as regards principles the methods proposed must be numerous and diverse. Nevertheless, there are certain well-recognized systems of treatment which in most instances will be found to be of benefit. The treatment differs in the two forms of the disease. As regards acute rheumatism the general management of the case from the outset requires attention. The patient should be placed in bed between blankets, and should wear a flannel shirt, the front and arms of which should be opened to admit of the examination of the heart and of the joints. Movements of all kinds should be as far as possible avoided. The affected joints should be enveloped in cotton wool, kept in position by a light bandage. Sometimes the bathing of these parts with warm water containing opium or other sedative affords relief. The local application of blisters in the neighbourhood of the painful joints, as proposed by Dr Herbert Davies, is in some instances followed with benefit, but is obviously applicable only where the rheumatism is limited in its extent. The same may be said of the local application of electricity to the joints. Constitutional remedies are of undoubted value in this disease, and the number of available agents for this purpose is so large that mention can only be briefly made of some of the more approved. For long the alkalis, especially the salts of potassium, were the chief remedies resorted to, and for them it was claimed that they shortened the attack, relieved pain, and prevented heart complications. They are certainly very valuable in many instances. Of late a new series of substances has been tried with great success, namely salicin (first suggested for acute rheumatism by Dr T. J. Maclagan), salicylic acid, and salicylate of soda. These remedies, which are known to have a powerful effect in reducing febrile temperatures, appear to exercise a special influence in acute rheumatism, not merely by lowering the fever, but by relieving pain and cutting short the attack, thereby lessening the risk of complications. From 20 to 30 grains of these drugs every two hours require to be given for about twenty-four hours in order to produce the desired effect, and the quantity is reduced as the acute symptoms subside. Although they do not succeed in all cases, and sometimes give rise to symptoms (delirium, sickness, &c.) which necessitate their suspension, it will be admitted by most physicians that cases which appeared likely to be of a severe character have under this treatment been cut short in a few days, and that even where this result was not attained the pain and other distressing symptoms were materially alleviated. Tonics, such as iron and quinine, have also been employed in acute rheumatism, but their advantage is more apparent in the convalescence, when there are anæmia and debility, rather than in the height of the disease. The pain and sleeplessness may render necessary the administration of opiates, but in many instances both are completely overcome by the remedies previously mentioned. In the dangerous complication of hyperpyrexia the cold bath (in which the water is quickly cooled down from 94° to 68°) has frequently been successful in speedily lowering the temperature and saving life. Persons who have suffered from acute rheumatism should ever afterwards be careful to avoid exposure to damp and chill, and to protect the skin by suitable underclothing.

In chronic rheumatism the remedies are innumerable. This form of the disease is less under the power of medicinal agents than the acute, although much may be done to alleviate the suffering produced by it as well as to limit its extension. Salicin and the salicylates so useful in acute rheumatism are not found as a rule to be of much service, while on the other hand alkalis in combination with sulphur, iodine, arsenic, and tonics, such as iron, quinine, cod-liver oil, &c., are the most serviceable remedies. Turpentine is also recommended. Friction of the affected parts with stimulating or soothing liniments, counter-irritation with blisters, iodine, or the button cautery are useful local applications, as is also galvanism. Hot baths or Turkish baths may occasionally be used with advantage. The mineral waters and baths of various well-known resorts are of undoubted benefit, especially those of Buxton, Bath, Strathpeffer, or Harrogate in Great Britain, or those of Aix-les-Bains, Wiesbaden, Homburg, Ems, Wildbad, Aix-la-Chapelle, and many others on the Continent. Changes to warmer climates during the colder season where practicable are also to be recommended, as well as every other measure calculated to improve the general health.

Rheumatoid Arthritis.—This term (syn. *chronic rheumatic arthritis, arthritis deformans*) is employed to designate a chronic inflammatory affection of joints, involving specially the synovial membranes and articular cartilages, of slow development and progressive character, resulting in stiffening and deformity of the parts.

This disease is held by some to partake of the nature of both rheumatism and gout (hence occasionally termed rheumatic gout); others regard it as simply a variety of chronic rheumatism; while in the opinion of several eminent authorities it is an independent constitutional affection occurring in persons with a strumous or tubercular tendency. It does not appear to be hereditary. It is more common in women than in men, and occurs at all ages. It is closely connected with conditions of ill health; and hence its frequent occurrence among those whose blood is impoverished by insufficient food, by hardship, or by any drain upon the system. It occasionally follows an attack of acute rheumatism; hence the supposed connexion.

The disease in most cases is slowly developed, and shows itself first by pain and swelling in one joint (knee, wrist, finger, &c.), which soon subside and may remain absent for a considerable time. Sooner or later, however, another attack occurs either in the joint formerly affected or in some other, and it is noticed that the affected articulation does not now regain its normal size but remains somewhat swollen. The attacks recur with increasing frequency, gradually involving more joints, until, in course of time (for its progress is very chronic), scarcely an articulation in the body is free from the disease. Thickening of the textures, with stiffness, is the result, and often considerable deformity from the joints being fixed in certain positions. The muscles of the affected limbs undergo atrophy and contrast strikingly with the abnormally enlarged joints. Painful inflammatory attacks often occur in the affected joints, and the patient is much reduced in strength by the constant irritation of the disease. In the young the hands are very liable to suffer, and the disease gradually extends to involve other parts; while in old persons it is apt to fasten upon one joint, often the hip, and is not so apt to spread. The chief changes in the joints are (1) in the synovial membrane, which is at first simply inflamed and contains fluid, but ultimately becomes much thickened, and (2) in the articular cartilage, which tends to split up and become gradually absorbed, leaving the articular ends of the bone exposed. The osseous surfaces thus brought into contact become hard and polished by friction. These changes and others affecting the ligaments are apt to produce partial dislocation as well as stiffening of the joint, rendering it deformed and useless. This disease often lasts for many years, sometimes continuing for a lengthened period without much change, but tending gradually to progress and to render the patient more and more helpless It is not attended with the complications of rheumatism, and is not inconsistent with long life, but its weakening effects upon the system and the ill health with which it is usually associated render the subject of it more liable to the inroads of other diseases. Rheumatoid arthritis is less amenable to treatment than rheumatism, the remedies for which are not found to be of much value in this disease. Most success is obtained if it is recognized early and measures are taken to strengthen the patient's general health. The best medicinal agents are iron, quinine, cod-liver oil, arsenic. Chalybeate mineral waters, such as those of Schwalbach, Spa, Pyrmont, &c., are often of service Locally blisters or milder counter-irritation to the affected joints, as well as the employment of galvanism, may be advantageously resorted to. (J. O. A.)

RHEYDT, a manufacturing town of Rhenish Prussia, is situated on the Niers, 14 miles to the west of Düsseldorf. The principal products of its numerous factories are silk, cotton, woollen, and mixed fabrics, iron goods, machinery, lamp wicks, and roofing pasteboard. Dyeing and finishing are also carried on. The most prominent buildings are the old parish church and a new one erected in 1866. Rheydt is an ancient place, but its industrial importance is of very recent growth. At the beginning of the present century it did not contain more than 2000 to 3000 inhabitants, whereas in 1880 the population of the municipal commune was 19,087, two-thirds of whom were Protestants.

RHIN, Haut-, a department of France before 1871. See France, vol. ix. p. 508.

RHINE (Lat. *Rhenus*, Germ. *Rhein*, Fr. *Rhin*, Dutch *Rhijn*), the chief river of Germany and one of the most important in Europe, is about 800 miles in length and drains an area of 75,000 square miles.[1] The distance in a direct line between its source in the Alps and its mouth in the German ocean is 460 miles. Its general course is north-north west, but it makes numerous deflexions and at one point is found running in a diametrically opposite direction. About 250 miles of its length are in Switzerland, 450 in Germany, and 100 in Holland; but the German half is in every respect so much the more important that it is no misnomer to call the Rhine a German river, even if the word German be confined to its modern political signification. The name Rhine, which is apparently of Celtic origin, is of uncertain import, but has been supposed to mean "flowing" or "clear." The sources of the Rhine are found in the Swiss canton of Grisons, where the drainage of at least 150 glaciers unites to form its headwaters. Among these streams, all of which are termed Rhin in the Ladine dialect of the district, two are generally recognized as the main sources of the river, viz., the Vorder Rhein and the Hinter Rhein. The chief feeder of the former rises in the small Lake of Toma, situated on the south-east slope of the St Gotthard,[2] at a height of 7690 feet above the sea and at no great distance from the source of the Rhone, which rises on the west side of the same mountain mass. It first flows to the east, receiving the waters of the Medelser Rhein and several other glacier streams, and after a course of about

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[1] This is the current estimate, but Strelbitzki, the latest authority, does not allow the Rhine a length of more than 710 miles.

[2] "Ræticarum Alpium inaccesso ac præcipiti vertice," says Tacitus.

45 miles unites with the Hinter Rhein at Reichenau. As far as Ilanz the Vorder Rhein is simply a mountain torrent, descending 1200 feet in the first 12 miles of its course. At Disentis, where it is joined by the Medelser Rhein, it is 15 feet wide, and at Ilanz it is about thrice as large. The Hinter Rhein has its cradle in the Rheinwald glacier, near the St Bernardino Pass, 7270 feet above the sea and 40 miles south of Reichenau. The Vorder Rhein contributes the greater volume of water to the joint stream, but the Hinter Rhein belongs to a more developed system.

Beyond Reichenau the united stream, 150 feet in width, bears the name of Rhine without any qualifying epithet. It is now navigable for rafts, and small boats begin to be seen a little further on, at Coire, where it turns to the north. On reaching the Lake of Constance the Rhine deposits the debris that it has brought down from its mountain sources, and the stream that emerges from the west end of the Untersee is of a clear deep green colour. Between the Lake of Constance and Basel the Rhine flows towards the west and practically forms the boundary between Germany and Switzerland. At Schaffhausen, in penetrating the barrier of the Jura, it forms the imposing falls of the Rhine, where it is precipitated over a ledge of rock in three leaps 50 or 60 feet in height. Near Lauterburg, where the river encounters the gneiss of the Black Forest, is a series of formidable cataracts, and about 15 miles lower down are the rapids of Rheinfelden. At Basel, which it reaches after a tortuous course of 250 miles, though it is only about a third of that distance from its source in a direct line, the Rhine turns once more to the north and enters Germany. Its breadth here is between 550 and 600 feet, while its surface now lies not more than 800 feet above the sea, showing that the river has made a descent of 6900 feet by the time it has traversed a third of its course. From Basel to Mainz the Rhine flows through a wide and shallow valley, bordered on the east and west by the parallel ranges of the Black Forest and the Vosges. Its banks are low and flat, and numerous islands occur. The tendency to divide into parallel branches has been curbed in the interests of navigation, and many windings have been cut off by leading the water into straight and regular channels. At Mannheim the river is nearly 1500 feet in width, and at Mainz, where it is diverted to the west by the barrier of the Taunus, it is still wider. It follows the new direction for about 20 miles, but at Bingen it again turns to the north and begins a completely new stage of its career, entering a narrow valley in which the enclosing rocky hills abut so closely on the river as often barely to leave room for the road and railway on the bank. This is the most beautiful part of the whole course of the river, abounding in the ruined castles, the romantic crags, the sunny vineyards, and the picturesque lateral ravines that have combined to make the Rhine so favourite a resort of lovers of natural beauty. At Coblentz the valley widens and the river is 1200 feet broad, but the hills close in again at Andernach, and this ravine-like part of its course cannot be considered as ending till below the Seven Mountains, where the river once more expands to a width of 1300–1600 feet. Beyond Bonn and Cologne the banks are again flat and the valley wide, though the hills on the right bank do not completely disappear till the neighbourhood of Düsseldorf. Further on the country traversed by the Rhine is perfectly level, and the current becomes more and more sluggish. On entering Holland, which it does below Emmerich, its course is again deflected to the west. Within Holland the banks are so low as to require at places to be protected by embankments against inundations. The river now loses its individuality in a number of separate branches, and the name of Rhine has often arbitrarily clung to the smaller arm after a bifurcation. Almost immediately after entering Holland the stream divides into two arms, the larger of which, carrying off about two-thirds of the water, diverges to the west, is called the Waal, and soon unites with the Maas. The smaller branch to the right retains the name of Rhine and sends off another arm, called the Yssel, to the Zuyder Zee. The Rhine now pursues a westerly course almost parallel with that of the Waal. At Wijk another bifurcation takes place, the broad Lek diverging on the left to join the Maas, while the "Kromme Rhijn" to the right is comparatively insignificant. Beyond Utrecht, where it is again diminished by the divergence of the Vecht to the Zuyder Zee, the river under the name of the "Oude Rhijn" or Old Rhine degenerates into a sluggish and almost stagnant stream, which requires the artificial aid of a canal and sluices in finding its way to the sea. In Roman times the Rhine at this part of its course seems to have been a full and flowing river, but by the 9th century it had lost itself in the sands of Katwijk, and it was not until the beginning of the 19th century that its way to the sea was re-opened. Though the name Rhine thus at last attaches to a very insignificant stream, the entire district between the Waal on one side and the Yssel on the other, the *Insula Batavorum* of Cæsar, in reality belongs to the delta of the famous river.[1] See vol. xii. Plate I.

The Rhine is said to receive, directly or indirectly, the waters of upwards of 12,000 tributaries of all sizes. Leaving out of account the innumerable glacier streams that swell its volume above the Lake of Constance, the most important affluents to its upper course are the Wutach, the Alb, and the Wiese, descending on the right from the Black Forest, and the Aar, draining several Swiss cantons on the left. In the Upper Rhenish basin, between Basel and Mainz, the tributaries, though numerous, are mostly short and unimportant. The Ill and the Nahe on the left and the Neckar and the Main on the right are, however, notable exceptions. Before joining the Rhine the Ill runs almost parallel with it and at no great distance for upwards of 50 miles. In the narrow part of the valley, between Bingen and Cologne, the Rhine receives the waters of the Lahn and the Sieg on the right, and those of the Moselle[2] (bringing with it the Saar) and the Ahr on the left. Still lower down, but before the Dutch frontier is reached, come the Ruhr and the Lippe on the right, and the Erft on the left. The numerous arms into which the Rhine branches in Holland have already been noticed.

The Rhine connects the highest Alps with the mud banks of Holland, and touches in its course the most varied geological periods; but the river valley itself is, geologically speaking, of comparatively recent formation. Rising amid the ancient gneiss rocks of the St Gotthard, the Rhine finds its way down to the Lake of Constance between layers of Triassic and Jurassic formation; and between that lake and Basel it penetrates the chalk barrier of the Jura. The upper Rhenish valley is evidently the bed of an ancient lake, the shores of which were formed by the gneiss and granite of the Black Forest on the one side and the granite and sandstone of the Vosges on the other. Within the valley all the alluvial deposits are recent. Between Bingen and Bonn the Rhine forces its way through a hilly and rocky district belonging to the Devonian formation. The contorted strata of slate and greywacke rock must have been formed at a period vastly anterior to that in which the lake of the upper valley managed to force an outlet through the enclosing barriers. Probably this section may be looked upon as the oldest portion of the river course proper, connecting the upper Rhenish lake with the primeval ocean at Bonn. In this district too, as has already been remarked, is the finest scenery of the Rhine, a fact due in great part to the grotesque shapes of the quartzose rocks, left denuded of the less durable slate and sandstone. All the strata intersected by the Rhine between Bingen and Bonn contain fossils of the same classes. The deposits of the actual valley here, belonging to the Miocene group of the Tertiary system, are older than the deposits either farther up or farther down the river; but they are contemporaneous with the basalts of the Rhine, which at Coblentz and in the peaks of the Seven Mountains also contribute to the scenic charm of the river. The very extensive pumice deposits at Neuwied and the lava and other volcanic rocks belong to a more recent epoch. Below Bingen the formations belong almost entirely to the Post-Tertiary period. Numerous extinct volcanoes rise near Neuwied. In the flatter parts of the valley occur large beds of loam and rubble, sometimes in terraces parallel with, but several hundred feet above, the river,—proving by their disposition and appearance that the valley has been formed by the action of water.

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[1] The nomenclature of the Rhine branches in the Netherlands is, according to Mr J. Dirks, a singular but [illegible] system, by which the rivers are chopped up, as it were, into longitudinal pieces.

[2] The Moselle rises in France, in the canton of [illegible], at a height of 2379 feet above the sea, on the west side of the Vosges. Its length is 315 miles (of which 190 are in France), but the direct line from source to confluence is only about 170 miles. At Épinal (1040 feet) the Moselle [illegible] the rocky [illegible] its course [illegible]. It enters the Lorraine [illegible], but the sides of the valley still remain high and steep. Below Metz (550 feet) the [illegible] to a [illegible]; but between Sierck and Coblentz the hills again close in upon the river. Rafts can generally be floated from Arches down to Frouard, and there, by the junction of the Meurthe (itself navigable, though with difficulty, from Nancy), the depth becomes [illegible] boats. Since 1840 steamboats have plied between Trèves and Coblentz.

The Rhine has been one of the chief waterways of Europe from the earliest times; and, as its channel is not exposed to the danger of silting up like those of the Elbe and the Oder, it has always been comparatively easy to keep it open. The Romans exerted themselves to improve the lower navigation of the river, and appointed prefects of the Rhine to superintend the shipping and to exact the moderate dues imposed to keep the channel in repair. The Franks continued the same policy and retained a system of river-dues. Afterwards as the banks became parcelled out among a host of petty princelings, each of whom arrogated the right of laying a tax on passing vessels, the imposts became so prejudicial as seriously to hamper the development of the shipping. Many of the riparian potentates derived the bulk of their revenue from this source, and it is calculated that in the 18th century the Rhine yielded a total revenue of £200,000, in spite of the comparatively insignificant amount of the shipping. The first proposal for a free Rhine was mooted by the French at the congress of Rastatt (1797–1799), but Holland, commanding the mouth of the river, placed every obstacle in the way of the suggestion. In 1831, on the separation of Holland and Belgium, the former had become more amenable to reason; and a system was agreed upon which practically gave free navigation to the vessels of the riverine states, while imposing a moderate tariff upon foreign ships. It was not, however, till 1869 that the last vestige of a toll disappeared and the river was thrown open without any restriction. The management of the channel and navigation is now vested in a Central Commission, meeting at Mannheim. The channel has been greatly improved and in many places made more direct since the beginning of the present century,—large sums being annually spent in keeping it in order. Capacious river harbours have been formed at various points, about twenty-five of these being in Germany and eight or ten more in Holland. The total weight of the goods forwarded each year on the Rhine has of late amounted to nearly 1,000,000 tons, the chief articles being timber, coal, iron, agricultural produce, and manufactured goods of various kinds. The position of the river is highly favourable for the development of its trade. It flows through the most populous regions of the continent of Europe, to discharge into one of the most frequented seas opposite Great Britain, and, besides serving as a natural outlet for Germany, Belgium, and Holland, is connected with a great part of central and southern France by the Rhine-Rhone and the Rhine-Marne Canals, and with the basin of the Danube by the Ludwigs-Canal.

The introduction of steam has greatly increased the shipping on the Rhine; and small steamers ply also on the Main, the Neckar, the Maas, and the Moselle. The first Rhine steamer was launched in 1817; and now the river is regularly traversed by upwards of a hundred, from the small tug up to the passenger saloon-steamer. The steamboat traffic has especially encouraged the influx of tourists, and the number of passing travellers may now be reckoned as between one and two millions annually. The river is navigable without interruption from Basel to its mouth, a distance of 550 miles, of which 450 lie within Germany. Above Spires, however, the river craft are comparatively small, but lower down vessels of 500 and 600 tons burden find no difficulty in plying. Between Basel and Strasburg the depth of water is sometimes not more than 3 feet, between Strasburg and Mainz it varies from 5 to 25 feet; while below Mainz it is never less than 9 or 10 feet. The deepest point is opposite the Lurlei Rock near St Goar, where it is 75 feet in depth; at Düsseldorf the depth is about 50 feet. One of the most interesting features of the Rhine navigation is afforded by the huge rafts of timber that are floated down the river. Single tree trunks sent down to the Rhine by the various tributaries are united into small rafts as they reach the main stream; and these again are fastened together to form one large raft about Andernach. Though not so large as formerly, these timber-rafts are still sometimes 400 or 500 feet in length, and are navigated by 200 to 400 men, who live in little huts on the raft, forming actual floating villages. On reaching Dort the rafts are broken up and sold, a single raft sometimes producing as much as £30,000. The voyage from Bingen to Dort takes from one to six weeks, and the huge unwieldy structures require to be navigated with great care. The commerce carried on by the river itself is supplemented by the numerous railways, which skirt its banks and converge to its principal towns. Before the introduction of railways there were no permanent bridges across the Rhine below Basel; but now trains cross it at about a dozen different points in Germany and Holland.

The salmon fisheries of the Rhine, lying mainly between Bacharach and St Goar, have long been famous; but their produce has been seriously diminished since the advent of the steamer. Pike, carp, and other white fish are also caught. A little gold is brought down by the Rhine from the Alps and the heights of the Black Forest, but not in sufficient amount to make its collection of economic value. The white wines of the Rhine are the finest in the world, though the palm in red wines must be given to the vineyards of Bordeaux. The vineyards lie mainly between Mainz and Bonn, a distance of 90 miles,—the choicest varieties of wine being produced in the Rheingau, a picturesque district on the right bank between Rüdesheim and Biebrich, about 12 miles long and 5 broad. The well known brands Johannisberger, Steinberger, Marcobrunner, and Assmannshauser are all grown in this narrow compass. The valleys of the Neckar, the Moselle, the Nahe, and other tributaries of the Rhine also yield good wine; and the valley of the Ahr may be indicated as the northern limit of the wine culture. The total annual value of the Rhenish wines is about £2,400,000.

The long array of ancient and flourishing towns along its banks bear witness to the great importance of the river. These are most frequent in the upper Rhenish basin and again below Bonn, the places in the narrower part of the valley being generally more remarkable for their picturesque situation than for their commercial or political influence. Beyond the borders of Germany the only large towns on the Rhine are Basel in Switzerland, and Arnheim, Utrecht, and Leyden in Holland. Within Germany, as we trace the course of the river form south to north, we come successively to Spires, Mannheim, Mainz, Coblentz, Bonn, Cologne, Düsseldorf, and Wesel. Worms, which was formerly washed by the Rhine, lies about ⅝ mile distant from the present course; and Strasburg, which lies on the Ill, 2 miles from the Rhine, may also be reckoned as one of its towns.

Politically the Rhine has always played a great part; and it would require no great straining to write a history of this majestic river which would also be a history of the western half of continental Europe. The whole valley seems to have been originally occupied by Celtic tribes, who have left traces of their presence on the contents of tombs and in the forms of names (Moguntiacum or Mainz, Borbetomagus or Worms, &c.); but at the beginning of the historical period we find the Celts everywhere in retreat before the advancing Teutons. Probably the Teutonic pressure began as early as the 4th century before Christ, and the history of the next few hundred years may be summed up as the gradual substitution of a Germanic for a Celtic population along the banks of the Rhine. Its second historical period begins with the advent of the Romans, who stemmed the advancing Teutonic tide. Augustus and his successors took good care to fortify the Rhine carefully, and a large proportion of the Roman legions were constantly in garrison here. For two hundred years the Rhine formed the boundary between the Roman empire and the Teutonic hordes; and during that period the left or Roman bank made prodigious strides in civilization and culture. The wonderful Roman remains at Treves and elsewhere, the Roman roads, bridges, and aqueducts, are convincing proofs of what the Rhine gained from Roman domination. This Roman civilization was, however, destined to be swamped by the current of Teutonic immigration, which finally broke down the barriers of the Roman empire and overwhelmed the whole of the Rhenish district. Under Charlemagne, whose principal residence was in Aix-la-Chapelle, the culture of the Rhine valley again began to flourish, its results being still to be traced in the important architectural remains of this period. At the partition of the domains of Charlemagne in 843 A.D. the Rhine formed the boundary between Germany and the middle kingdom of Lotharingia; but by 870 it lay wholly within the former realm. For nearly eight hundred years it continued in this position, the frontier of the German empire coinciding more or less with the line of the Rhone. During the early Middle Ages the bank of the Rhine formed the most cultured part of Germany, basing its civilization on its Roman past. The Thirty Years' War exercised a most prejudicial effect upon the district of the Rhine; and the peace of Westphalia gave France a footing on the left bank of the hitherto exclusively German river by the acquisition of Alsace. The violent seizure of Strasburg by France in 1681 was ratified by the peace of Ryswick in 1697, which recognized the Rhine as the boundary between Germany and France from Basel to about Germersheim. It was an easy inference for the French mind that the Rhine should be the boundary throughout and the Gaul of Cæsar restored. This ideal was realized in 1801, when the whole of the left bank of the Rhine was formally ceded to France. The congress of Vienna (1815) restored the lower part of the Rhenish valley to Germany, but it was not till the war of 1870–71 that the recovery of Alsace and Lorraine made the Rhine once more "Germany's river, not Germany's frontier." In the military history of all these centuries constant allusion is made to the Rhine, its passages, and its fortresses. Every general who has fought in its neighbourhood has at one time or another had to provide for a crossing of the Rhine, from Julius Cæsar, who crossed it twice, down to our own time. The wars carried on here by his Most Christian Majesty Louis XIV. are still remembered in the Rhine district, where the devastations of his generals were of the most appalling description; and scarcely a village or town but has a tale to tell of the murder and rapine of this period.

The Rhine has always exercised a peculiar sort of fascination over the German mind, in a measure and in a manner not easily paralleled by the case of any other river. "Father Rhine" is the centre of the German's patriotism and the symbol of his country. In his literature it has played a prominent part from the *Nibelungenlied* to the present day; and its weird and romantic legends have been alternately the awe and the delight of his childhood. The Rhine was the classic river of the Middle Ages; and probably the Tiber alone is of equal historical interest among European rivers. Victor Hugo has perhaps best described the mingled feelings which the Rhine awakens. "Le Rhin," he says, "réunit tout. Le Rhin est rapide comme le Rhône, large comme la Loire, encaissé comme la Meuse, tortueux comme la Seine, limpide et vert comme la Somme, historique comme le Tibre, royal comme le Danube, mystérieux comme le Nil, pailleté d'or comme un fleuve d'Amérique, couvert de fables et de fantômes comme un fleuve d'Asie." (J. F. M.).

RHINOCEROS, a name applied by the ancients to an animal the most striking external peculiarity of which is certainly the horn growing above its nose (ῥινόκερως, nose-horn).

The various existing and extinct species are grouped into a family, *Rhinocerotidæ*, which is a division of the Perissodactyle (odd-toed) section of the great order of *Ungulata* or hoofed mammals, of which section the tapirs and horses are the only other surviving members (see MAMMALIA, vol. xv. p. 428).

The following are the general characters applicable to all the members of the family.

First, as regards dentition. Incisors variable, generally reduced in number and often quite rudimentary, and early deciduous. Canines, in existing species, absent. Molar series, consisting of the full number of four premolars and three molars above and below, all in contact and closely resembling each other, except the first, which is much smaller than the rest and often deciduous. The others gradually increasing in size up to the penultimate. The upper molars have a very characteristic pattern of crown, having a much-developed flat or more or less sinuous outer wall, and two transverse ridges running obliquely inwards and backwards from it, terminating internally in conical eminences or columns, and enclosing a deep (middle) sinus between. The posterior sinus is formed behind the posterior transverse ridge, and is bounded externally by a backward continuation of the outer wall and behind by the cingulum. The anterior sinus is formed in the same manner, but is much smaller. The middle sinus is often intersected by vertical laminæ ("combing plates") projecting into it from the anterior surface of the posterior transverse ridge or from the wall, the development of which is a useful guide in discriminating the species, especially those no longer existing and known only by the teeth and bones. The depressions between the ridges are not filled up with cementum as in the horse. The lower molars have the crown formed by a pair of crescents; the last has no third lobe or talon.

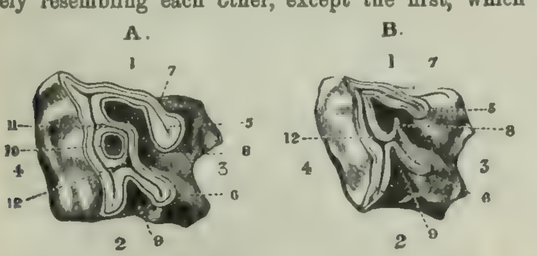

FIG. 1.—Grinding surface of a moderately worn right upper second molar of Rhinoceros. A, *Rhinoceros unicornis*; B, *Rhinoceros sondaicus*. 1, anterior surface; 2, posterior surface; 3, internal surface; 4, external surface (wall or dorsum); 5, antero-internal pillar or cusp; 6, postero-internal pillar or cusp; 7, anterior sinus; 8, median sinus; 9, posterior sinus; 10, accessory sinus or valley; 11, crista (anterior combing plate); 12, crochet (posterior combing plate).

Head large, skull elongated, elevated posteriorly into a transverse occipital crest. No post-orbital processes or any separation between orbits and temporal fossæ. Nasal bones large and stout, co-ossified, and standing out freely above the premaxillæ, from which they are separated by a deep and wide fissure; the latter small, generally not meeting in the middle line in front, often quite rudimentary. Tympanics small, not forming a bulla. Brain cavity very small for the size of the skull. Vertebræ:—cervical, 7; dorsal, 19–20; lumbar, 3; sacral, 4; caudal, about 22. Limbs stout, and of moderate length. Three completely developed toes, with distinct broad rounded hoofs on each foot.[1] Mammæ two, inguinal. Eyes small. Ears of moderate size, oval, erect, prominent, placed near the occiput. Skin very thick, in many species thrown into massive folds. Hairy covering scanty. All existing species have one or two median horns on the face. When one is present it is situated over the conjoined nasal bones; when two, the hinder one is over the frontals. These horns, which are of a more or less conical form and usually recurved, and often grow to a great length (three or even four feet), are composed of a solid mass of hardened epidermic cells growing from a cluster of long dermal papillæ. The cells formed on each papilla constitute a distinct horny fibre, like a thick hair, and the whole are cemented together by an intermediate mass of cells which grow up from the interspaces between the papillæ. It results from this that the horn has the appearance of a mass of agglutinated hairs, which, in the newly growing part at the base, readily fray out on destruction of the softer intermediate substance; but the fibres differ from true hairs in growing from a free papilla of the derm, and not within a follicular involution of the same.

The *Rhinocerotidæ* are all animals of large size, but of little intelligence, generally timid in disposition, though ferocious when attacked and brought to bay, using the nasal horns as weapons, by which they strike and toss their assailant. Their sight is dull, but their hearing and scent are remarkably acute. They feed on herbage, shrubs, and leaves of trees, and, like so many other large animals which inhabit hot countries, sleep the greater part of the day, being most active in the cool of the evening or even during the night. They are fond of bathing and wallowing in water or mud. None of the species have been domesticated. Animals of the group have existed in both the Old and New Worlds since the beginning of the Miocene period. In America they all became extinct before the end of the Pliocene period. In the Old World their distribution has become greatly restricted, being no longer found in Europe and North Asia, but only in Africa and in portions of the Indian and Indo-Malayan regions.

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[1] In some extinct species a small outer toe is present on the forefoot.

The existing species of rhinoceros are naturally grouped into three sections, which some zoologists consider of generic value.

I. *Rhinoceros* proper. The adults with a single large compressed incisor above on each side, and occasionally a small lateral one; below, a very small median, and a very large, procumbent, pointed lateral incisor. Nasal bones pointed in front. A single nasal horn. Skin very thick, and raised into strong, definitely arranged ridges or folds.

There are two well-marked species of one-horned rhinoceroses. (1) The Indian Rhinoceros, *R. unicornis* of Linnæus,[1] the largest and best known, from being the most frequently exhibited alive in England, is at present only met with in a wild state in the terai region of Nepal and Bhutan, and in the upper valley of the Brahmaputra or province of Assam, though it formerly had a wider range.

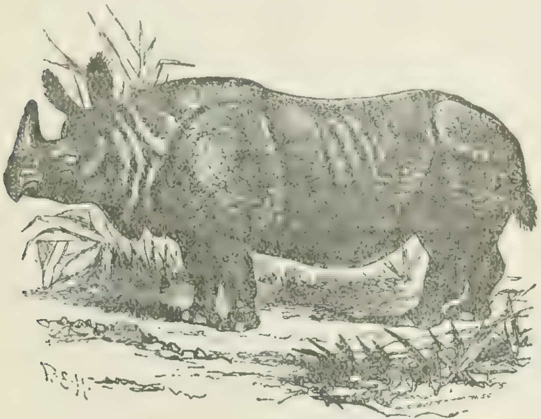

Fig. 2.—Indian Rhinoceros (*Rhinoceros unicornis*). This and the following woodcuts are reduced from drawings by J. Wolf, from animals living in the London Zoological Society's Gardens.

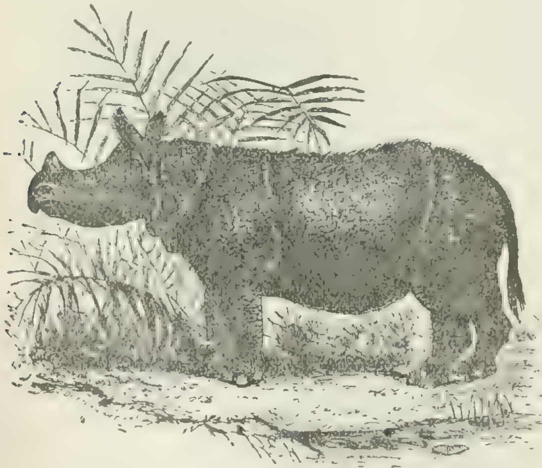

Fig. 3.—Javan Rhinoceros (*Rhinoceros sondaicus*).

The first rhinoceros seen alive in Europe since the time when they, in common with nearly all the large remarkable beasts of both Africa and Asia, were exhibited in the Roman shows, was of this species. It was sent from India to Emmanuel, king of Portugal, in 1513; and from a sketch of it, taken in Lisbon, Albert Dürer composed his celebrated but rather fanciful engraving, which was reproduced in so many old books on natural history. (2) The Javan Rhinoceros, *R. sondaicus*, Cuvier, is distinguished by smaller size, special characters of the teeth and skull, and different arrangement of the plications of the skin (as seen in the figures); the horn in the female appears to be very little developed, if not altogether absent. This has a more extensive geographical range, being found in the Bengal Sunderbans near Calcutta, Burmah, the Malay Peninsula, Java, Sumatra, and probably Borneo.

II. *Ceratorhinus.* The adults with a moderate-sized compressed incisor above, and a laterally placed, pointed, procumbent incisor below, which is sometimes lost in old animals. Nasal bones narrow and pointed anteriorly. A well-developed nasal, and a small frontal horn separated by an interval. The skin thrown into folds, but these not so strongly marked as in the former section. The smallest living member of the family, the Sumatran Rhinoceros, *R. sumatrensis*, Cuv., belongs to this group. Its geographical range is nearly the same as that of the Javan species, though not extending into Bengal; but it has been found in Assam, Chittagong, Burmah, the Malay Peninsula, Sumatra, and Borneo. It is possible that more than one species have been confounded under this designation, as two animals now living in the London Zoological Gardens present considerable differences of form and colour. One of them, from Chittagong, has been named by Sclater *R. lasiotis*, the Hairy-Eared Rhinoceros, but until an opportunity is afforded for anatomical examination, it is difficult to pronounce upon the value of the distinction.

III. *Atelodus.* In the adults, the incisors are quite rudimentary or entirely wanting. Nasal bones thick, rounded and truncated in front. Well-developed anterior and posterior horns in close contact. Skin without any definite permanent folds.

The two well-marked existing species are peculiar to the African continent.

1. The common Two-Horned Rhinoceros, *R. bicornis*, Linn., is the smaller of the two, with a pointed prehensile upper lip, and a narrow compressed deep symphysis of the lower jaw. It ranges through the wooded and watered districts of Africa, from Abyssinia in the north to the Cape Colony, but its numbers are yearly diminishing, owing to

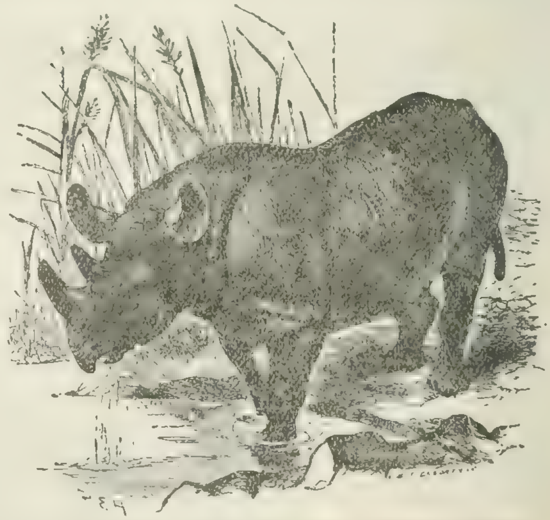

Fig. 4.—Common African Rhinoceros (*Rhinoceros bicornis*).

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[1] Many authors use Cuvier's name, *R. indicus*, in preference to this, on the ground that there are more than one species with one horn, forgetting that the name substituted is equally inconvenient, as more than one species live in India. The fact of a specific name being applicable to several members of a genus is no objection to its restriction to the first to which it was applied; otherwise changes in old and well-received names would constantly have to be made in consequence of new discoveries

the inroads of European civilization, and especially of English sportsmen. It feeds exclusively upon leaves and branches of bushes and small trees, and chiefly frequents the sides of wood-clad rugged hills. Specimens in which the posterior horn has attained a length as great as or greater than the anterior have been separated under the name of *R. keitloa*, but the characters of these appendages are too variable to found specific distinctions upon. The two-horned African rhinoceros is far more rarely seen in menageries in Europe than either of the three Indian species, but one has lived in the gardens of the London Zoological Society since 1868. Excellent figures from life of this and the other species are published in the ninth volume of the *Transactions* of the society, from which the accompanying woodcuts are reduced.

2. Burchell's or the Square-Mouthed Rhinoceros (*R. simus*), sometimes called the White Rhinoceros, though the colour (dark-slate) is not materially different from that of the last species, is the largest of the whole group, and differs from all the others in having a square truncated upper lip and a wide, shallow, spatulate symphysis to the lower jaw. In conformity with the structure of the mouth, this species lives entirely by browsing on grass, and is therefore more partial to open countries or districts where there are broad grassy valleys between the tracts of bush. It is only found in Africa south of the Zambesi, and of late years has become extremely scarce, owing to the persecutions of sportsmen; indeed, the time of its complete extinction cannot be far off. No specimen of this species has ever been brought alive to Europe. Mr F. C. Selous gives the following description of its habits from extensive personal observation:—

> "The square-mouthed rhinoceros is a huge ungainly-looking beast, with a disproportionately large head, a large male standing 6 feet 6 inches at the shoulder. Like elephants and buffaloes they lie asleep during the heat of the day, and feed during the night and in the cool hours of early morning and evening. Their sight is very bad; but they are quick of hearing, and their scent is very keen; they are, too, often accompanied by rhinoceros birds, which, by running about their heads, flapping their wings, and screeching at the same time, frequently give them notice of the approach of danger. When disturbed they go off at a swift trot, which soon leaves all pursuit from a man on foot far behind, but if chased by a horseman they break into a gallop, which they can keep up for some distance. However, although they run very swiftly, when their size and heavy build is considered, they are no match for an average good horse. They are, as a rule, very easy to shoot on horseback, as, if one gallops a little in front of and on one side of them, they will hold their course, and come sailing past, offering a magnificent broadside shot, while under similar circumstances a prehensile-lipped rhinoceros will usually swerve away in such a manner as only to present his hind-quarters for a shot. When either walking or running, the square-mouthed rhinoceros holds its head very low, its nose nearly touching the ground. When a small calf accompanies its mother, it always runs in front and she appears to guide it by holding the point of her horn upon the little animal's rump, and it is perfectly wonderful to note how in all sudden changes of pace, from a trot to a gallop or *vice versa*, the same position is always exactly maintained. During the autumn and winter months (*i.e.*, from March to August) the square-mouthed rhinoceros is usually very fat; and its meat is then most excellent, being something like beef, but yet having a peculiar flavour of its own. The part in greatest favour among hunters is the hump, which, if cut off whole and roasted just as it is in the skin, in a hole dug in the ground, would, I think, be difficult to match either for juiciness or flavour."—*Proc Zool. Soc.*, 1881, p. 726

Extinct Species of Rhinoceros.—The family once contained many more species, which were far more widely distributed than at present. As in similar cases, our knowledge of them is as yet but fragmentary, though constantly augmenting, especially by discoveries made in the Tertiary deposits of North America, a region in which they all died out long ago, though, judging from the evidence at present available, this was the locality in which they first made their appearance. In the Eocene formations of the Rocky Mountains are found the remains of numerous modifications of the primitive Perissodactyle type, from which the rhinoceroses may have originated. In the Lower Miocene a form called *Hyracodon* by Leidy already presented many of the characteristics of the family, though, especially as regards the dentition, in a very generalized condition. The next stage of specialization is represented by *Aceratherium*, found in the Miocene of both Europe and America, which still, like the last, shows no sign of having possessed a nasal horn. It differed from the existing species also in having four toes on the anterior limb, instead of only three. At the same period forms occurred (*Diceratherium*, Marsh) which show a pair of lateral tubercles on the nasal bones, apparently supporting horns side by side. These, however, soon disappeared and gave way in the Old World to species with one or two horns in the median line, a stage of development which apparently was never reached in America. In the Pliocene and Pleistocene of Europe and Asia numerous modifications of the existing types have been found. The present African two-horned type was represented in the Early Pliocene of Greece by *R. pachygnathus*, the skeleton of which is described by Gaudry as intermediate between the existing *R. bicornis* and *R. simus*. As many as three species were inhabitants of the British Isles, of which the best known is the Tichorhine or Woolly Rhinoceros, *R. antiquitatis* of Blumenbach, nearly whole carcases of which, with the thick woolly external covering, have been discovered associated with those of the mammoth, preserved in the frozen soil of the north of Siberia, and which, in common with some other extinct species, had a solid median wall of bone supporting the nasals, from which it is inferred that the horns were of a size and weight surpassing that of the modern species. The one-horned Indian type was well represented under several modifications (*R. sivalensis*, *palæindicus*, &c.), in the Pliocene deposits of the sub-Himalayan region, and forms more allied to the African bicorn species have also been found in India. *R. schleiermacheri* of the late European Miocenes was in some respects allied to the existing Sumatran rhinoceros, possessing incisor teeth and two horns. (W. H. F.)

RHODE ISLAND, one of the six New England States, and the smallest in extent of all the States, is one of the original thirteen which formed the American Union. It has an actual land area of only 1054·6 square miles, the waters of Narragansett Bay, its chief physical feature, comprising an additional area of not far from 360 square miles. It lies between 41° 18′[1] and 42° 3′ N. lat., and 71° 6′ and 71° 55′ W. long., its greatest length from north to south being about 48 miles, and its greatest width from east to west about 35 miles. It is shut in on the east and north by Massachusetts, and on the west by Connecticut, while its southern shores are washed by the Atlantic Ocean.

Plate IV.

Physical Characteristics.—The geological formation of the western portion of the State is chiefly that of the Montalban gneiss, which characterizes a great part of southern New England (see geological sketch map of New England, in article NEW HAMPSHIRE, vol. xvii. p. 391), but under the bay and to the east of it is an extensive coal-bearing formation, from which at different times upwards of 750,000 tons of coal have been taken. The only other important deposit is one of magnetic oxide of iron. The climate of Rhode Island, though variable, differs from that of the exposed coast of Massachusetts Bay in the absence of harassing east winds; while the proximity of the southern parts of the State (Newport and vicinity) to the Gulf Stream results in an atmosphere of unusual warmth and moisture, and at the same time comparatively equable. No great extremes, either of heat or of cold, are experienced in the State.

Population.—The earliest authentic estimate of population is that of 7181 in 1708. The War of Independence (1775–83) had the effect of reducing it from 59,707 in 1774 to 52,347 in 1782. The subsequent United States censuses show steady gains, as follows:—1790, 68,825; 1800, 69,122; 1810, 77,031; 1820, 83,059; 1830, 97,210; 1840, 108,830; 1850, 147,545; 1860, 174,620; 1870, 217,353; 1880, 276,531 (143,501 males, 133,030 females), while a State census in 1885 (advance returns) gives 304,419. The census of 1880 showed Rhode Island to be surpassed in aggregate population by all except Colorado, Oregon, Delaware, and Nevada, but in density it was surpassed by none (254·9 per square mile, the average for the whole United States being 13·92). By the same census the number of persons of foreign birth was 73,993, or 26·8 per cent., no State east of Lake Michigan showing a higher percentage; of these 30,973 (over 41 per cent.) were natives of the United Kingdom or its colonies. About 100,000 of the population are Roman Catholics; of the remainder, the Baptists (who have been in Rhode Island from its earliest settlement) are most numerous, while the communicants of the Protestant Episcopal church, with the Congregationalists and Methodists, have also a large representation.

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[1] The town of New Shoreham, which lies on an island 10 miles from shore, is beyond this limit.

Industries.—No portion of the State can be described as exceptionally fertile; and only 3 per cent. of the population are engaged in agriculture. The favourable situation of Newport and Providence, at the two extremities of Narragansett Bay, led to the development in the last century of a flourishing trade. This was long ago greatly reduced, and the tonnage of these ports is now chiefly that of a coasting trade. With the final check given to foreign commerce in the war of 1812–14, manufactures gained at once that prominence in the local industries of the State which they have ever since held. The census of 1880 returned the total number of persons in Rhode Island engaged in "gainful and reputable" occupations as 116,979, of whom 66,160, or more than 55 per cent., were classed under the heading "manufactures, mechanics, and mining."[1] From Samuel Slater's efforts at Providence and Pawtucket Falls, in 1790–93, may in fact be dated the real development of the cotton manufacturing industry in America, Slater, who had served an apprenticeship in England with a partner of Arkwright, having then been able from memory to set up in Rhode Island the whole set of recently improved spinning machinery. In 1791 only 5858 yards of cotton cloth were made in Providence and vicinity, but in 1810 in Rhode Island 735,319 were made. Two years later, in 1812, there were fifty-three cotton mills within a radius of 30 miles of Providence, nearly three-fifths of them being in Rhode Island. The number of cotton mills in Rhode Island was 33 in 1812, 116 in 1831, and 139 in 1870. Owing to the widespread depression in business the number was greatly reduced throughout the country during the next decade, but even in 1880 the number in Rhode Island was surpassed by that of no other State except Massachusetts. According to the census of 1880, the amount of capital invested in the manufacture of cotton goods was $24,609,461; woollen goods $15,410,450; dyeing and finishing textiles, $6,874,254; foundry and machine-shop products, $6,281,707; worsted goods, $6,177,754; jewellery, $5,650,133; slaughtering and meat-packing, $3,876,740; mixed textiles, $2,718,822; rubber and elastic goods, $2,217,000. Thus Rhode Island is second to but one other State—Massachusetts—in its aggregate production of cotton goods; and in the total amount of capital invested in all manufactures it ranks ninth. In each of the five following industries—cotton, woollen, worsted, mixed textiles, and dyeing and finishing—it stands at the head of all the States in amount of production per head of population. In jewellery the yearly product of a single city, Providence, exceeds that of every other city in the country ($5,444,092 in 1880). The same city ranks ninth in the value of its foundry and machine-shop products, $4,522,179; Pawtucket, closely adjoining, adds about $1,600,000.

Wealth and Finances.—The assessed valuation of the State was—in 1850, $80,508,794; in 1860, $135,337,588; in 1870, $296,965,646; and in 1880, upwards of $420,000,000—a gain of 500 per cent. in thirty years. In aggregate valuation it was surpassed in 1880 by twenty-four States (its population in the same year being exceeded by that of thirty-two States), but in valuation per head it ranked third ($1518·82 in 1880). Notwithstanding the large foreign-born population, the number of persons classed as paupers is very small,—only 553 in 1880, as compared with 15,217 in New York. In 1884 thirty-eight savings banks contained deposits to the amount of $51,079,160·66, with 115,752 depositors (more than 40 per cent. of the entire population). The number of other banks in the State was, in 1883, seventy-three, with a capital of $22,330,579·00. The State tax in 1880 amounted to $383,439·23; and in the same year the rate of taxation per head for all purposes ($9·74) was exceeded only by that of Massachusetts, New York, and California. The debt of the State, held in bonds issued during the war of 1861–65, has for the last few years been steadily diminishing. In 1880 it stood at $2,534,500, and in 1884 at $1,372,000.

Cities and Towns.—The five counties into which Rhode Island is divided contain in all thirty-six towns and cities, of which six lie on the narrow strip bordering the eastern shore of the bay, five on islands in the bay and ocean, and the remaining twenty-five on the mainland, to the west and north-west of the bay. By the State census of 1885 six cities and towns had a population exceeding 10,000:—Providence, 117,607; Pawtucket, 22,873; Newport, 20,339; Lincoln, 17,262; Woonsocket, 16,005; Warwick, 13,281. Only two of these places, Providence and Newport, have hitherto been organized as cities; but a third, Pawtucket (the largest in the country under a town government), is also now (1885) about to be organized under a city charter. The quaint old city of Newport, situated at the southern end of the island (Rhode Island) from which the State receives its name,[2] has for many years been nearly stationary as regards the development of its population and industries, but is well known on both sides of the Atlantic for its social attractions. In 1880 the "urban" population of Rhode Island constituted 77 per cent. of the total—a percentage surpassed only in the District of Columbia. Yet the growth of manufacturing industries in the State has resulted in building up compact settlements (in not a few instances almost continuous), with little regard to town lines and boundaries. On the Blackstone river are sixteen of these "villages" situated within five different towns; on the Woonasquatucket river twelve, in four cities and towns; and on the Pawtuxet river and its branches thirty-two, in five towns. In 1875 there were 186 "villages."

Education.—It was not until 1828 that the present public school system was established; but, owing largely to the exceptional organizing ability of the first commissioner of public schools, Henry Barnard, a most efficient system was securely built up. From various causes (including the presence of a large foreign-born element), illiteracy is a serious problem in this State,—the percentage unable to write (11·2) being in 1880 higher than in any other Northern State. Imperfect attendance is also a serious difficulty in the manufacturing villages. While the number of children registered by the school census of 1880 as of "school age" was 52,273, only 33,504 of these were actually enrolled as pupils in the public schools. Even after counting those who attend private and parochial schools, those "not attending any school" comprise so large a number as 12,279. Under the operation of a newly enacted compulsory law encouraging progress has been made. The public school funds in 1884 amounted to $659,585·50. Educational institutions, other than public, include Brown University, the Friends' School, and various others at Providence. Brown University was founded in 1764, under the name of Rhode Island College, and was the seventh college established in America.

Libraries.—The Redwood Library, at Newport, still in existence, incorporated in 1747, was the fourth public library founded in New England. The Providence Library was founded only a few years later, and is still perpetuated in the Providence Athenæum, an admirably conducted shareholders' library (43,656 volumes in 1884). The Brown University Library, founded 1772, had in June 1885 more than 62,000 volumes, including several special collections of great rarity and value. There were, moreover, in the same year thirty-two "public libraries" in the State (free to all readers), with a total of about 100,000 volumes. The largest of these (31,650 volumes in 1885) is the Providence Public Library.

History and Constitution.—The planting of the three scattered and independent settlements (Providence, 1636; Portsmouth, 1638; Newport, 1639) by Roger Williams and others whose views of church polity and doctrine had been found unpalatable to the Massachusetts Puritans, was not in the outset a movement for the establishment of a colony. The need of mutual protection, however, led to their combination; and the first general union of these three towns (together with a fourth, Warwick), was secured in 1647, under the charter of March 14, 1643–44. The union effected by this instrument was of the very loosest description, but under the pressure of causes which threatened the very existence of the colony a new and much more comprehensive charter was obtained in 1663. This extraordinarily liberal instrument constituted the fundamental law of Rhode Island for the next hundred and eighty years, through a succession of remarkable vicissitudes. The charters of Massachusetts and other American colonies were withdrawn in 1686, but the efforts of the royal agent were frustrated in Connecticut and Rhode Island; and in this colony the government was simply committed temporarily to the separate towns which had constituted the colony, the charter government being peacefully resumed three years later, in 1689. Rhode Island was hardly free, during the next seventy years, from some form of conflict with the mother country over the question of charter rights; and in the steps which served to precipitate the War of Independence (1775–83), as well as in the war itself, it was among the foremost. In the military operations of this war Nathanael Greene, a Rhode Island officer, ranks easily second to Washington in generalship. Reluctant as Rhode Island was to acknowledge other authority than that of its own colonial charter, even after the close of the war, it did not accede to the constitution of the United States until June 1790, more than a twelvemonth after the new government had gone into operation under Washington as president. Nor did it even then follow the example of the other States in framing a State constitution for the government of its local affairs, but retained its colonial charter of 1663 until almost the middle of the present century. In 1841 and 1842 the dissatisfaction with this mode of government culminated in a series of revolutionary movements; and a convention called by citizens of the State adopted what was known as the "people's

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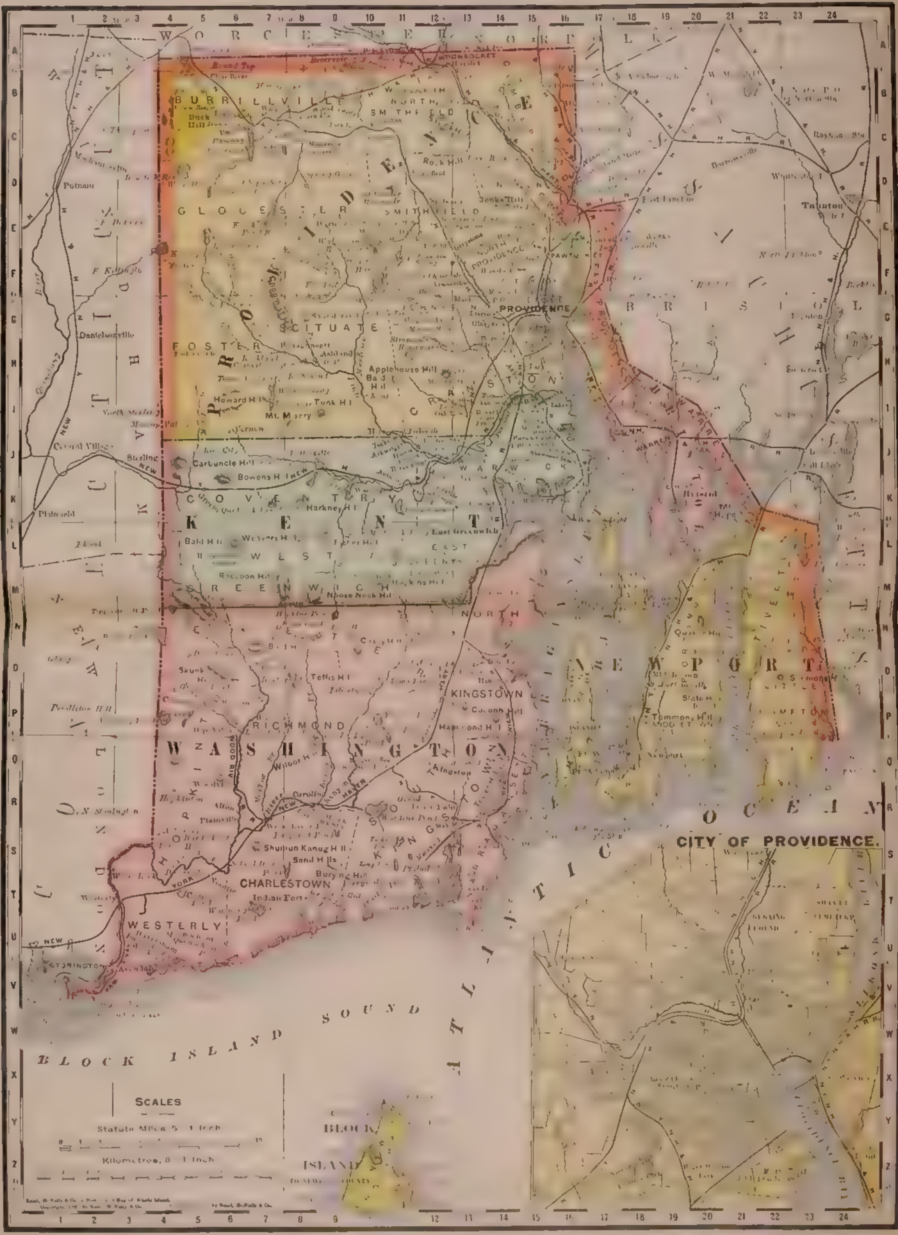
[1] Mining has long been unrepresented among Rhode Island industries.

[2] The official name of the State is "the State of Rhode Island and Providence Plantations."


WORCESTER
NORFOLK
PROVIDENCE
BURRILLVILLE
Buck Hill
NORTH SMITHFIELD
WOONSOCKET
GLOUCESTER
SMITHFIELD
NORTH PROVIDENCE
PAWTUCKET
PROVIDENCE
FOSTER
SCITUATE
JOHNSTON
CRANSTON
Applehouse Hill
Howard Hill
Tunk Hill
Mt. Masry
KENT
COVENTRY
WARWICK
Carbuncle Hill
Bowens Hill
Harkney Hill
East Greenwich
EAST GREENWICH
WEST GREENWICH
Bald Hill
Weavers Hill
Raccoon Hill
Hopkins Hill
Noose Neck Hill
WASHINGTON
EXETER
NORTH KINGSTOWN
Cocoon Hill
Hammond Hill
Teffts Hill
Skunk Hill
RICHMOND
HOPKINTON
Wood River
SOUTH KINGSTOWN
Kingston
Shumunkanuc Hill
Sand Hills
Burying Hill
CHARLESTOWN
Indian Fort
WESTERLY
Stonington
BRISTOL
Bristol
WARREN
BARRINGTON
Mt. Hope
NEWPORT
TIVERTON
LITTLE COMPTON
MIDDLETOWN
Newport
JAMESTOWN
NEW SHOREHAM
Tommony Hill
Taunton
Putnam
Danielsonville
Plainfield
Sterling
WINDHAM
NEW LONDON
CONNECTICUT
MASSACHUSETTS
BLOCK ISLAND SOUND
BLOCK ISLAND
ATLANTIC OCEAN
CITY OF PROVIDENCE.
SCALES
Statute Miles 5 = 1 Inch
Kilometres 8 = 1 Inch
Rand, McNally & Co.'s New Map of Rhode Island
Copyright, by Rand, McNally & Co.

constitution," under whose provisions it was claimed that Thomas Wilson Dorr was chosen governor. Later in the year 1842 a convention called by the regularly constituted authorities adopted the present constitution, under whose provisions the State government was organized in 1843. The governor (chosen annually) has no veto power. The legislative body, known as the General Assembly, comprises a senate and a house of representatives, each one of the thirty-six cities and towns choosing a single senator. The General Assembly begins its annual sessions in May at Newport, adjourning, after a few days, for a much more extended session at Providence beginning in the following January. The judicial body consists of one supreme court, with subordinate courts for the respective counties, the justices being chosen by vote of the General Assembly. The suffrage is a limited one, a property qualification being required in certain instances. The State is represented in the national Congress by two senators and two representatives. In the quadrennial election of president, Rhode Island has four votes in the "electoral college." In the Civil War of 1861–65 Rhode Island took an active part, furnishing for the defence of the Union 24,042 men. (W. E. F.)

RHODES, an island in the Ægean Sea, belonging to the Turkish empire, lying off the south-west coast of Asia Minor, between 35° 52′ and 36° 28′ N. lat. and 27° 40′ and 28° 15′ E. long., about 10 miles south of Cape Alepo. Its length is about 45 miles from north-east to south-west, its greatest breadth 22 miles, and its area nearly 424 square miles

The island is diversified in its surface, and is traversed from north to south by an elevated mountain range, the highest point of which, named in ancient times Atabyris or Atabyrium, and still called Atairo, rises to an elevation of 4560 feet. It commands a view of the elevated coast of Asia Minor towards the north, and of the Archipelago, studded with its numerous islands, on the north-west; while on the south-west is seen Mount Ida in Crete, often veiled in clouds, and on the south and south-east the vast expanse of waters which wash the African shore. The rest of the island is occupied in great part by ranges of moderately elevated hills, on which are found extensive woods of ancient pines, planted by the hand of nature. These forests were formerly very thick, but they are now greatly thinned by the Turks, who cut them down and take no care to plant others in their place. Beneath these hills the surface of the island falls lower, and several hills, in the form of amphitheatres extend their bases as far as the sea.

Rhodes was famed in ancient times for its delightful climate, and it still maintains its former reputation. The air is pure and salubrious, and it is said that there is hardly a day throughout the year in which the sun is not visible. The winds are liable to little variation; they blow from the west, often with great violence, for nine months in the year, and at other times from the north; and they moderate the summer heats, which are chiefly felt during the months of July and August, when the hot winds blow from the coast of Anatolia.

Rhodes, in addition to its fine climate, is blessed with a fertile soil, and produces a variety of the finest fruits and vegetables. Numerous streams and rivulets, which take their rise in the central range, water the surrounding plains and valleys of the island. The inhabitants have a great taste for gardens; and around the villages are extensive cultivated fields and orchards, containing fig, pomegranate, and orange trees. On the sloping hills carob-trees, and others both useful and agreeable, still grow abundantly; the vine also holds its place, and produces a species of wine which was highly valued by the ancients, though it seems to have degenerated greatly in modern times. The valleys afford rich pastures, and the plains produce every species of grain; the wheat is of an excellent quality; and, but for the extortions of its barbarian rulers, the island might be the seat of agriculture as well as commerce, and might export large quantities of corn.

The commerce of the island has been of late years increasing at a rapid rate. Many British manufactures are imported by indirect routes, through Smyrna, Constantinople, Beyrout, and other places. Cotton stuffs, calicoes, and grey linen are among the goods most in demand. It is not so much, however, the peasantry of the island who use these British goods, for they prefer their own home made stuffs; but they are exported to the neighbouring coast of Anatolia, between Budrum and Adalia, and thence conveyed into the interior. The expansion of the trade has been very much owing to the establishment of steam navigation direct to the island, which is now visited regularly by French and Austrian steamers, as well as by some from England to Smyrna.

The only town of any importance in the island is the capital, Rhodes, which stands at the north-east extremity. It rises in an imposing manner from the sea, on a gentle slope in the form of an amphitheatre. It is surrounded with walls and towers, and defended by a large moated castle of great strength. These fortifications are all the work of the Knights of St John. Above them rise the domes and minarets of the mosques, and the tufted stems of the palm trees, which adorn this like most other Oriental towns. The interior of the city does not correspond to its outward appearance. No trace exists of the splendour of the ancient city, with its regular streets, well-ordered plan, and numerous public buildings. The modern city of Rhodes is in general the work of the Knights of St John, and has altogether a mediæval aspect, the streets being for the most part narrow and winding, though the houses, as well as the public edifices, are in general solidly built of stone, and present at almost every step some memorial of the past in the escutcheons and coats of arms with which they are adorned. The picturesque fortifications also by which the city is surrounded remain almost unaltered as they were in the 15th century, and it has been remarked by numerous travellers that scarcely any city of western Europe has preserved its mediæval aspect so unchanged as this last refuge of European civilization in the East. The principal buildings which remain are the church of St John, which is become the principal mosque; the hospital, whence the charity of the knights was liberally dispensed to the faithful from all quarters of the world, and which has been transformed into public granaries; the palace of the grand master, now the residence of the pasha; and the senate-house, which still contains some marbles and ancient columns. Of the streets, the best and widest is a long street which is still called the Street of the Knights. It is perfectly straight, and formed of old houses, on which remain the armorial bearings of the members of the order. On some of these buildings are still seen the arms of the popes and of some of the royal and noble houses of Europe.

The only relics of classical antiquity are the numerous inscribed altars and bases of statues, as well as architectural fragments, which are found scattered in the courtyards and gardens of the houses in the extensive suburbs which now surround the town, the whole of which were comprised within the limits of the ancient city. The foundations also of the moles that separate the harbours are of Hellenic work, though the existing moles were erected by the Knights of St John.

Rhodes has at present two harbours. The least of these lies towards the east, and its entrance is obstructed by a barrier of rocks, so as to admit the entrance of but one ship at a time. It is sufficiently sheltered, but by the negligence of the Turks the sand has been suffered to accumulat until it has been gradually almost choked up. The othe harbour is larger, and also in a bad condition, here frigates of thirty guns may anchor, and are sheltered from the wes winds, though they are exposed to the north and north-east winds. The two harbours are separated by a mole which runs obliquely into the sea. At the eastern entrance is the fort of St Elmo, with a lighthouse; but the light is very feeble, and visible only a few miles.

History.—The numerous poetical legends current among the Greeks with respect to Rhodes bear testimony to the importance which it attained in very early times. Of these the most familiar is that celebrated by Pindar in one of the most beautiful of his odes (*Ol.* vii.), according to which the island was raised from the depths of the sea by Helios, the god of the sun, who always continued to be its tutelary deity, and whose image is found upon all its coins. The poet as usual derives its name from a nymph Rhoda, but there is no doubt that it was really derived from *ῥόδον*, a rose, the symbol that invariably accompanies the head of Helios on its coins. Another set of legends connected it with the Telchines, a mythical people celebrated for their skill as workers in bronze and other metals, while another version of the same tale represented these Telchines as themselves expelled by the Heliadæ, who became the first introducers of civilization. It is not improbable that both traditions had some reference to the Phœnicians, who may well have been the first to establish settlements in an island that lay so directly on their way to the Ægean. But the first record that can claim anything like an historical character is that of the occupation of the island by a body of Doric emigrants from the Peloponnesus, who founded the three cities of Lindus, Ialysus, and Camirus, which long continued to divide the island among them, and together with those of Cos, Cnidus, and Halicarnassus formed the Doric Hexapolis or league of six cities. These cities, like the more important Ionic confederacy, had a common sanctuary on the Triopian Promontory near Cnidus, but they do not appear to have formed a political union, though the distinct predominance in them all of the Doric element would naturally lead to a community of interest as well as of feeling. Nothing is known of their history for several centuries, during which they appear to have developed a remarkable amount of maritime power and enterprise, and became the founders of numerous colonies in distant parts of the Mediterranean, including Gela in Sicily, as well as Rhoda on the coast of Spain, and Salapia on the Adriatic coast of Italy. Towards the east also they were the recognized founders of Corydalla and Phaselis in Lycia and Soli in Cilicia.

Notwithstanding these evidences of early prosperity and power, we meet with very scanty notices of the Rhodian cities in the first period of Greek history. After the Persian War they appear to have passed into the condition of tributaries to Athens, and were compelled as such to join in the Athenian expedition to Sicily, but in 412 B.C. they deserted the Athenian cause and joined that of the Peloponnesians. It was shortly after this (in 408) that they adopted a resolution which became the foundation of their future greatness, the inhabitants of the three cities having agreed to abandon their homes and found a new city on the site which has ever since continued to be the capital of the island.

The architect was Hippodamus of Miletus, who had planned and embellished the Piræus at Athens; and the new city soon became one of the most splendid in the world, adorned with magnificent buildings and exquisite works of art. When Conon and his fleet restored the Athenian power by his victory off Cnidus (394 B.C.), Rhodes again embraced the victorious cause; but her fidelity during the subsequent contests was not very great. Sparta afterwards received the allegiance of the island; and in the Social War (357–5) it joined the alliance against Athens, and, with the assistance of the Carian monarch Mausolus, succeeded in achieving independence. But, finding the power of that king dangerous to their liberties, the Rhodians once more sued for the Athenian protection, which they obtained through the eloquence of Demosthenes. But neither they nor the rest of Greece could resist the overwhelming power of Macedonia, though Memnon, a Rhodian, was one of the ablest generals under the last Persian king, and attempted to check the career of Alexander. Rhodes received a Macedonian garrison; but it was expelled after the death of Alexander, and a resolute resistance was begun to the Macedonian power. This formed one of the most illustrious periods in the history of the island. The capital was besieged in 304 B.C. by Demetrius Poliorcetes, with a large army and a complete train of the artillery of that age. Although a breach was effected in the walls, the desperate valour of the defenders foiled all the attempts to carry it by assault, and cost the besiegers the lives of some of their generals and a great number of their soldiers. This heroic resistance obtained for the Rhodians great renown; and the period which followed was one of the most brilliant in the history of the city. They enjoyed the friendship of Rome, and obtained possession of some of the adjacent islands and coasts, including a considerable district on the mainland which was known as the Rhodian Peræa. For arts as well as arms the island was then renowned; the Rhodian laws, especially on maritime affairs, were reckoned the best in antiquity, and many of them adopted into the Roman code. Æschines, who had contended in eloquence with the greatest of orators, opened a school of rhetoric here, which became the parent of a new school of oratory, regarded by the ancients as possessing a Græco-Asiatic character. Protogenes embellished the city with his paintings, and Chares of Lindus with the celebrated colossal statue. The Colossus, erroneously supposed to have occupied a position striding over the entrance to the harbour, stood for fifty-six years, till an earthquake prostrated it in 224 B.C. Its enormous fragments continued to excite wonder in the time of Pliny, and were not removed till 656 A.D., when Rhodes was conquered by the Saracens, who sold the remains for old metal to a dealer who employed nine hundred camels to carry them away. Besides this not less than three thousand statues are said to have adorned the city, which was said by Strabo to surpass all others in beauty and ornamental character. Being the sovereigns of the seas, the Rhodians by their fleets rendered good service to Rome, with whom they were in alliance, and retained their independence for a long time. The severest blow they suffered was from Cassius in 42 B.C., who plundered the island even to the bare temple walls in the nominal cause of liberty, for it had embraced the side of Cæsar. Under the empire the liberty of Rhodes was repeatedly permitted and withdrawn according to the caprice of the sovereign; but ultimately it became a part of the Roman empire, and, after its partition, of the Eastern, till 616 A.D., when Chosroes the Persian obtained possession of it for a short time. It was subsequently conquered by Moawiyah, one of Othman's generals; but, recovered by the Byzantine empire, it proved the last of their Asiatic possessions that succumbed to the infidel. In 1308 it was granted by the emperor Emmanuel to the Knights of St John, who soon after resisted a siege by the sultan Othman. They strengthened the natural advantages of the place by skilful fortifications, and by discipline and equipments made themselves nearly a match for the superior numbers of the Turks. Nor did the knights restrict their efforts to self-defence; they conquered Smyrna, and established an outpost there in 1344, and at a later period formed a league against the common enemy of Christendom. But in 1401 Smyrna was taken by Timur; in 1480 Mohammed II. besieged Rhodes with a vast train of artillery; and, though then averted by the courage of its few defenders, the downfall of the place could not long be delayed. The last and most famous siege of Rhodes took place in 1522, when, after a desperate resistance for four months to the overwhelming numbers of the Ottomans, the knights, being left unassisted by all the European powers, capitulated on honourable terms, and evacuated the island. On the first day of 1523 Villiers de Lisle Adam, the grandmaster, embarked the last of the small band, carrying away all the property of the order, and leaving the ruins of their city to the enemy. The knights subsequently settled in Malta, where they also gained great renown. Rhodes has since been in the possession of the Turks, and is now the residence of the pasha of the Archipelago. The sites of Lindus, Ialysus, and Camirus, which in the most ancient times were the principal towns of the island, are clearly marked, and the first of the three is still occupied by a small town with a mediæval castle, both of them dating from the time of the knights, though the castle occupies the site of the ancient acropolis, of the walls of which considerable remains are still visible. There are no ruins of any importance on the site of either Ialysus or Camirus, but excavations at the latter place have produced valuable and interesting results in the way of ancient vases and other antiquities, which are now in the British Museum.

The population of the island is estimated at about 27,000, of whom 6000 are Turks, 3000 Jews, and the remainder Greeks. Of these nearly 20,000 are contained in the city and its suburbs; the rest of the island is very thinly peopled, though numerous small villages are scattered over its whole extent.

A large mass of matter relating to the ancient history and institutions of Rhodes are collected by Meursius in his dissertation (*Opera*, vol. iii.); the present condition of the island, and the objects of interest still visible there, are fully described by Ross (*Reisen auf den Griechischen Inseln*, vol. iii., Stuttgart, 1840) and Newton (*Travels and Discoveries in the Levant*, vol. i., London, 1865). The inscriptions that have been discovered there, which are very numerous, have unfortunately been published in a very irregular manner, and are scattered through a number of works, many of them not easy of access. By far the most complete collection of all that relates to the ancient condition of the island, as well as its history and antiquities, will be found in a treatise by Mr C. Torr, entitled *Rhodes in Ancient Times*, which is passing through the Cambridge University Press while this article has been in preparation. (E. H. B.)

RHODIUM. See PLATINUM.

RHODODENDRON. Classical writers, such as Dioscorides and Pliny, seem, from what can be ascertained, to have called the oleander (*Nerium Oleander*) by this name, but in modern usage it is applied to a large genus of shrubs and trees belonging to the order of heaths (*Ericaceæ*). No adequate distinction can be drawn between this genus and *Azalea*,—the proposed marks of distinction, however applicable in particular cases, breaking down when tested more generally. The rhododendrons, then, are trees or shrubs, never herbs, with simple, evergreen or deciduous leaves, and flowers in terminal clusters surrounded in the bud by bud scales but not as a rule by true leaves. The flowers are remarkable for the frequent absence or reduced condition of the calyx. The funnel- or bell-shaped corolla, on the other hand, with its five or more lobes, is usually conspicuous, and in some species so much so as to render these plants greatly prized in gardens. The free stamens are usually ten, with slender filaments and anthers opening by pores at the top. The ovary is five- or many-celled, ripening into a long woody pod which splits from top to bottom by a number of valves, which break away from the central placenta and liberate a large number of small bran-like seeds provided with a membranous wing-like appendage at each end. The species are for the most part natives of the mountainous regions of the northern hemisphere, extending as far south as the Malay Archipelago and New Guinea, but not hitherto found in South America or Australia. None are natives of Britain. They vary greatly in stature, some of the alpine species being mere pigmies with minute leaves and tiny blossoms, while some of the Himalayan species are moderate sized trees with superb flowers. Some are epiphytal, growing on the branches of other trees, but not deriving their sustenance from them. The varieties grown in gardens are mostly derived from the Pontic species (*R. ponticum*) and the Virginian *R. catawbiense*. These are mostly hardy in England. The common Pontic variety is excellent for game-covert from its hardiness, the shelter it affords, and the fact that hares and rabbits rarely eat it. Variety of colour has been infused by crossing or hybridizing the species first-named, or their derivatives, with some of the more gorgeously-coloured Indian varieties. In many instances this has been done without sacrifice of hardihood, but even where the infusion of Indian blood has brought about a tenderness of constitution the magnificence of the bloom amply repays the very slight shelter which is requisite in winter.

What are termed greenhouse rhododendrons are derivatives from certain Malayan and Javanese species, and are consequently much more tender. They are characterized by the possession of a cylindrical (not funnel-shaped) flower-tube and other marks of distinction. Azaleas now referred to *Rhododendron* are derived from Chinese and Japanese species chiefly. The "Indian" azaleas, so-called, have nearly evergreen foliage like a rhododendron, but with stiff hairs on the under surface of the leaf, and the flower-buds comprise leaves and not bud-scales only as in true rhododendrons. *Rhododendron* (*Azalea*) *indicum* is truly a native of China and Japan, but not of India. What are called in gardens Ghent azaleas are hardy varieties with deciduous gummy foliage and tufts of fragrant, brilliantly-coloured flowers. These are derivatives from *A. calendulacea*, *A. viscosa*, and other north-east American species. Another group of garden azaleas are derivatives from *Rhododendron* (*Azalea*) *sinense* (of which *R. mollis* is a form). These are scarcely less hardy than the preceding. *Azalea amœna* of gardens is a dwarf form of *R. indicum*, remarkable for having "hose in hose" flowers, a state of things brought about by the fact that the calyx in this variety becomes petaloid like the corolla. The foliage of rhododendrons contains much tannin, and has been used medicinally. Whether the honey mentioned by Xenophon as poisonous was really derived from plants of this genus as alleged is still an open question.

RHONE (Fr. *Rhône*), the largest European river flowing directly into the Mediterranean, rises in the Swiss canton of Valais, passes through the Lake of Geneva, strikes across the line of the Jura, and turning southward through France falls into the Gulf of Lyons. It has a length of 447 miles according to Strelbitzky (505 according to other authorities), and its principal affluent the Saône has a length of 268 miles above the confluence, which is 200 miles inland. The drainage area of the whole river-system is 38,000 square miles, and the mean discharge at the river mouth is 60,000 cubic feet per second, the maximum being 428,840 cubic feet and the minimum 19,426. The natives give the name of source of the Rhone (locally Rotten or Rodden) to three warm springs that rise in a circular stone basin near the Hôtel du Glacier du Rhône; but the real beginning of the river is the well-known glacier. According to M. Gosset,[1] a Swiss engineer, the Rhone glacier, which at present measures about 9 miles in length by about 3200 feet in width, is proved to have retreated 3028 feet between 1856 and 1881 and sunk upwards of 300 feet. In geological time the Rhone glacier filled the whole valley to a depth of 4800 feet and spread out over the Swiss plain now partly occupied by the Lake of Geneva. Obstructed by the Jura, it divided into two branches, one of which found its way (as the river does still) by the "écluse" between the Jura and the western Alps to deposit its erratic blocks on the heights in the neighbourhood of Lyons, while the other branch, bending northward, widened out so as to distribute its burden at Freiburg, Bern, Soleure, and even Aarburg.[2]

In the first 30 miles from the foot of the glacier (5751 feet) to Brieg (2214 feet) the stream has a fall of 1 in 46; in the next 70 miles to Villeneuve it descends at the rate of 1 in 378.[3] It passes between the Bernese and the Pennine Alps, receiving the tribute of 260 glaciers, of which the Aletsch is one of the most important. At Martigny, where it is joined by the Drance (a glacier-fed stream memorable for the terrible inundation of 1818 caused by the sudden bursting of the ice barrier by which its waters had been dammed back), the Rhone turns suddenly north-west, and below the defile of St Maurice (about 90 miles from its source) it enters the wide alluvial plain formerly occupied by the south-eastern arm of the Lake of GENEVA (*q.v.*), which has now retreated about 12 miles northward. The limpid character of the Rhone water as it issues from the south-western end of this great settling vat has become a commonplace of geographical illustration, and equally well-known is the contrast afforded at the confluence about a mile below Geneva between the current of the main river and that of its turbulent affluent the Arve, which has found no resting place in its 2000 feet descent by a course of 60 miles from the valley of Chamouni and the glaciers of Mont Blanc. It is the Arve that is mainly responsible for the dangerous inundations of the Rhone valley farther down; while its volume is sometimes not more than 1235 per second,[4] at other times it pours into the Rhone (whose maximum at this point is 2000 cubic feet) no less than 24,700 cubic feet, sometimes causing the river to flow backwards towards the Lake of Geneva.[5] To obviate the evils of their irregularity it has been proposed to divert the lower course of the Arve into the Lake of Geneva. The annual maximum of the Rhone at Geneva, according to observations between 1806 and 1880, occurs on the 7th of August. Since 1862 there has been an increase of high levels owing to the dyking of the river and the destruction of forests (see Plantamour, "Obs. limnimétriques," in *Mém. de la Soc. de Genève*, 1880). The defile or "écluse" by which the Rhone passes between Grand Credo, the terminal bastion of the Jura, and Mont Vouache, one of the Alps of Savoy, is commanded by one of the great frontier fortresses of France,

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[1] A sketch of M. Gosset's remarkable labours is given in the *Alpine Journal*, 1878–80.

[2] See Falsan and Chantre, *Monographie géologique des anciens glaciers et du terrain erratique de la partie moyenne du bassin du Rhône*, 1880. See also the map illustrating Auguste Jaccard's paper in *Bull. de la Soc. Vaudoise*, Feb. 1885.

[3] A large-scale profile of the upper Rhone accompanies Gerlach's paper "Die Penninischen Alpen" in *Mém. de la Soc. Helv.*, 1869.

[4] Professors Paul Chaix and Plantamour, on one occasion in March, found the volume of the Arve as low as 812 cubic feet per second, and that of the Rhone 1612.

[5] See the annual *Observations hydrométriques suisses sur le bassin du Rhône* issued by the Bureau fédéral des travaux publics.

Fort de l'Écluse. About 5½ miles farther down occurs the famous Perte du Rhône, a partially subterranean passage, now considerably modified by blasting.

> "The rocks forming the funnel come so close at one place that there is only a distance of about two feet from bank to bank, and a man of moderate height could stand with one foot on the French side and the other on the Savoy side and see between the beautiful river trembling as it were with rage and hastening to escape from the defile through which it is doomed to pass. A little way farther down the river has hollowed out a passage about 30 feet wide, which retains this width for a depth of from 30 to 35 feet, when it contracts considerably. At this depth a stratum of harder rock has resisted the action of the water, which, however, has scooped out beneath it almost as much as above it. Along each side of the ravine the harder rock projects for eight or ten feet like a cornice. At first the water is seen through the opening down the middle; but farther on great masses of rock from the walls of the ravine have fallen down, and, resting on the double cornice, conceal the river for a distance of some 60 paces."[1]

During the summer floods the water filled the ravine far above the level of the fallen blocks, and the Perte du Rhône was no longer visible.[2] The rocks through which the "perte" is cut belong to the Urgonian subdivision of the Cretaceous system,—the stratum which has been hollowed out being described as *calcaire gris*. Just below the ravine the Rhone is joined by the Valserine, which a little above Bellegarde passes through a "perte" of a similar character. Since 1871 the motive power of the main river has been utilized for the industries of Bellegarde; a large tunnel 20 feet high and more than half a kilometre long brings the water from the south side of the perte to turbine wheels placed in the bed of the Valserine, and wire ropes transmit the power to the Bellegarde workshops on the plateau 400 feet above.[3] Below Bellegarde the river is deflected southwards by the western chain of the Jura. It receives from the left the Usses, the Fiar (which drains the lake of Annecy), and the emissary of the Lake of Bourget, the largest of the purely French lakes, and then at the junction of the Guiers (from the Grande Chartreuse) it turns north-west round the southern end of the Jura. The Ain (118 miles long), which joins it from the right, is navigable in the direction of the current, and in its upper waters has a "perte" of some interest. Farther down the main river meanders for a time with shifting channels in a bed about two miles broad, but it gathers into a single stream before its junction with the Saône. This important confluent (the ancient Arar, which according to Cæsar flows "incredibili lenitate") has its source at Vioménil in the Vosges 1300 feet above the sea, and has been joined by the Doubs, which, rising in the district between the Jura and the Vosges, is famous for the beauty of its upper gorges and for the waterfall (70 feet) known as the Saut du Doubs.[4] Southwards from Lyons, where it is 530 feet above the sea, the united river continues to be still the "arrowy Rhone"; in the 61 miles from the Saône mouth to the Isère it falls 180 feet, in the 18 from the Isére to the Drome 56 feet, in the 38 from the Drome to the Ardèche 164, and in the 34 from the Ardèche to the Durance 88½. Those affluents, all except the last from the Savoy and Maritime Alps, are in general of little importance, but at times become formidable torrents. The same is true of the much shorter streams which bring down the waters from the eastern slopes of the Cevennes. During the inundation of the 10th September 1857, which has been frequently exceeded, the three streams the Doux, the Érieux, and the Ardèche poured into the Rhone 49,000 cubic feet per second. At Fourques d'Arles, 25 miles from the sea, the river begins to form its delta, breaking up into two main branches, the Grand Rhône passing from Arles south-east towards the Gulf of Fos, and the Petit Rhône south-west towards the Little Camargue. With all its rapidity of current and mass of waters it is not able to keep a clear passage to the sea through its own alluvium, which, according to M. Reclus's estimate, has since the Gallo-Roman period added from 75 to 100 square miles to the area of its delta.

From the time that Marius caused his soldiers to excavate the Fossæ Marianæ which have left the name of Fos to the bay already mentioned the endeavour to maintain a navigable channel inland from the sea has perplexed successive generations. Vauban himself declared "Les embouchures du Rhône sont incorrigibles." The method of contracting and embanking a principal channel right out to sea failed, either because the embankments were not carried out far enough, or more probably because the tides of the Mediterranean are not sufficiently strong to aid in removing the alluvium. A canal constructed in 1802–1832 from Arles to Bouc (on the east side of the Gulf of Fos) proved too shallow for the new steam traffic. At length in 1863 a scheme brought forward by Hippolyte Peut in 1846 was adopted for the making of a canal, 11,480 feet long, 210 feet wide and 19½ feet deep at low tide, from Tour St Louis on the left bank of the Grand Rhône to the Anse de Repos in the Gulf of Fos. The canal was completed in 1871, and the quays of the port of St Louis by the close of 1878, at a cost of 26,000,000 francs. Hostile critics maintain that it will be possible to keep this channel open at the seaward end only by continual and costly dredging, but hitherto their fears seem exaggerated. The new port has been very successful, 1261 vessels (313,745 tons) entering in 1881 and 2317 vessels (448,757 tons) in 1882. The regulation of the river itself is still a problem. The rapidity of the current from Lyons downwards, the extremely shifting character of the channel, and the variations that take place in the volume of water are the great obstacles to be overcome. Two months of the year are lost for navigation through floods or lack of water or fogs or ice. At present (1885) a scheme combining the two systems of regularization and canalization is being carried out for the purpose of securing everywhere at low water a depth of 5 feet 3 inches.

In the beginning of the present century even passenger boats used to be hauled up the river by towing ropes, and when steam was introduced it was found that the vessels had to be specially constructed to make head against the current. The laying of a continuous chain all the way from Lyons to Arles is impracticable through the shifting character of the bed; but several methods have been adopted to overcome the difficulties of the ascent. Thus some boats advance by means of long jointed levers which catch into the ground. Or a steel wire cable with one of its ends fixed at a given spot is unwound as a steam tug descends the stream and then the tug with its convoy of boats makes its way up again by simply winding in. Or two tugs are employed, the first going in advance of the other so far that the cable which it pays out takes a sufficient hold of the bottom to enable the second to haul by it. Or, lastly, Dupuy de Lome's system is adopted, by which the boat grips the river bottom by means of two continuous chains perpetually sunk in front and emerging behind. The Saône is much more easily dealt with than the Rhone. It is navigable as far up as Port-sur-Saône, and a system of movable dams and sluices has been established to secure a depth of 6 to 7 feet at low water.

The basin of the Rhone communicates with the Loire by the Canal du Centre (joining the Saône at Chalons), with the Seine by the Burgundy Canal (joining the Saône at St Jean de Losne), with the Rhine by a canal (1783–1834) which passes from the Saône at Saint Symphorien to the Doubs, and finally ends at Strasburg, and with the Meuse and the Belgian system by a canal (Canal de l'Est) constructed since 1875 from the Saône to the Moselle.

See Boissel, *Voy. pitt. et navigation executée sur une partie du Rhône reputé non-navigable*, 1795, and works on the river by Hippolyte Peut (1846), Surell (1847), Desjardins (1866), Adrian Germau (1372), and De la Rochette. Also Lentheric, *Les villes mortes du Golfe de Lyon*, 1875, and a paper in *Rev. des Deux Mondes*, 1880; Blerzy, *Torrents, fleuves, et canaux de la France*, 1878. (H. A. W.)

RHÔNE, a department of south-eastern France, deriving its name from the great river on which Lyons, its chief town, is situated, was formed in 1793 from the eastern portion of the department Rhône-et-Loire, comprising parts of Lyonnais and Beaujolais. It is bounded on the N. by Saône-et-Loire, on the E. by Ain and by Isère, on the S. and W. by Loire, and lies between 45° 27′ and 46° 18′ N. lat. and 4° 15′ and 4° 53′ E. long. The Saône and the Rhone, each for a distance of 26 miles, form its natural boundary on the east. The department belongs almost entirely to the basin of the Rhone, to which it sends its waters by the Saône and its tributary the Azergues, and by the Gier. The watershed between the Rhone and the Loire rises to the west of the department, and from north to south forms four successive groups—the Beaujolais Mountains, the highest peak of which is 3320 feet; the Tarare group; the Lyonnais Mountains (nearly 3000 feet); and Mont Pilat, the highest peak of which belongs to the department of Loire. The lowest point of the department, where it is left by the Rhone, is 460 feet above the level of the sea. The meteorological conditions vary greatly with the elevation and exposure. Snow sometimes lies in the mountains from November to April, whilst at Lyons and in the valleys the mean temperature in winter is 36° Fahr., and in summer 70°, the annual mean being 53°. The average rainfall is somewhat higher than is general over France owing to the amount of the precipitation on the hilly region.

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[1] De Saussure, *Voyage dans les Alpes* (1780–1796), ii. 90 *sq.*

[2] See the elaborate papers, with maps and sections, by Renevier in *Mém. de la Soc. Helvétique*, 1855 ("Mém. Geol. sur la Perte du Rhône et ses environs"), and in *Bull. de la Soc. Géologique*, 1874-5, 3d ser. vol. iii.

[3] See Reclus, *Nouv. Geogr. Univ.*, "La France," p. 215.

[4] See "La Saut du Doubs," in *Tour du Monde*, 1880.

Of a total area of 689,545 acres, 286,000 are arable, 120,000 are pasture meadow land, 79,000 under vines, 79,000 wood, and 66,000 moorland. From 1874 to 1883 the average annual harvests yielded 253,869 quarters of wheat, 7509 of meslin, 114,468 of rye, 3035 of barley, and 98,803 of oats. In 1883 there were produced 5,390,000 bushels of potatoes, 106,650 bushels of buckwheat, 41,320 tons of beetroot, 12 of hemp seed, and 83 of hemp. Between 1874 and 1883 the average annual yield of the vines was 16,533,956 gallons of wine; in 1883 it was only 11,918,084. In 1881 the live stock numbered 12,350 horses, 2000 asses, 600 mules, 9000 oxen or bulls, 65,000 cows, 12,500 calves, 49,000 sheep (producing 110 tons of wool), 16,000 pigs, 36,000 goats, 8000 beehives (producing 48 tons of honey and 16 tons of wax); 78 cwts. of cocoons were produced in 1882, while in 1883 there were only 47 cwts. The soil of the department is for the most part stony and only moderately fertile. Fruit trees, such as peaches, apricots, walnuts, and chestnuts, grow well, but the wood in general is little more than copse and brushwood. The wealth of the department is mainly derived from its industries. Its transactions with the Bank of France at Lyons in 1882 amounted to £30,398,960—a figure only exceeded by the departments Seine and Nord. The population is principally engaged in the manufacture of chemicals, of machinery, and of silk. In 1881 324 factories, with 18,500 spindles, 700 power-looms, and 43,000 hand-looms, were employed in the spinning and weaving of silk; 58 works, with 35,800 hackling and reeling machines, in the preparation of the raw material; 7 works, with 450 spindles, 230 power-looms, and 1250 hand-looms, in the manufacture of mixed goods, and 800 looms in the manufacture of lace; 80 dyeworks employ 4000 workmen. In 1879 it was calculated that the turnover for silk articles amounted to £15,000,000 (£5,000,000 for labour and £10,000,000 for the raw material). LYONS (*q.v.*) is the centre for the silk manufacture and Tarare for that of muslins, velvets, plush, calicoes, and prints, there being 26 factories, with 33,000 spindles, 540 power-looms, 4800 hand-looms; 2000 workmen are also employed in the manufacture of counterpanes. In 1882 88,115 tons of iron were produced. The chief workshops for repairing the locomotives of the Paris, Lyons, and Mediterranean line are in this department. There are also foundries of copper, bronze, and bell-metal, as also gold, silver, and steel wire works. The manufacture of gold and silver plate and jewellery has an annual turnover of £320,000, that of edible pastes amounts to £480,000, and that of paper to £54,000. The manufacture of wall papers is only second to that of Paris. In addition there are 15 chemical works, 8 glass works employing 1000 workmen with a turnover of £190,000 in 1879, 9 candle works (£268,800), 12 soap works (£102,200), and 700 mills. In 1881 there were in the department 1448 industrial establishments, employing 1558 steam engines with an aggregate horse power of 13,077. Coal and anthracite are found (36,169 tons in 1882), as well as argentiferous lead, manganese, and copper pyrites; there are also large stone quarries. The cold mineral spring of Charbonnière, containing bicarbonates, iron, and sulphur, is 19 miles west of Lyons. The means of communication include 76 miles of navigable river, 5 of canal (the canal of Givors), 141 miles of Government road, 3685 miles of other roads, and 165 miles of railway connecting Lyons with Paris, with Roanne by Tarare, with Montbrison, St Étienne, Nîmes, Marseilles, Grenoble, Chambéry, Geneva, Bourg, and Trévoux, Beaujeu with Belleville (on the Lyons and Mâcon line), and Thizy with Cours (two manufacturing towns in the neighbourhood of Tarare on the line from Lyons to Roanne). The population, which owing to the development of industries has doubled since 1801, was 741,470 in 1881—266 per square kilometre, the average in France being 71. There are two arrondissements, Lyons and Villefranche, 29 cantons, and 264 communes. Rhone belongs to the diocese of Lyons, is under the jurisdiction of the superior court of Lyons, and is divided between the corps d'armée of Clermont and of Grenoble. The chief towns are LYONS (*q.v.*); Tarare (13,352); Villeurbane (11,176); Caluire-et-Cuire (9740) and Oullins (7536), suburbs of Lyons; Givors (11,470), a stirring town on the Rhone at the junction of the canal by which coal is brought from St Étienne to the Rhone, with glass works, blast furnaces, foundries, brick and tile works, and potteries; Amplepius (7118); and Cours (6929).

RHUBARB. This name is applied both to a drug and to a vegetable.

1. The drug has been used in medicine from very early times, being described in the Chinese herbal *Pen-king*, which is believed to date from 2700 B.C. The name seems to be a corruption of *Rheum barbarum* or *Reu barbarum*, a designation applied to the drug as early as the middle of the 6th century, and apparently identical with the ῥῆον or ῥᾶ of Dioscorides, described by him as a root brought from beyond the Bosphorus. Rha is said by Ammianus Marcellinus to take its name from the river Rha (Volga), on the banks of which a species of *Rheum* (*R. Rhaponticum*) grows. It is not, however, known whether the root of this species was the article used under the name of *Rha ponticum* or *Rha barbarum*, or whether these names were applied to the drug brought overland from China by way of the Caspian Sea. It is, however, certain that in the early part of the 11th century Chinese rhubarb was distinguished as superior to the *Rha barbarum*. In the 14th century rhubarb appears to have found its way to Europe by way of the Indus and Persian Gulf to the Red Sea and Alexandria, and was therefore described as "East Indian" rhubarb. Some also came by way of Persia and the Caspian to Syria and Asia Minor, and reached Europe from the ports of Aleppo and Smyrna, and became known as "Turkey" rhubarb. Subsequently to the year 1653, when China first permitted Russia to trade on her frontiers, Chinese rhubarb reached Europe chiefly by way of Moscow; and in 1704 the rhubarb trade became a monopoly of the Russian Government, in consequence of which the term "Russian" or "crown" rhubarb came to be applied to it. Urga was the great depôt for the rhubarb trade in 1719, but in 1728 the depôt was transferred to Kiachta. All rhubarb brought to the depôt passed through the hands of the Government inspector, acting under the instructions of the Russian minister of war, and all pieces except those of good quality were rejected. Hence Russian rhubarb was invariably good and obtained a remarkably high price. This severe supervision naturally led, as soon as the northern Chinese ports were thrown open to European trade, to a new outlet being sought; and the increased demand for the drug at these ports resulted in less care being exercised by the Chinese in the collection and curing of the root, so that the rhubarb of good quality offered at Kiachta rapidly dwindled in quantity, and after 1860 Russian rhubarb ceased to appear in European commerce. The drug from that date became known as Chinese rhubarb, although the older names still continue in domestic use in England. Owing to the expense of carrying the drug across the whole breadth of Asia and the difficulty of preserving it from the attacks of insects, rhubarb was formerly one of the most costly of drugs. In 1542 it was sold in France for ten times the price of cinnamon and four times that of saffron, and in an English price list bearing date of 1657 it is quoted at 16s. per ℔, opium being at that time only 6s. and scammony 12s. per ℔.

Rhubarb is used in medicine as a mild purgative and cholagogue, promoting digestion and improving the appetite when given in small doses, probably by stimulating the intestinal secretions. It has a subsequent astringent effect due to the rheotannic acid it contains but this can be counteracted by giving it with alkaline preparations. It is especially valuable in the treatment of duodenal catarrh or catarrh of the biliary ducts with jaundice; and in certain skin diseases it has proved to be a valuable medicine, the results obtained being probably due to the chrysophan contained in it.

The botanical source of Chinese rhubarb cannot be said to have been as yet definitely cleared up by actual identification of plants observed to be used for the purpose. *Rheum palmatum*, *R. officinale*, *R. palmatum* (var. *tanguticum*), *R. colinianum*, and *R. Franzenbachii* have been variously stated to be the source of it, but the roots produced by these species under cultivation in Europe do not present the characteristic network of white veins exhibited by the best specimens of the Chinese drug (see Goebel and Kunze, pt. ii., pl. i. figs. 2b, 3b).

Chemistry.—The chief chemical constituents of Chinese rhubarb are chrysophan ($C_{15}H_{10}O_4$), rheotannic acid ($C_{26}H_{26}O_{14}$), emodin ($C_{15}H_{10}O_5$), a neutral colourless crystalline substance having the formula $C_{10}H_{12}O_4$, a white and a dark brown crystalline resin; it also contains mucilage in the proportion of 11 to 17 per cent., and a considerable quantity of oxalate of lime. An albuminoid principle containing nitrogen and sulphur is also found in the root, which, in the presence of water, as recently shown by Kubli,[1] decomposes the chrysophan into chrysophanic acid and glucose, and apparently exerts a similar action on rheotannic acid, giving rise to the formation of rheumic acid ($C_{20}H_{10}O_9$) and a fermentable sugar. Rheumic acid is a reddish-brown powder, sparingly soluble in cold water. The albuminoid principle is insoluble in rectified spirit of wine; consequently a preparation of the root made with that menstruum contains the active principles of the drug in the natural state, whilst an aqueous extract contains them in an altered condition.

Production and Commerce.—Rhubarb is produced in the four northern provinces of China proper (Chih-li, Shan-se, Shen-se, and Ho-nan), in the north-west provinces of Kan-suh formerly included in Shen-se, but now extending across the desert of Gobi to the frontier of Tibet, in the Mongolian province of Tsing-hai, including the salt lake Koko-nor, and the districts of Tangut, Sifan, and Turfan, and in the mountains of the western provinces of Sze-chuen. According to Richthofen the best rhubarb is collected exclusively from wild plants in the high mountains of western Sze-chuen between the sources of the Hoang-ho and the rivers Ya-lung Keang and Min-keang, and comes into trade under the name of Shen-se rhubarb.[2] Two of the most important centres of the trade are Sining-fu in the province of Kan-suh and Kwan-hien in Sze-chuen. From Shen-se, Kan-suh, and Sze-chuen the rhubarb is forwarded to Hankow, and thence carried to Shanghai, whence it is shipped to Europe. Lesser quantities are shipped from Tien-tsin, and occasionally the drug is exported from Canton, Amoy, Fuh-chow, and Ning-po.

Very little is known concerning the mode of preparing the drug for the market. According to Mr Bell, who on a journey from St Petersburg to Peking had the opportunity of observing the plant in a growing state, the root is not considered to be mature until it is six years old. It is then dug up, usually in the autumn, and deprived of its cortical portion and smaller branches, and the larger pieces are divided in half longitudinally; these pieces are bored with holes and strung up on cords to dry, in some cases being previously subjected to a preliminary drying on stone slabs heated by fire underneath. In Bhutan the root is said to be hung up in a kind of drying room, in which a moderate heat is regularly maintained. The effect produced by the two drying processes is very different; when dried by artificial heat, the exterior of the pieces becomes hardened before the interior has entirely lost its moisture, and consequently the pieces decay in the centre, although the surface may show no change. These two varieties are technically known as kiln-dried and sun-dried; and it was on account of this difference in quality that the Russian officer at Kiachta had every piece examined by boring a hole to its centre. The best rhubarb occurs in pieces of a yellowish colour externally, more or less marked with a network of whitish veins, the surface being convex and smooth. Internally it presents no signs of decay, but is compact, marbled with reddish-brown and white, mixed sometimes with iron grey. The smaller cylindrical sections of the root which have not been divided longitudinally are technically known as "rounds," and have usually a hole with a piece of string left in it; the flat pieces are more rarely pierced. Inferior qualities are shrunken and shrivelled on the surface, and externally of a brownish tint, showing traces of the darker bark, and when broken open are frequently decayed in the centre.

European Rhubarb.—As early as 1608 Prosper Alpinus of Padua cultivated as the true rhubarb a plant which is now known as *Rheum Rhaponticum*, L., a native of southern Siberia and the basin of the Volga. This plant was introduced into England through Sir Matthew Lister, physician to Charles I., who gave seed obtained by him in Italy to the botanist Parkinson. The culture of this rhubarb for the sake of the root was commenced in 1777 at Banbury in Oxfordshire, by an apothecary named Hayward, the plants being raised from seed sent from Russia in 1762, and with such success that the Society of Arts awarded him a silver medal in 1789 and a gold one in 1794. The cultivation subsequently extended to Somersetshire, Yorkshire, and Middlesex, but is now chiefly carried on at Banbury. English rhubarb root is sold at a cheaper rate than the Chinese rhubarb; and forms a considerable article of export to America, and is said to be used in Britain in the form of powder which is of a finer yellow colour than that of Chinese rhubarb. The Banbury rhubarb appears to be a hybrid between *R. Rhaponticum* and *R. undulatum*,—the root, according to E. Colin, not presenting the typical microscopic structure of the former. During the last few years very good rhubarb has been grown at Banbury from *Rheum officinale*, but these two varieties are not equal in medicinal strength to the Chinese article, yielding less extract,—Chinese rhubarb affording, according to H. Seier, 58 per cent., English rhubarb 21 per cent., and *R. officinale* 17 per cent. In France the cultivation of rhubarb was commenced in the latter half of the last century,—*R. compactum*, *R. palmatum*, *R. Rhaponticum*, and *R. undulatum*, L., being the species grown. The cultivation has, however, now nearly ceased, small quantities only being prepared at Avignon and a few other localities.

The culture of *Rheum compactum* was begun in Moravia in the beginning of the present century by Prikyl, an apothecary in Austerlitz, and until twenty-five or thirty years ago the root was largely exported to Lyons and Milan, where it was used for dyeing silk. As a medicine 5 parts are stated to be equal to 4 of Chinese rhubarb. Rhubarb root is also grown at Auspitz in Moravia and at Ilmitz, Kremnitz, and Frauenkirchen in Hungary; *R. Emodi* is said to be cultivated for the same purpose in Silesia.

The cultivation of *Rheum palmatum*, var. *tanguticum*, has been begun within the last few years in the United States.

Rhubarb is also prepared for use in medicine from wild species in the Himalayas and Java.

2. The rhubarb used as a vegetable consists of the leaf stalks of several hybrids between the species *R. rhaponticum*, *R. undulatum*, *R. palmatum*. The petioles of *R. officinale* have also been proved to be edible; but that plant is grown more frequently on account of its ornamental foliage (see HORTICULTURE, vol. xii. p. 287). (E. M. H.)

RHYL, a watering-place of North Wales, in the county of Flint, is situated near the mouth of the Clwyd, 30 miles north-west of Chester and 10 north-north-west of Denbigh, a railway line to which here joins that from Chester to Holyhead. Only recently it was a small fishing village. Its chief advantages as a watering-place are the pure air and extensive firm sands. Although the situation of the town was formerly bare and cheerless, much has been done to improve it. There are many handsome houses, and the neighbouring country is interesting both from its scenery and from its castles and other ancient buildings. The town possesses a town-hall, extensive winter gardens, racquet courts, lawn-tennis grounds, and other attractions. The east and west parades face the sea, and the pier, constructed of iron, is 700 feet in length. There is daily communication by steamer with Liverpool, Llandudno, Bangor, &c. The population of the urban sanitary district (area 600 acres) in 1871 was 4500, and in 1881 it was 6029.

RHYMER, THOMAS THE. See THOMAS OF ERCELDOUNE.

RHYMNEY, an urban sanitary district of Monmouthshire, on the borders of Glamorganshire, is situated in the valley of the Rumney river, 20 miles west of Abergavenny, and 22 north of Cardiff. It owes its importance to the neighbouring coal mines and to its iron and steel works, which employ nearly the whole population. The works of the Rhymney Iron Company, including blast furnaces and rolling mills, are among the largest of the kind in England. The town consists chiefly of plain houses inhabited by workpeople, the principal building being the church, a handsome structure in the Doric style erected in 1642. The population of the urban sanitary district (area 2890 acres) in 1871 was 8138, and in 1881 it was 8663.

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[1] *Jour. Pharm. Soc.*, [3], vi. p. 65.

[2] According to Mr F. Newcombe, *Med. Press and Circ.*, August 2, 1882, the Chinese esteem the Shen-se rhubarb as the best, that coming from Kanchow being the most prized of all; Sze-chuen rhubarb has a rougher surface and little flavour, and brings only about half the price; Chung-chi rhubarb also is greatly valued, while the Chi-chuang, Tai-huang, and Shan-huang varieties are considered worthless.

RIAZAN. See Ryazan.

RIBAULT, or Ribaut, Jean (*c.* 1520–1565), a French navigator rendered famous by his connexion with the early settlement of Florida (*q.v.*), was born at Dieppe, probably about 1520. Appointed by Coligny to the command of a colonizing expedition (from which the admiral was not deterred by the failure of Nicolas Durand de Villegagnon on a similar mission), Ribault sailed on 18th February 1562 with two vessels, and on 1st May landed at St John's river, or, as he called it, Rivière de Mai. Having settled his colonists at Port Royal Harbour and built Fort Charles for their protection, he returned to France to find the country in the throes of the civil war. In 1563 he appears to have been in England and to have issued *The whole and true discoverie of Terra Florida.* In April 1564 Coligny was in a position to despatch another expedition under Laudonnière; but meanwhile Ribault's colony had come to an untimely end, the unfortunate adventurers, destitute of supplies from home, having revolted against their governor and attempted to make their way back to Europe in a boat which was happily picked up, when they were in the last extremities, by an English vessel. In 1565 Ribault was again sent out to satisfy the admiral as to Laudonnière's management of his new settlement, Fort Caroline, on the Rivière de Mai. While he was still there the Spaniards under Menendez de Avila, though their country was at peace with France, attacked the French ships at the mouth of the river. Ribault set out to retaliate on the Spanish fleet, but his vessels were wrecked by a storm near Cape Cañaveral and he had to attempt to return to Fort Caroline by land. The fort had by this time fallen into the hands of the Spaniards, who had slaughtered all the colonists except a few who got off with two ships under Ribault's son. Induced to surrender by false assurances of safeguard, Ribault and his men were also put to the sword in October 1565. The massacre was avenged in kind by Dominique de Gourgues two years later.

See Haag, *La France Protestante*, *s.v.*; French, *Hist. Collections of Louisiana and Florida*; Parkman, *Pioneers of France in the New World.*

RIBBON-FISHES (*Trachypteridæ*), a family of marine fishes readily recognized by their long, compressed tape-like body, short head, narrow mouth, and feeble dentition. A high dorsal fin occupies the whole length of the back; an anal is absent, and the caudal, if present, deviates in its direction from the longitudinal axis of the body. The pectoral fins are small, the ventrals composed of several rays, or of one long ray only. Ribbon-fishes possess all the characteristics of fishes living at very great depths. They are extremely fragile when found floating on the surface or thrown ashore, and rarely in an uninjured condition; the rays of their fins especially, and the membrane connecting them, are of a very delicate and brittle structure. In young ribbon-fishes some of the fin-rays are prolonged in an extraordinary degree, and sometimes provided with appendages (see fig. 2). The largest of ribbon-fishes are the species of *Regalecus* (see Oar-Fish), of which specimens some 20 feet long by 12 inches in depth of body and 2 inches in thickness have been found. Like all deep sea fishes they occur in all seas. The most common of the British seas is the Vagmaer or Deal-Fish (*Trachypterus arcticus*) from 3 to 5 feet long, of which almost every year after the equinoctial gales specimens are picked up on the coasts of North Britain, of the Orkneys, Scandinavia, and Iceland (see also Ichthyology, vol. xii. pp. 684, 691).

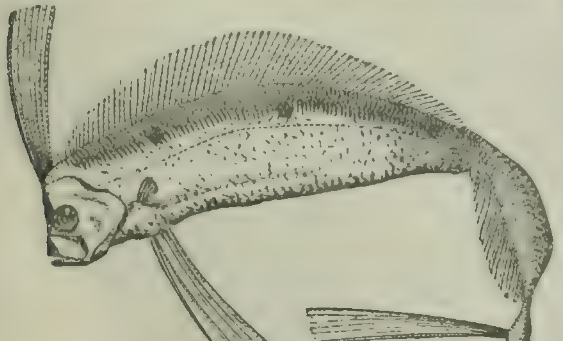

Fig. 1.—*Trachypterus tænia.*

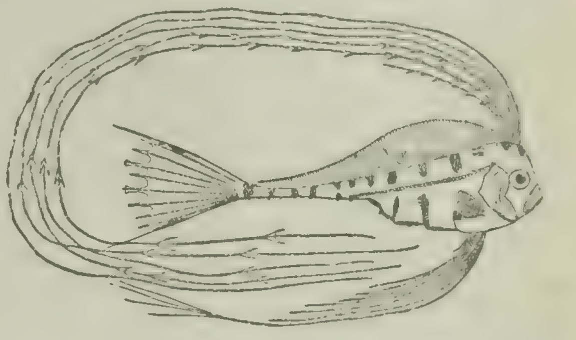

Fig. 2.—Young *Trachypterus.*

RIBBONS. By this name are designated narrow webs, properly of silk, not exceeding nine inches in width, used primarily for binding and tying in connexion with dress, but also now applied for innumerable useful, ornamental, and symbolical purposes. Along with that of tapes, fringes, and other smallwares, the manufacture of ribbons forms a special department of the textile industries. It is obvious that the weaving of very narrow fabrics, piece by piece, on separate looms would be a tedious and expensive process; yet for ages such was the only method of making ribbons. The essential feature of a ribbon loom is the simultaneous weaving in one loom frame of two or more webs, going up to as many as forty narrow fabrics in modern looms. To effect the conjoined throwing of all the shuttles and the various other movements of the loom the automatic action of the power-loom is necessary; and it is a remarkable fact that the self-acting ribbon loom was known and extensively used more than a century before the famous invention of Cartwright. A loom in which several narrow webs could be woven at one time is mentioned as having been working in Dantzic towards the end of the 16th century. Similar looms were at work in Leyden in 1620, where their use gave rise to so much discontent and rioting on the part of the weavers that the states general had to prohibit their use. The prohibition was renewed at various intervals throughout the century, and in the same interval the use of the ribbon loom was interdicted in most of the principal industrial centres of Europe. About 1676, under the name of the Dutch loom or engine loom, it was brought to London; and, although its introduction there caused some disturbance, it does not appear to have been prohibited. In 1745 the celebrated John Kay, the inventor of the fly-shuttle, obtained, conjointly with Joseph Stell, a patent for improvements in the ribbon loom; and since that period it has benefited by the inventions applied to weaving machinery generally.

Ribbon weaving is known to have been established near St Étienne (dep. Loire) so early as the 11th century, and that town to the present day continues to be the headquarters of the industry. In the time of Louis XIV. the ribbon trade there gave employment to about 6000 persons; now about 17,000 looms are in operation in the district, 1500 of which are power-looms in factories. Statistics compiled in 1881 give the annual value of the trade at 63,400,000 francs, of which 45,000,000 francs was the value of ribbons proper, the remainder being represented by scarfs, trimmings, elastic web, chenille, &c. During the Huguenot troubles, ribbon weavers from St Étienne settled at Basel and there established an industry which now rivals that of the original seat of the trade. In the Basel district the looms number 8000; but one-half of these are power-looms in factories, which have a much greater productive capacity than the domestic looms. Crefeld is the centre of the German ribbon industry, the manufacture of black velvet ribbon being there a specialty. In Vienna about 2000 looms are employed. Next to St Étienne and Basel, Coventry is the most important seat of ribbon making, and to some extent the industry is also prosecuted at Norwich and Leicester. The average annual value of the ribbon trade of western Europe and America is £16,000,000. A large proportion of the ribbons now made are mixed fabrics of silk and cotton.

RIBERA, JUSEPE, or, in Italian, **GIUSEPPE** (1588–1656), commonly called **LO SPAGNOLETTO**, or the Little Spaniard, a leading painter of the Neapolitan or partly of the Spanish school, was born near Valencia in Spain, at Xativa, now named S. Felipe, on 12th January 1588. His parents intended him for a literary or learned career; but, having an innate tendency to design, he neglected the regular studies, and entered the school of the Spanish painter Francisco Ribalta. Fired with a longing to study art in its Italian headquarters, he somehow, while still quite a youth, made his way to Rome, worked vehemently, and struggled with hunger and destitution. Early in the 17th century a cardinal noticed him in the streets of Rome drawing from the frescos on a palace façade; he took up the ragged stripling and housed him in his mansion. Artists had then already bestowed upon the alien student, who was perpetually copying all sorts of objects in art and in nature, the nickname of Lo Spagnoletto. In the cardinal's household Ribera was comfortable but dissatisfied; he found his studies in abeyance, and one day he decamped. He then betook himself to the famous painter Michelangelo da Caravaggio, the head of the naturalist school, called also the school of the Tenebrosi, or shadow-painters, owing to the excessive contrasts of light and shade which marked their style. In this method of art Ribera, though not claiming the first place as initiator, was destined to rank as hardly second to Caravaggio himself. The Italian master gave every encouragement to the Spaniard, but not for long, as he died in 1609. Ribera, who had in the first instance studied chiefly from Raphael and the Caracci, had by this time acquired so much mastery over the tenebroso style that his performances were barely distinguishable from Caravaggio's own. He now went to Parma, and worked after the frescos of Correggio with great zeal and efficiency; in the museum of Madrid is his Jacob's Ladder, which is regarded as his *chef-d'œuvre* in the Correggesque manner. From Parma Spagnoletto returned to Rome, where he resumed the style of Caravaggio, which was doubtless more conformable to his natural bent, and shortly afterwards he migrated to Naples, which became his permanent home.

Ribera was as yet still poor and inconspicuous, but a rich picture-dealer in Naples soon discerned in him all the stuff of a successful painter, and gave him his daughter in marriage. This was the turning point in the Spaniard's fortunes. He painted a Martyrdom of St Bartholomew, which the father-in-law exhibited from his balcony to a rapidly increasing and admiring crowd. The popular excitement grew to so noisy a height as to attract the attention of the Spanish viceroy the Count de Monterey. From this nobleman and from the king of Spain, Philip IV., commissions now flowed in upon Ribera. Various professional honours followed; he painted with incessant vigour; his house became a centre of fashionable concourse; and he made vast sums of money. In the streets he only appeared in his carriage—then a sure criterion of affluence. After a while he found it necessary to curb his own and his patrons' appetite for work, and he limited himself to six hours in the day, ending towards noon. With prosperity came grasping and jealous selfishness. Spagnoletto, chief in a triumvirate of greed, his abettors being a Greek painter, Belisario Corenzio, and a Neapolitan, Giambattista Caracciolo, determined that Naples should be an artistic monopoly; by intrigue, terrorizing, and personal violence on occasion they kept aloof all competitors. Annibale Caracci, the Cavalier d'Arpino, Guido, Domenichino, all of them successively invited to work in Naples, found the place too hot to hold them. Domenichino was so persecuted and victimized that his life was probably abridged by these truly "tenebrous" machinations. The cabal ended at the time of Caracciolo's death in 1641.

The close of Ribera's triumphant career has been variously related. If we are to believe Dominici, the historian of Neapolitan art, he totally disappeared from Naples in 1648 and was no more heard of,—this being the sequel of the abduction, by Don John of Austria, son of Philip IV., of the painter's beautiful only daughter Maria Rosa. Dominici indeed will not even allow that Ribera was a Spaniard by birth: he alleges that the painter, though of Spanish descent, was born at Gallipoli, in the province of Lecce, kingdom of Naples. But these assertions have not availed to displace the earlier and well-authenticated statement that Ribera, a genuine Spaniard in the fullest sense, died peaceably and wealthy in Naples in 1656. His own signature on his pictures is constantly "Jusepe de Ribera, Español." His daughter, so far from being disgraced by an abduction, married a Spanish nobleman who became a minister of the viceroy.

The pictorial style of Spagnoletto is extremely powerful; or one might better define its special quality as immensely forcible, equally sustaining the test of a distant and general or of a close and scrutinizing view. In his earlier style, founded (as we have seen) sometimes on Caravaggio and sometimes on the wholly diverse method of Correggio, the study of Spanish and Venetian masters can likewise be traced. Along with his massive and predominating shadows, he retained from first to last great strength of local colouring. His forms, though ordinary and partly gross, are correct; the impression of his works gloomy and startling. He delighted in subjects of horror: an agonizing martyrdom—the gridiron of Lawrence, the flaying knife of Bartholomew, or the vulture of Prometheus—had for him no repulsion but a grim fascination. He had many imitators, his influence extending from Naples to other parts of Italy, and also to his native Spain. Salvator Rosa and Luca Giordano were his most distinguished pupils; also Giovanni Do, Enrico Fiammingo, Michelangelo Fracanzani, and Aniello Falcone, who was the first considerable painter of battle-pieces. Among Ribera's principal works should be named St Januarius Emerging from the Furnace, in the cathedral of Naples; the Descent from the Cross, in the Neapolitan Certosa, generally regarded as his masterpiece; the Adoration of the Shepherds (a late work, 1650), now in the Louvre; the Martyrdom of St Bartholomew, in the museum of Madrid; the Pietà in the sacristy of S. Martino, Naples. His mythologic subjects are generally unpleasant—such as the Silenus, in the Studi Gallery of Naples, and Venus Lamenting over Adonis, in the Corsini Gallery of Rome. The Louvre contains altogether twenty-five of his paintings; the London National Gallery two—one of them, a Pietà, being an excellent though not exactly a leading specimen. He executed several fine male portraits; among others his own likeness, now in the collection at Alton Towers. He also produced twenty-six etchings, ably treated. For the use of his pupils, he drew a number of elementary designs, which in 1650 were etched by Francisco Fernandez, and which continued much in vogue for a long while among Spanish and French painters and students.

Besides the work of Dominici already referred to (1840–46), the *Diccionario Historico* of Cean Bermudez is a principal authority regarding Ribera and his works. (W. M. R.)

RIBES. See CURRANT and GOOSEBERRY.

RICARDO. DAVID (1772–1823), a celebrated political economist, was born at London 19th April 1772. He was the third son of his father, a Jewish gentleman of Dutch birth, whose family, it is said, had formerly resided in Portugal. The elder Ricardo bore an honourable character, and was a successful member of the Stock Exchange. The son was placed for two years at a commercial school in Holland, and at the age of fourteen entered his father's office, where he showed much aptitude for business. About the time when he attained his majority he abandoned the Hebrew faith, and conformed to the Anglican Church, a change which seems to have been connected with his marriage to Miss Wilkinson, which took place in 1793. In consequence of the step thus taken he was separated from his family and thrown on his own resources. His ability and uprightness were known, and he at once entered on such a successful career in the profession to which he had been brought up that at the age of twenty-five, we are told, he was already rich. He now began to occupy himself with scientific pursuits, and gave some attention to mathematics as well as to chemistry and mineralogy; but, having met with Adam Smith's great work in 1799 at Bath, whither he had gone for his wife's health, he threw himself with ardour into the study of political economy.

His first publication (1809) was *The High Price of Bullion a Proof of the Depreciation of Bank Notes.* This tract was an expansion of a series of articles which the author had contributed to the *Morning Chronicle.* It gave a fresh stimulus to the controversy, which had for some time been discontinued, respecting the resumption of cash payments. Ricardo argued that the premium on bullion and the unfavourable state of the exchanges could only be explained by the depreciation of the inconvertible paper money then in circulation, which had fallen 25 per cent. below the value of specie in consequence of its over-issue. A committee to consider the whole question, commonly known as the Bullion Committee, was nominated by the House of Commons in February 1810. Amongst the members were Francis Horner, who was appointed chairman, Alexander Baring (afterwards Lord Ashburton), William Huskisson, and Henry Thornton, author of the well known *Inquiry into the Nature and Effects of the Paper Credit of Great Britain* (1802). The report, which was presented to parliament in June of the same year, was the joint production of Horner, Huskisson, and Thornton. It asserted the same views which Ricardo had put forward, and recommended the repeal of the Bank Restriction Act. Notwithstanding this, the House of Commons of the following year, on the motion of Mr Vansittart (afterwards Lord Bexley), declared in the teeth of the facts that paper had undergone no depreciation, and negatived Horner's resolutions founded on the report of the committee. One of the strongest opponents of Ricardo's opinions was Mr Bosanquet; he published in 1811 a pamphlet entitled *Practical Observations on the Report of the Bullion Committee,* and this drew forth from Ricardo an elaborate reply. Both this tract and its predecessor attracted much attention. They propound no new economic principles, but are based on the doctrines of Smith. They do not give such a systematic and complete view of the subject as Huskisson's well known tract (*The Question respecting the Depreciation of the Currency Stated and Examined,* 1810), but they are well reasoned, and, as to their main conclusions, convincing It has, however, been maintained that there were features of the case which Ricardo did not sufficiently take into account, especially the demand for bullion created by the necessity of meeting the foreign payments of England, which, in consequence of the Continental system, could not be otherwise discharged.

In 1811 he made the acquaintance of James Mill, whose introduction to him arose out of the publication of Mill's tract entitled *Commerce Defended.* The conversation of Ricardo's new friend seems to have largely influenced his views; Bentham indeed declared him to be Mill's intellectual child; but, whilst Mill doubtless largely affected his political ideas, he was, on his side, under obligations to Ricardo in the purely economic field; Mill said in 1823 that he himself and J. R. M'Culloch were Ricardo's disciples, and, he added, his only genuine ones.

In 1815, when the Corn Laws were under discussion, he published his *Essay on the Influence of a Low Price of Corn on the Profits of Stock.* This was directed against a recent tract by Malthus entitled *Grounds of an Opinion on the Policy of Restraining the Free Importation of Foreign Corn.* The reasonings of the essay are based on the theory of rent which has often been called by the name of Ricardo; but the author distinctly states that it was not due to him. "In all that I have said concerning the origin and progress of rent I have briefly repeated, and endeavoured to elucidate, the principles which Malthus has so ably laid down on the same subject in his *Inquiry into the Nature and Progress of Rent.*" We now know that the theory had been fully stated, before the time of Malthus, by Anderson; it is in any case clear that it was no discovery of Ricardo. Even the conception of the soils of a country as comparable to a series of machines of different original powers, though capable of improvement by the application of capital, is quoted from Malthus. Ricardo states in this essay a set of propositions, most of them deductions from the theory of rent, which are in substance the same as those afterwards embodied in the *Principles,* and regarded as characteristic of his system, such as that increase of wages does not raise prices; that profits can be raised only by a fall in wages and diminished only by a rise in wages; and that profits, in the whole progress of society, are determined by the cost of the production of the food which is raised at the greatest expense. It does not appear that, excepting the theory of foreign trade, anything of the nature of fundamental doctrine, as distinct from the special subjects of banking and taxation, is laid down in the *Principles* which does not already appear in this tract. We find in it, too, the same exclusive regard to the interest of the capitalist class, and the same identification of their interest with that of the whole nation, which are generally characteristic of his writings. "Rent," he says, "is in all cases a portion of the profits previously obtained on the land," a proposition by which, for the sake, it is to be feared, of creating a political prejudice, he obscures his own doctrine that true rent can never be a part of profit; and he alleges what is in a sense true, but has a most invidious effect,—that "the interest of the landlord is always opposed to the interest of every other class in the community," though the existence of a distinct landlord class is by no means a necessity, and the owner of rent, which somebody must own, could not, even by entirely remitting it, alter the price of food, or increase the profits of the capitalist, except by presenting him with a gift to which he has no economic claim. At the close of the tract he endeavours to show in opposition to Malthus that the danger of dependence on foreign supply for a large part of our food, and the losses on invested capital which would result from a legislative change, could not be so serious as to counterbalance the advantages arising from a free importation.

Both parts of this proposition are probably true; but he does not establish the first in a very satisfactory manner.

In the *Proposals for an Economical and Secure Currency* (1816) he first disposes of the chimera of a currency without a specific standard, and pronounces in favour of a single metal, with a preference for silver, as the standard. He then puts forward a scheme which had been already briefly indicated in the appendix to the 4th edition (1811) of his *High Price of Bullion.* This was that the bank should be obliged to deliver on demand, not coin, but uncoined bullion or gold standard bars, in exchange for its notes, whenever the notes presented together for payment reached a moderate fixed amount. The consequence would be that, all the smaller payments being made in the cheap medium, paper, the country would enjoy the profit derivable from the metallic currency used as a capital; the wear of the coinage, too, would be prevented, and a saving thus effected. By this method the public would secure itself against any variations in the value of the currency beyond those to which the standard itself is necessarily subject; and, at the same time, the circulation would be carried on in the least expensive way. Thus, whilst the use of the precious metals as the medium of exchange was, in the earlier stages of social life, one of the most important steps towards the improvement of commerce and the advancement of civilization, it is proposed to us, and on grounds which it is difficult to gainsay, to banish them once more from such employment in almost all the internal transactions of a country. A kindred revolution, tending to the further elimination of metallic money, Jevons has spoken of as "a return to barter"; but that expression is misleading, for in the modern system of settlement by writing off liabilities against each other a metallic standard is always supposed, and lies at the basis of every transaction, whereas in the primitive method of dealing commodities were directly compared. Ricardo's plan was in operation for some time, but was then given up on the ground, urged by the bank, of the frequent forgery of one pound notes, and the consequent necessity of replacing them with coin—a very insufficient reason, as experience demonstrates, though a good argument in favour of such an improved manufacture of notes as would effectually defeat fraudulent imitation. In a later tract (*Plan for a National Bank*) Ricardo proposes that one pound notes should be confined to the country districts. The general plan has been objected to on the ground that it would not provide for a sufficient metallic reserve to meet sudden emergencies arising from the necessity of foreign payments.

Ricardo's chief work, *Principles of Political Economy and Taxation,* appeared in 1817. A full account of the general theory expounded in this treatise has been given under Political Economy; a very brief statement must here suffice. The fundamental doctrine is that, on the hypothesis of free competition, exchange value is determined by the labour expended in production,—a proposition not new, nor, except with considerable limitation and explanation, true, and of little practical use, as "amount of labour" is a vague expression, and the thing intended is incapable of exact estimation. Ricardo's theory of distribution has been briefly enunciated as follows:—"(1) the demand for food determines the margin of cultivation; (2) this margin determines rent; (3) the amount necessary to maintain the labourer determines wages; (4) the difference between the amount produced by a given quantity of labour at the margin and the wages of that labour determines profit." These theorems are too absolutely stated, and require much modification to adapt them to real life. His theory of foreign trade has been embodied in the two propositions—"(1) international values are not determined in the same way as domestic values; (2) the medium of exchange is distributed so as to bring trade to the condition it would be in if it were conducted by barter." His views on currency and banking will be gathered from the present article.

A considerable portion of the work is devoted to a study of taxation, which requires to be considered as a part of the problem of distribution. A tax is not always paid by those on whom it is imposed; it is therefore necessary to determine the ultimate, as distinguished from the immediate, incidence of every form of taxation. Smith had already dealt with this question; Ricardo develops and criticizes his results. The conclusions at which he arrives are deduced from the theory of rent and from the assumptions of a uniform rate of profits and of a rate of wages coincident with the necessary subsistence of the labourer. They are in the main as follows:—a tax on raw produce falls on the consumer, but will also diminish profits; a tax on rents on the landlord; taxes on houses will be divided between the occupier and the ground landlord; taxes on profits will be paid by the consumer, and taxes on wages by the capitalist. These propositions of course participate in the infirmity of the premises from which they are deduced, or must at least be taken with limitations corresponding to those to which the premises are subject. Ricardo adopts and even extols as a "golden maxim" the shallow dictum of Say, that "the very best of all plans of finance is to spend little, and the best of all taxes is that which is of least amount."

In 1819 Ricardo, having retired from business and become a landed proprietor, entered parliament as member for Portarlington. He was at first diffident and embarrassed in speaking, but gradually overcame these difficulties, and was heard with much attention and deference, especially when he addressed the house on economic questions. He probably contributed in a considerable degree to bringing about the change of opinion on the question of free trade which ultimately led to the legislation of Sir Robert Peel on that subject.

In 1820 he contributed to the supplement of the *Encyclopædia Britannica* (6th ed.) an *Essay on the Funding System.* In this, besides giving an historical account (founded on Dr Robert Hamilton's valuable work *On the National Debt,* 1813, 3d ed., 1818) of the several successive forms of the sinking fund, he urges that nations should defray their expenses, whether ordinary or extraordinary, at the time when they are incurred, instead of providing for them by loans; and, not believing that the system of a sinking fund would ever be consistently and perseveringly carried out, he maintains that the national debt should be paid off by a tax on property—an operation which he thought might be completed in two or three years during peace. Thus, by a single effort we might, he says, get rid of those great sources of demoralization, the customs and the excise, and our commerce would be freed from "all the vexatious delays and interruptions which our present artificial system imposes upon it."

In 1822 he published a tract *On Protection to Agriculture,* which is an able application to controversy of the general principles laid down in his systematic work. Its arguments and conclusions are therefore subject to the same limitations which those fundamental principles require. He does not advocate an absolutely free importation of corn, but proposes, in consideration of the special burdens on agriculture, to impose on the foreign commodity a duty equivalent to the exclusive taxes imposed on home growers, as well as to allow a drawback on exportation equal to the duty. The only point of much interest in the tract, apart from the question of protection, is the assertion of the doctrine that a high rate of interest beneficial to a country—a view curiously opposed to that held by Child and others in the 17th century. "Profits and interest," he says, "cannot be too high. Nothing contributes so much to the prosperity and happiness of a country as high profits." It seems to follow that, the productiveness of labour being given, wages cannot be too low, which can only be true on the supposition,[1] tacitly assumed by Ricardo in many places, that wages coincide with the cost of the labourer's maintenance. The proposition, too, appears to lead to economic pessimism, for, according to his own doctrines, the rate of profits must inevitably decline in the course of the history of any society.

In his *Plan for the Establishment of a National Bank*, published posthumously in 1824, he proposes that the issue of the paper currency should be taken out of the hands of the Bank of England, and vested in commissioners appointed by the Government, but not removable except on an address from one or both Houses of Parliament. These functionaries should in no case lend money to the ministers of the crown, who, when they wanted it, should raise it by taxation or have recourse to the general market. The commissioners would act as bankers to all the public departments, but would be precluded from fulfilling the same office for any corporation or individual whatever. Their great business would be to regulate the issue of paper by the price of bullion, so as to keep the value of the former equal to that of the coins it would represent. The tract describes in detail the measures to be adopted for the introduction and working of the new system. A certain step towards realizing the objects of this scheme, though on different lines from Ricardo's, was taken in Sir Robert Peel's Act of 1844, by which the discount business of the bank was separated from the issue department.

Ricardo died on the 11th September 1823, at his seat (Gatcomb Park) in Gloucestershire. He was only fifty-one years of age, and there had been nothing in his general health to give rise to apprehension; the cause of death was a cerebral affection resulting from disease of the ear. He was much regretted, as he had been highly esteemed, both in public and private life. His character is represented in very favourable colours by those who knew him best. He is described as modest, candid, and ever open to conviction,—as affectionate in his family, steady in his friendships, and generous and kind in his wider personal relations. James Mill, who was intimately acquainted with him, says (in a letter to Napier of November 1818) that he knew not a better man, and on the occasion of his death published a highly eulogistic notice of him in the *Morning Chronicle*. A lectureship on political economy, to exist for ten years, was founded in commemoration of him, M'Culloch being chosen to fill it.

In forming a general judgment respecting Ricardo, we must have in view not so much the minor writings, to which this article has been in great part devoted, as the *Principles*, in which his economic system is expounded as a whole. By a study of this work we are led to the conclusion that he was an economist only, not at all a social philosopher in the wider sense, like Adam Smith or John Mill. He had great acuteness, but little breadth. For any large treatment of moral and political questions he seems to have been alike by nature and preparation unfitted; and there is no evidence of his having had any but the most ordinary and narrow views of the great social problems. His whole conception of human society is material and mechanical, the selfish principle being regarded, after the manner of the Benthamites, as omnipotent, not merely in practical economy, but, as appears from his speech on the ballot and his tract on reform, in the whole extent of the social field. Roscher calls him "ein tiefer Menschenkenner"; it would be difficult to characterize him more inaptly. The same writer remarks on his "capitalistic" tone, which, he says, becomes "mammonistic" in some of his followers; but the latter spirit is already felt as the pervading atmosphere of Ricardo's works. He shows no trace of that hearty sympathy with the working classes which breaks out in several passages of the *Wealth of Nations*; we ought, perhaps, with Held, to regard it as a merit in Ricardo that he does not cover with fine phrases his deficiency in warmth of social sentiment. The idea of the active capitalist having any duties towards his employés never seems to occur to him; the labourer is, in fact, merely an instrument in the hands of the capitalist, a pawn in the game he plays. His principal work is the ultimate expression of what Comte calls "l'ignoble métaphysique qui prétend étudier les lois générales de l'ordre matériel en l'isolant de tout autre." Against such a picture of industrial life as a mere sordid struggle of conflicting interests contemporary socialism is the necessary, though formidable, protest; and the leaders of that movement have eagerly seized his one-sided doctrines and used them for their own ends.

He first introduced into economics on a great scale the method of deduction from *a priori* assumptions. The conclusions so arrived at have often been treated as if they were directly applicable to real life, and indeed to the economic phenomena of all times and places. But the truth of Ricardo's theorems is now by his warmest admirers admitted to be hypothetical only, and they are stated as applying, at most, to the existing highly-developed condition of European, and especially of English, commerce. Bagehot, however, seems right in believing that Ricardo himself had no consciousness of the limitations to which his doctrines are subject. Be this as it may, we now see that the only basis on which these doctrines could be allowed to stand as a permanent part of economic science is that on which they are placed by Roscher, namely, as a stage in the preparatory work of the economist, who, beginning with such abstractions, afterwards turns from them, not in practice merely, but in the completed theory, to real life and men as they actually are or have been. But it may well be doubted whether it is not better to discard them altogether, and begin, as we end, with an historical method, which, it may be added, will of necessity lead to the introduction of those moral and social considerations which would otherwise be almost certainly overlooked.

The criticisms to which Ricardo's general economic scheme is open do not hold with respect to his treatment of the subjects of currency and banking. These form precisely that branch of economics into which moral ideas (beyond the plain prescriptions of honesty) can scarcely be said to enter, and where the operation of purely mercantile principles is most immediate and invariable. They were, besides, the departments of the study to which Ricardo's early training and practical habits led him to give special attention; and they have a lasting value independent of his systematic construction.

Ricardo's collected works were published, with a notice of his life and writings, by J. R. M'Culloch in 1846. A French translation of the *Principles* by Constancio, with notes by Say, appeared in 1818; the whole works, translated by Constancio and Fonteyraud, form vol. xiii. (1847) of the *Collection des Principaux Économistes*, where they are accompanied by the notes of Say, Malthus, Sismondi, Rossi, &c. The *Principles* was first "naturalized" in Germany, says Roscher (though another version by Von Schmid had previously appeared), by Edward Baumstark in his *David Ricardo's Grundgesetze der Volkswirthschaft und der Besteuerung übersetzt und erläutert* (1837), which Roscher highly commends, not only for the excellence of the rendering, but for the value of the explanations and criticisms which are added. (J. K. I.)

RICCATI, JAMES, COUNT (1676–1754), a celebrated Italian mathematician, was born at Venice, May 8, 1676, and died at Treviso, April 15, 1754. He studied at the university of Padua, where he graduated in 1696. Riccati was deeply read in history, belles lettres, architecture, and poetry—in fact, was a highly cultivated man; his favourite pursuits, however, were scientific, and his authority on all questions of practical science was referred to by the senate of Venice. He corresponded with many of the European savants of his day, and contributed largely to the *Acta Eruditorum* of Leipsic. He was offered the presidency of the academy of science of St Petersburg; but this high distinction he declined, preferring the leisure and independence of life in Italy. Riccati's name is best known and will be preserved by mathematicians in connexion with his celebrated problem called Riccati's equation, published in the *Acta Eruditorum*, September 1724. A very valuable and complete account of this equation and its various transformations has been recently given by Mr J. W. L. Glaisher, F.R.S., in the *Transactions* of the Royal Society (1881, pp. 759–829).

After Riccati's death his works were collected by his sons and published in four volumes. His sons, Vincenzo (1707–1775) and Giordano (1709–1790), inherited his talents. The former was professor of mathematics at Bologna, and published, among other works, a large treatise on the calculus. Giordano was distinguished both as a mathematician and an architect.

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[1] The same assumption had been previously made by the Physiocrats. Turgot says, "En tout genre de travail, il doit arriver et il arrive que le salaire de l'ouvrier se borne à ce qui est nécessaire pour se procurer sa subsistance."

RICCI, MATTEO (1552–1610), is eminent as practically the founder of Christian missions in modern China.

He was born of a noble family at Macerata in the March of Ancona on 7th October 1552, two months before Francis Xavier, burning with the desire to carry his message into China, died at its gates. After some education at a Jesuit college in his native town, Ricci, at the age of sixteen, was sent by his father to study law at Rome. But the youth had already contemplated entering the Jesuit Company, and this purpose he accomplished about 1571, without informing his father, of whose opposition he was aware, until the step had been taken. The father instantly started for Rome, but was stopped by illness, and abandoned opposition.

In 1577 Ricci and several other Italian students of noble birth offered themselves for the East Indian missions; and Ricci, without visiting his family to take leave, proceeded to Portugal. His comrades were Rudolfo Acquaviva, Nicolas Spinola, Francesco Pasio, and Michele Ruggieri, all afterwards, like Ricci himself, famous in the Jesuit annals. They arrived at Goa in September 1578. After four years spent in India, Ricci was summoned to the task of opening China to evangelization.

Several attempts had been made by Xavier, and since his death, to introduce the church into China,—as by Melchior Nunes of the Jesuit society operating from Sanchian[1] in 1555; by Gaspar da Cruz, a Dominican, in that or the following year; by the Augustinians under Martin Herrada, 1575; and in 1579 by the Franciscans led by Pedro d'Alfaro; but all these attempts proved abortive. In 1571 a house of the Jesuits had been set up at Macao (where the Portuguese were established in 1557), but their attention was then occupied with Japan, and it was not till the arrival at Macao of Alessandro Valignani on a visitation in 1582 that work in China was really taken up. For this object he had obtained the services first of M. Ruggieri and then of Ricci. After various disappointments they found access to Chau-king-fu on the Si-Kiang or West River of Canton, where the viceroy of the two provinces of Kwang-tung and Kwang-si then had his residence, and by favour of this personage they were enabled to establish themselves, and there spent several years. Their proceedings were very cautious and tentative; they excited the curiosity and interest of even the more intelligent Chinese by their clocks, their globes and maps, their books of European engravings, and by Ricci's knowledge of mathematics, including dialling and the like, and the projection of maps. They conciliated some influential friends, and their reputation spread pretty widely in China. This was facilitated by the Chinese system of transfer of public officers from one province of the empire to another, and in the later movements of the missionaries they frequently met with one and another of their old acquaintances in office, who were more or less well disposed. Eventually troubles arose at Chau-king which compelled them to seek a new locality; and in 1589, with the viceroy's sanction, they migrated to Chang-chau in the northern part of Kwang-tung not far from the well known Meiling Pass.

During his stay here Ricci was convinced that a mistake had been made in adopting a dress resembling that of the bonzes, thus identifying the missionaries with a class who were the objects either of superstition or of contempt. With the sanction of the visitor it was ordered that in future the missionaries should adopt the costumes of Chinese literates. And, in fact, they before long adopted Chinese manners altogether.

Chang-chau, as a station, did not prove a happy selection, but it was not till 1595 that an opportunity occurred of travelling northward. We cannot follow Ricci's movements in detail, or the vicissitudes of favour and trouble which attended his plans. The latter were, on the whole, never very grave. For some time his residence was at Nan-chang-fu, the capital of Kiang-si; but in 1598 he was enabled to proceed under favourable conditions to Nanking, and thence, for the first time, to Peking, which had all along been the goal of his missionary ambition. But circumstances were not then propitious, and the party had to return to Nanking. The fame of the presents which they carried had, however, reached the court, and the Jesuits were summoned north again, and on the 24th January 1601 they entered the capital. Wan-lieh, the emperor of the Ming dynasty, in those days lived in seclusion, and saw no one but his women and the eunuchs. But the missionaries were summoned to the palace; their presents were immensely admired; and the emperor had the curiosity to send for portraits of the fathers themselves.

They obtained a settlement, with an allowance for subsistence, in Peking, and from this time to the end of his life Ricci's estimation among the Chinese was constantly increasing, as was at the same time the amount of his labours. Visitors, who were never turned away, thronged the mission residence incessantly; inquiries coming to him from all parts of the empire, from strangers as well as acquaintances, respecting the doctrines which he taught, or the numerous Chinese publications which he issued, had to be answered. This in itself was a great burden, as Chinese composition, if wrong impressions are to be avoided, demands extreme care and accuracy. As head of the mission, which now had four stations in China, he also devoted much time to answering the letters of the priests under him, a matter on which he spared no pains or detail. The new converts had to be attended to—always welcomed, and never hustled away. Besides these came the composition of his Chinese books, the teaching of his people, and the maintenance of the record of the mission history which had been enjoined upon him by the general of the order, and which he kept up to the most recent dates. Thus his labours were wearing and incessant. In May 1610 he broke down, and after an illness of eight days died on the 11th of that month, aged fifty-eight. His coadjutor Pantoja applied to the emperor for a burying-place outside the city. This, after due consideration by the boards concerned, was granted, with the most honourable official testimonies to the reputation and character of Ricci; and a large building in the vicinity of the city was at the same time bestowed upon the mission for their residence.

Ricci's character, his acquirements, and the use he made of them were certainly worthy of all honour. We do not know what amount of success in conversion had rewarded his labours during his life, but some eminent and creditable converts there were, and his work was the foundation of the considerable spread which the Roman Catholic Church has since attained in China. When the missionaries of other Roman Catholic orders made their way into China, some twenty years after the death of Ricci, they found great fault with the manner in which certain Chinese practices had been dealt with by the Jesuits, a matter in which Ricci's action and policy had given the tone to the mission in China,—though in fact that tone was rather inherent in the Jesuit system than the outcome of individual character, for controversies of an exactly parallel nature arose two generations later in southern India, between the Jesuits and Capuchins, regarding what were called "Malabar rites." The controversy thus kindled in China burned for considerably more than a century with great fierceness,[2] and we can here, in connexion with the career of Ricci, but indicate its existence. The chief points of controversy were (1) the lawfulness and expediency of certain terms employed by the

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[1] The island (properly Shang-chuan) on which the Portuguese had a temporary settlement before they got Macao, and on which F. Xavier died.

[2] The list of the literature of this controversy occupies forty-one columns in M. Cordier's excellent *Bibliographie de la Chine.*

Jesuits in naming God Almighty, such as *Tien*, "Heaven," and *Shang-ti*, "Supreme Ruler" or "Emperor," instead of *Tien-Chu*, "Lord of Heaven," and in particular the erection of inscribed tablets in the churches, on which these terms were made use of ;[1] (2) in respect to the ceremonial offerings made in honour of Confucius, and of personal ancestors, which Ricci had recognized as merely "civil" observances ; (3) the erection of tablets in honour of ancestors in private houses ; and (4), more generally, sanction and favour accorded to ancient Chinese sacred books and philosophical doctrine, as not really trespassing on Christian faith.

Probably no European name of past centuries is so well known in China as that of *Li-ma-teu*, the form in which the name of our missionary (*Ri-cci Mat-teo*) was adapted to Chinese usage, and by which he appears in Chinese records.[2] The works which he composed in Chinese are numerous ; a list of them (apparently by no means complete, however) will be found in Kircher's *China Illustrata*, and also in Abel Rémusat's *Nouveaux Mélanges Asiatiques* (ii. pp. 213–215). They are said to display an aptitude for clothing ideas in a Chinese dress very rare and remarkable in a foreigner. One of the first which attracted attention and reputation among Chinese readers was a Treatise upon Friendship, in the form of a dialogue containing short and pithy paragraphs ; this is stated in the *De Expeditione* to have been suggested during Ricci's stay at Nan-chang by a conversation with the prince of Kien-ngan, who asked questions regarding the laws of friendship in the West.

In the early part of his residence at Peking, when enjoying constant intercourse with scholars of high position, Ricci brought out the *T'ien-chu shih-i*, or "Veritable doctrine of the Lord of Heaven," which deals with the divine character and attributes under eight heads. "This work," says Mr A. Wylie, "contains some acute reasoning in support of the propositions laid down, but the doctrine of faith in Christ is very slightly touched upon. The teachings of Buddhism are vigorously attacked, whilst the author tries to draw a parallel between Christianity and the teachings of the Chinese literati."

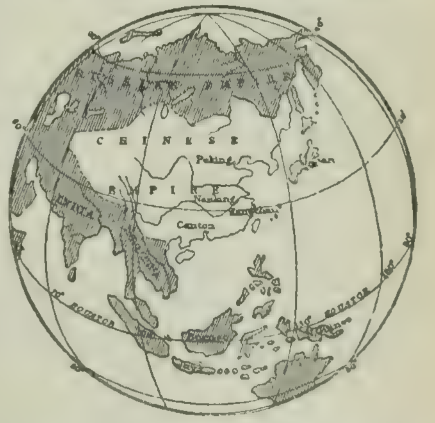
In 1604 Ricci completed the *Erh-shih-wu yen*, a series of short articles of moral bearing, but exhibiting little of the essential doctrines of Christianity. *Chi-jên shih pien* is another of his productions, completed in 1608, and consisting of a record of ten conversations held with Chinese of high position. The subjects are :—(1) Years past no longer ours ; (2) Man a sojourner on earth ; (3) Advantage of frequent contemplation of eternity ; (4) Preparation for judgment by such contemplation ; (5) The good man not desirous of talking ; (6) Abstinence, and its distinction from the prohibition to take life ; (7) Self-examination and self-reproof inconsistent with inaction ; (8) Future reward and punishment ; (9) Prying into futurity hastens calamity ; (10) Wealth with covetousness more wretched than poverty with contentment. To this work is appended a translation of eight European hymns, with elucidations, written in 1609.

Some of the characteristics briefly indicated here may have suggested, though probably they are far from justifying, the bitterness of attacks made upon Ricci's theology, long after he had been in his grave, by some of the opponents of the Jesuits in the controversies to which we have referred. An example of these is found in the work called *Anecdotes sur l'État de Religion dans la Chine*, Paris, 1733–35, the author of which (Abbé Villers) speaks of the *T'ien-chu shih-i* in this fashion—"The Jesuit was also so ill versed in the particulars of the faith that, as the holy bishop of Conon, Monsgr. Maigrot, says of him, one need merely read his book on the true religion to convince oneself that he had never imbibed the first elements of theology". . . . The writer goes on to say other things even much more bitter.

Ricci's pointed attacks on Buddhism, and the wide circulation of his books, called forth the opposition of the Buddhist clergy. One of the ablest who took their part was Chu-hang, a priest of Hang-chau, who had abandoned the literary status for the Buddhist cloister. He wrote three articles against the doctrine of the missionaries. These were brought to Ricci's notice in an ostensible tone of candour by Yu-chun-he, a high mandarin at the capital. This letter, with Ricci's reply, the three Buddhist declamations, and Ricci's confutation, were published in a collected form by the Christian Sen-Kwang-K'e.

Another work of Ricci's which attracted attention was the *Hsi-kuo fa*, or "Art of Memory as practised in the West." Ricci was himself a great expert in *memoria technica*, and astonished the Chinese by his performances in this line. He also wrote or edited various Chinese works on geography, the celestial and terrestrial spheres, geometry, and arithmetic.[3] And the detailed history of the mission was drawn out by him, which after his death was brought home by P. Nicolas Trigault, and published at Augsburg, and in a complete form at Lyons a year later under the name *De Expeditione Christiana apud Sinas Suscepta, ab Soc. Jesu*, Ex P. Mat. Ricci ejusdem Societatis *Commentariis*, in which Trigault himself added a large amount of interesting matter respecting China and the Chinese.

Among the scientific works of his time which Ricci took with him into China, there was a fine set of maps, which at first created great interest, but disgust afterwards when the Chinese came to perceive the insignificant place assigned therein to the "Middle Kingdom," thrust, as it seemed, into a corner, instead of being set in the centre of the world like the gem in a ring. Ricci, seeing their dissatisfaction, set about constructing a map of the hemisphere on a great scale, so adjusted that China, with its subject states, filled the central area, and, without deviating from truth of projection, occupied a large space in proportion to the other kingdoms gathered round it. All the names were then entered in Chinese calligraphy. This map obtained immense favour, and was immediately engraved at the expense of the viceroy, and widely circulated.



In the accompanying cut we have endeavoured to realize this *Jesuitical* map, as we fear it must be called. The projection we have adopted is a perspective of the hemisphere, as viewed from a point at the distance of one diameter from the surface, and situated on the production of the radius which passes through the intersection of 115° E. long. (Greenwich) with 30° N. lat. Something pretty near this must have been Li-ma-teu's projection. With a vertex much more distant the desired effect would be impaired, and with one nearer neither of the poles would be seen, whilst the exaggeration of China would have been too gross for a professed representation of the hemisphere.

The chief facts of Ricci's career are derived from Trigault ; some contemporary works on the rites controversy have also been consulted ; in the notice of Ricci's Chinese writings valuable matter has been derived from *Notes on Chinese Literature* by Mr A. Wylie,[4] an indefatigable scholar, and perhaps our only contemporary who can speak of these from actual examination. The projection of the sphere by the present writer appeared in the (now defunct) *Geographical Magazine* for July 1874. A number of Ricci's letters are extant in the possession of the family, and access to them was afforded to Giuseppe La Farina, author of the work called *La China, considerata nella sua Storia*, &c., Florence, 1843, by the Marchese Amico Ricci of Macerata, living at Bologna (see vol. i. p. 112 *sq.*). La Farina's quotations contain nothing of interest. There is a curious Chinese account of Ricci published by Dr Breitschneider in the *China Review*, iv. 391 *sq.* (H. Y.)

RICCIARELLI, Daniele (1509–1566), Italian artist, generally called, from the place of his birth, Daniele da

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[1] Compare Browning, *The Ring and the Book*, x., The Pope, 1589–1603.

[2] The name comes forward prominently in the mouth of the emperor Kang-hi, in a dialogue which took place between him and Monsgr. Maigrot, the leader of the anti-Jesuit movement (mentioned in Browning's lines referred to above), at the summer residence in Tartary, August 1706,—a dialogue which the Jesuits have reported with not a little malice :—

"*Emperor*. 'Tell me why do the people call me *Van-sui* (10,000 years).' *The Most Reverend* (*i.e.*, Maigrot), 'To express their desire for your Majesty's long life.' *Emp.* 'Good. You see, then, Chinese words are not always to be taken literally. We pay cult to Confucius and to the dead to express our respect for them. How is that inconsistent with your religion? When did it begin to be so? Is it since Ly-Mattheu's time? Hast thou ever read Ly-Mattheu?' *The Most Reverend*, turning to P. Parenin, whispers, "Who's he?" and learning that it was P. Matteo Ricci, . . . answered the emperor : 'I have not read that book.' *Emp.* 'Ly-Mattheu and his fellows came hither some two centuries ago ; and before their time China never heard anything of the Incarnation, anything of *Tien-chu*, who had not become incarnate in this part of the world. Why then, if it was lawful to call God *Tien* before Ly-Mattheu's time, should it be improper now?"—*Epistola de Eventu Apostolicæ Legationis, scripta a PP. Missionariis . . . ad Præpositum Generalem S. J.*, An. 1706, 1 Novembris.

[3] In the catalogue of the London Mission Library, Shanghai, 1857, we find the following entries :—"197. *Chi'ho yüan pên*, Elements of Geometry (MS.). This is the first six books of Euclid, translated by Matthew Ricci and his disciple Sen-Kwang-K'e, 1607." "198. *T'ung-wen suan-chih*. Guide to Arithmetic, 9 vols. incomplete ; this treatise was drawn up by Ricci, with the aid of his disciple Le-Che-tsaou, and published in 1613." "199. *Chi-jên shih pien*" (see above).

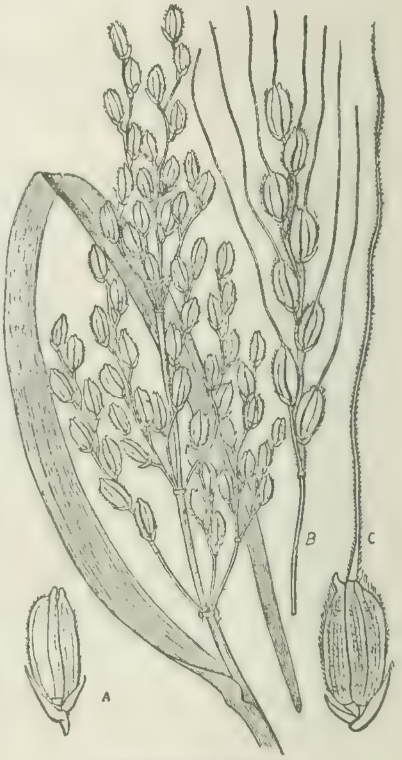
[4] Shanghai and London, 1867.

Volterra, was born in 1509, and studied painting under Razzi and Peruzzi. The young artist, settling in Rome, strove most unweariedly to attain eminence in his profession. No efforts were spared on his pictures. He proceeded with a careful slowness, attempting to reach his ideal by a close imitation of Michelangelo. It is even said that he sometimes in a difficulty had recourse to the more direct aid of that great master's own hand. The result of this earnest labour was that Ricciarelli obtained abundant encouragement. His constant friend, Michelangelo, recommended him on all possible occasions. He had the honour to beautify with works of art a chapel in the church of the Trinità, to paint in the Farnese Palace, to execute certain decorations in the Palazzo de' Medici at Navona, and to begin the stucco work and the pictures in the Hall of the Kings. Nor was he less highly patronized when, towards the close of his life, he turned his attention to statuary. His last work was a bronze horse intended for an equestrian statue of Henry II. of France. He died in 1566. The principal extant works of Ricciarelli are at Rome. These are a St John the Baptist in the picture gallery of the Capitol, a Saviour bearing the Cross in the Palazzo Rospigliosi, and a Descent from the Cross, his masterpiece, in the church of Trinità de Monti. There is also an Elijah at Volterra.

RICCOBONI, Madame (1714–1792), whose maiden name was Marie Jeanne Laboras de Mézières, and who married and was deserted by an actor and author of little merit, was born at Paris in 1714. She herself was an actress, but did not succeed on the stage. She then took to novel writing and deserves a considerable place in the history of the sentimental novel. Her first work was the remarkable *Histoire du Marquis de Cressy* (1758). This was followed by *Milady Catesby*, *Fanny Butler* (both of them, as indeed are almost all her books, in letter form), *Ernestine* (sometimes thought her masterpiece), three series of *Lettres* in the names of *Adelaide de Dammartin* (often quoted as *Madame de Sancerre*), *Elizabeth Sophie de Vallière*, *Milord Rivers*, and others. These books were much admired, but brought their author little money. She obtained, however, a small pension from the crown, but the Revolution deprived her of it, and she died in 1792 in great indigence. Besides the works named she translated Fielding's *Amelia*, and tried a continuation (but not the conclusion sometimes erroneously ascribed to her) of Marivaux's unfinished *Marianne*.

All Madame Riccoboni's work is very clever, and there is real pathos in it. But it is among the most eminent examples of the "sensibility" novel, of which no examples but Sterne's have kept their place in England, and that not in virtue of their sensibility. A still nearer parallel may be found in the work of Mackenzie. Madame Riccoboni is an especial offender in the use of mechanical aids to impressiveness—italics, dashes, rows of points, and the like. The principal edition of her complete works is that of Paris, 1818. The chief novels appear in a volume of Garnier's *Bibliothèque Amusante*, Paris, 1865.

RICE. According to Roxburgh the cultivated rice with all its numerous varieties has originated from a wild plant called in India Newaree or Nivara (*Oryza sativa*). It is said to grow on the borders of lakes in the Circars and elsewhere in India, and is also native in tropical Australia. The rice plant is an annual grass with long linear glabrous leaves, each provided with a long sharply-pointed ligule. The spikelets are borne on a compound or branched spike, erect at first but afterwards bent downwards. Each spikelet contains a solitary flower with two outer small glumes and two inner, larger and folded lengthwise, the outer one of the two rather larger and sometimes provided with an awn. Within these are six stamens, a hairy ovary surmounted by two feathery styles which ripens into the fruit (grain), and which is invested by the husk formed by the persistent glumes. The cultivated varieties are extremely numerous, some kinds being adapted for marshy land, others for growth on the hill-sides. The cultivators make two principal divisions according as the sorts are early or late. Other subdivisions depend upon the habit of the plant, the presence or absence of an awn, the colour of the grain, and other particulars. Rice has been cultivated from time immemorial in tropical countries. According to Stanislas Julien a ceremonial ordinance was established in China by the emperor Chinnung 2800 years B.C., in accordance with which the emperor sows the rice himself while the seeds of four other kinds may be sown by the princes of his family. This fact, joined to other considerations, induced Alphonse de Candolle to consider rice as a native of China. It was very early cultivated in India, in some parts of which country, as in tropical Australia, it is, as we have seen, indigenous. It is not mentioned in the Bible, but its culture is alluded to in the Talmud. There is no evidence of the existence of rice in Egyptian remains, nor is there any trace of it as a native plant among the Greeks, Romans, or ancient Persians. There is proof of its culture in the Euphrates valley and in Syria four hundred years before Christ. Crawfurd on philological grounds considers that rice was introduced into Persia from southern India. The Arabs carried the plant into Spain under the name "aruz," the *arros* of the Spanish, the *rizo* of the Italian, whence our word rice. Rice was first cultivated in Italy near Pisa in 1468. It was not introduced into Carolina until 1700, and then, as it is said, by accident, although at one time the southern United States furnished a large proportion of the rice introduced into commerce. Rice, says Crawfurd, sports into far more varieties than any of the corns familiar to Europeans, for some varieties grow in the water and some on dry land; some come to maturity in three months, while others take four and six months to do so. The Hindus, however, are not content with such broad distinctions as might be derived from these obvious sources, but have names for varieties the distinctions between which are unappreciable by Europeans; besides terms for this corn founded on variety, on season, and on mode of culture, the grain itself bears one name in the straw, another when threshed, one name in the husk and another when freed from it, and a fifth when cooked. A similar abundance of terms is found in the languages of the Malay and Philippine Islands. Such minute nomen-



Rice (*Oryza sativa*).
A, spikelet (enlarged); B, bearded variety, C, spikelet of B (enlarged).

clatures seem to point to a great antiquity in the culture of this cereal.

Rice constitutes one of the most important articles of food in all tropical and subtropical countries, and is one of the most prolific of all crops. The rice yields best on low lands subject to occasional inundations, and thus enriched by alluvial deposits. An abundant rainfall during the growing season is also a desideratum. Rice is sown broadcast, and in some districts is transplanted after a fortnight or three weeks. No special rotation is followed; indeed the soil best suited for rice is ill adapted for any other crop. In some cases little manure is employed, but in others abundance of manure is used. No special tillage is required, but weeding and irrigation are requisite. Rice in the husk is known as "paddy." On cutting across a grain of rice and examining it under the microscope, first the flattened and dried cells of the husk are seen, and then one or two layers of cells elongated in a direction parallel to the length of the seed, which contain the gluten or nitrogenous matter. Within these, and forming by far the largest part of the seed, are large polygonal cells filled with very numerous and very minute angular starch grains. Rice is not so valuable as a food as some other cereals, inasmuch as the proportion of nitrogenous matter (gluten) is less. Payen gives only 7 per cent. of gluten in rice as compared with 22 per cent. in the finest wheat, 14 in oats, and 12 in maize. The percentage of potash in the ash is as 18 to 23 in wheat. The fatty matter is also less in proportion than in other cereals. Rice, therefore, is chiefly a farinaceous food, and requires to be combined with fatty and nitrogenous substances, such as milk or meat gravy, to satisfy the requirements of the system.

The imports of rice into the United Kingdom range from 7,000,000 cwt. to 8,000,000 cwt. annually, having an estimated value of from £3,000,000 to £3,500,000. Nearly the whole of this comes from British Burmah and Bengal. A large proportion of the rice brought to Europe is used for starch-making, and some is taken by distillers of alcohol. Rice is also the source of a drinking spirit in India, and the national beverage of Japan—saké—is prepared entirely from the fermented grain.

RICE PAPER. The substance which has received this name in Europe, through the mistaken notion that it is made from rice, consists of the pith of a small tree *Aralia papyrifera* cut into thin slices. The tree grows in the swampy forests of Formosa and apparently nowhere else, and large quantities of the stems are conveyed to Chinchew, where the snow-white delicate pith is carefully sliced by spiral cuts into uniform sheets of a fine ivory-like texture. It is dyed various colours, and extensively used for the preparation of artificial flowers, while the white sheets are employed by native artists for water-colour drawings.

RICH, CLAUDIUS JAMES (1787–1821), Eastern traveller and scholar, was born near Dijon, March 28, 1787. While still an infant he was taken to Bristol, where he spent his youth. At a very early age he developed a wonderful capacity for the acquisition of languages, soon becoming familiar not only with Latin and Greek but also with Hebrew, Syriac, Persian, Turkish, and other Eastern tongues. His unusual intelligence and extraordinary acquirements in Oriental languages procured for him in 1803 a nomination to a writership in the Bombay establishment of the East India Company. In 1804 Rich proceeded to Constantinople, where, and at Smyrna, he stayed a considerable time, perfecting himself in the Turkish language. Proceeding to Alexandria as assistant to the British consul-general there, he devoted himself to Arabic and its various dialects, and made himself master of Eastern manners and usages. On leaving Egypt he proceeded by land to the Persian Gulf, disguised as a Mameluke, visiting Damascus, and entering the great mosque undetected. At Bombay, which he reached in September 1807, he was the guest of Sir James Mackintosh, whose eldest daughter he married in January 1808, proceeding soon after to Baghdad as resident. While gaining the respect of Turks of all classes, as well as of Europeans, he now began his investigations into the geography, history, and antiquities of the vastly interesting region in the midst of which he was placed, the results of which give him a high place among Eastern students. He made collections of all kinds, visited and examined the remains of Babylon, and projected a geographical and statistical account of the pashalic of Baghdad. The results of his investigations at Babylon appeared first in the Vienna serial the *Mines de l'Orient*, and in 1811 in England, under the title *Narrative of a Journey to the Site of Babylon in 1811*. In 1839 this was republished by his widow, with Major Rennell's remarks upon it, and a second memoir by Rich in reference to these remarks, together with the narrative of a journey to Persepolis. In 1813–14 Rich spent some time in Europe, and on his return to Baghdad paid special attention to the geography of Asia Minor, and collected much information in Syrian and Chaldæan convents concerning the Yezzidis. He continued, too, to collect manuscripts of all kinds, his collections being probably the most extensive and valuable brought together by any private person up to that time. His collection of coins—Greek, Parthian, Sasanian, and Moslem—as well as of gems and engraved stones, was much enlarged. During this period he made a second excursion to Babylon, and in 1820 he undertook an extensive tour to Kurdistan—from Baghdad north to Sulimania, eastward to Sinna, then west to Nineveh, and thence down the Tigris to Baghdad. The narrative of this journey, which for the first time furnished accurate knowledge (from scientific observation) regarding the topography and geography of the region traversed, was published by his widow in 1836. It abounds with information on the country and the people, their history and traditions, the ruins and inscriptions met with, characterized by the profundity and thoroughness of the real scholar and trained observer. He visited many of the ancient Christian churches in Chaldæa, adding largely to his stock of manuscripts, including ancient Syrian and Chaldæan versions of the Scriptures. In 1821 Rich went to Basora, whence he made an excursion to Shiraz, visiting the ruins of Persepolis and the other remains of antiquity in the neighbourhood. An account of these excursions is given in the posthumous publication referred to, which also contains many notes on Rich's collections and minor excursions as well as a brief memoir. At Shiraz he was struck down by cholera on October 5, 1821. His early death was a vast loss to Oriental investigation. The work he did accomplish was of great value for Eastern archæology and history.

RICHARD I. (1157–1199), king of England, called even before his death "the Lion" or "Cœur de Lion," was the third son of Henry II. and Eleanor of Aquitaine. He was born, probably at Oxford, on September 8, 1157. When little more than eleven years old he was invested with the duchy of Aquitaine, and imbibed in southern France the spirit of the adventurer and the troubadour which characterized him through life. In 1173 he joined the league against Henry II., but when the rebellion was suppressed in 1174 he was pardoned by his father. Shortly afterwards he was affianced to Alice, the daughter of Louis VII. The death of his brother Henry in 1184 made Richard heir to the throne. From this time he was the centre of the disturbances which troubled the last five years of Henry II.'s reign. The pretext for his quarrel with his father was the refusal of the latter to allow the barons to do fealty to Richard as heir, and Henry's wish to transfer Aquitaine to his younger son John. War was for some time averted by the preparations for the third crusade, and Richard himself took the cross (1187). Next year, however, a quarrel between Richard and his neighbour the count of Toulouse led to the final breach. Philip, king of France, took advantage of this quarrel to invade Berri, whence he was driven out again by Richard, who so far was acting in concert with his father. A truce was made between the two kings, and Philip used the opportunity to separate Henry from his son. In November 1188 Richard did homage to Philip for his French provinces, and the latter demanded that Henry should acknowledge him as heir. Henry hesitated, and Richard openly joined Philip. In the spring of 1189 the allies overran Maine and Touraine, and forced Henry, in a meeting at Colombières, to submit to their demands. Two days later Henry died at Chinon (July 6, 1189), and Richard became king of England.

Richard's reign falls into two equal divisions—the one comprising his crusade and captivity, the other his wars against Philip in France. On his father's death he was at once acknowledged as duke of Normandy and count of Anjou. On September 3, 1189, he was crowned with great pomp at Westminster. This is the first English coronation of which we have a full account, and the formalities then adopted have been followed with little alteration ever since. Richard at once set to work to collect funds for the crusade. He sold ecclesiastical and temporal offices, released the king of Scotland from the vassalage to which Henry II. had subjected him; and, having by these means and by taxation collected a large sum of money, he crossed to Calais on December 12. Soon afterwards he met Philip at St Remy and made a treaty with him for a joint crusade. On June 27, 1190, the two armies assembled at Vezelai, whence they marched together as far as Lyons. There Philip took the route to Genoa, while Richard went by Marseilles. Visiting Naples on the way, he landed at Messina on September 23, where he found the French army and his own fleet awaiting him. The two kings remained in Sicily during the winter. William II., king of Sicily, husband of Richard's sister Joanna, had died shortly before, and Tancred, nephew of William, had seized the throne. During the negotiations for the recovery of Joanna and her dowry, disturbances broke out which ended in Richard's forcing his way into Messina at the head of his army. His real enemy was, however, not Tancred, but Philip. The natural jealousy of the two kings grew into mutual hatred during their stay in Sicily, and Tancred informed Richard of French intrigues. In March 1191 Richard made a treaty with Tancred, and recognized him as king of Sicily. At the same time he repudiated Alice, Philip's sister, and betrothed himself to Berengaria of Navarre. Philip was the first to leave Sicily. He arrived at Acre early in April. On April 10 Richard set sail, and a month later reached Cyprus, where he married Berengaria (May 12). He then proceeded to conquer Cyprus, took Isaac Comnenus and his daughter prisoners, and set out again for the Holy Land, reaching Acre on June 8. Guy of Lusignan, who claimed the throne of Jerusalem, had besieged that fortress since 1189, but the Christian army was itself hemmed in by the forces of Saladin. Richard's arrival encouraged the besiegers, and on July 11 Acre surrendered. The two kings now settled the dispute between Guy of Lusignan and Conrad of Montferrat about the throne of Jerusalem and on August 3 Philip left the Holy Land. Saladin having failed to fulfil the terms on which Acre had surrendered, Richard ordered the massacre in cold blood of some three thousand Mohammedan prisoners. Soon afterwards he set out for Jaffa, and on the way thither won the battle of Arsuf. Having rebuilt Jaffa, he started for Jerusalem. About Christmas 1191 he arrived at Beit-nûba, within sight of the Holy City, but, owing to the reluctance or desertion of his French allies, he found it impossible to besiege it, and therefore withdrew to the coast. In April 1192, at the instance of his followers, he recognized Conrad as king of Jerusalem, indemnifying Guy with the crown of Cyprus. The murder of Conrad immediately afterwards was laid, probably without sufficient ground, to the charge of Richard, who conferred the vacant throne on Henry count of Champagne. Bad news from England now made him anxious to go home, but he resolved on one more attempt to save Jerusalem. He set out on June 4, arrived again within sight of the city, and again retired without venturing to attack. Jaffa, which had been taken by Saladin, was retaken on August 1. This was Richard's last exploit in the East. On September 1 he made a three years' truce with Saladin, on the basis of the *status quo*; and on October 9 he sailed for home, leaving behind him a name long remembered by the Saracens, but, beyond the capture of Acre, having accomplished none of the objects with which he set out.

Fearing to go through France, Richard sailed up the Adriatic, and made his way on foot, as a pilgrim and almost alone, to Erdburg near Vienna. Here he was discovered (December 21, 1192) by Leopold, duke of Austria, of whom, while at Ascalon, he had made a bitter enemy. After being confined for some time at Dürrenstein on the Danube, he was surrendered in March 1193 to the emperor Henry VI., who imprisoned him first at Trifels and afterwards at Worms. Legend was already rife about him, but the story of his discovery by Blondel only dates from the following century, and is of French origin. In order to liberate himself, Richard resigned his crown to Henry VI. as overlord of Christendom, promised to pay a yearly tribute, and received back the crown as a vassal of the emperor. At Easter a diet was held at Spires, at which Richard was charged with various misdoings,—the recognition of Tancred, the conquest of Cyprus, the murder of Conrad, even with the betrayal of the Holy Land to Saladin. He defended himself eloquently, and the charges were dropped. Shortly afterwards a treaty was made at Worms (July 29) for Richard's release on payment of a ransom of 150,000 marks, with other conditions. Great efforts were made in England to collect the money, two-thirds of which was paid over to Henry, hostages being given for the rest. Philip and John were able, however, by offers of money and other means, to induce the emperor to detain Richard till the following spring. At length he was liberated. On March 13, 1194, he set foot again in England. He found his dominions in great confusion owing to the intrigues of Philip and John. He rapidly made himself master of the castles which held out for John, and on April 17, 1194, he was crowned a second time. He then collected more money from the impoverished country for the rest of his ransom and for an expedition to France, and on May 12 left England again never to return. Philip retired before him; John submitted and was pardoned. For the remaining five years of his reign Richard kept up an intermittent struggle with Philip, a struggle marked by no great battles, and interrupted only by fruitless negotiations and truces which were never kept. Neither party was strong enough to inflict a severe blow upon the other. In the autumn of 1198 the war went decidedly against Philip, but in January 1199 a peace for five years was made, each side retaining what it held. Shortly afterwards Richard, while besieging the castle of Chaluz near Limoges, which was held against him by one of his vassals, was wounded by an arrow. He died on April 6, 1199, and was buried at Fontevraud. His brother John succeeded him.

In person Richard was tall, muscular, ruddy, with light brown hair. He was lavish, generous, and fearless; a skilful commander, but incapable of extensive combinations or far-reaching plans; more religious than his father or brothers, but equally vicious; a bad husband and a bad son, with much of the ferocity that characterized his race;

in fact, a typical representative of the faults as well as the virtues of the chivalry of his day. His reign was signalized by no great legal or administrative reform, and England owes him nothing but barren fame.

Chief Authorities.—Hoveden, *Chronica*; Ralph de Diceto, *Imagines Historiarum*; Gervase of Canterbury, *Chronica*, &c.; *Chronicles and Memorials of the Reign of Richard I.*; *Gesta Regis Henrici II.*, &c. (ascribed to Benedict of Peterborough); all the above have been edited, with most valuable prefaces, by Dr Stubbs for the Rolls Series; also William of Newburgh, *Historia Rerum Anglicarum*, edited for the Engl. Hist. Society by H. C. Hamilton, and for the Rolls Series by R. Howlett; Richard of Devizes, *Chronicon*, &c., edited for the Engl. Hist. Society by J. Stevenson; Pauli, *Geschichte von England*, vol. iii.; Stubbs, *Early Plantagenets*; Lingard, *History of England*, vol. ii. (G. W. P.)

RICHARD II. (1366–1400), king of England, the only son of Edward the Black Prince and Joan of Kent, was born at Bordeaux, April 13, 1366. He succeeded to the throne on the death of his grandfather Edward III., on June 21, 1377. He was crowned on July 16. During the first eleven years of his reign, Richard was in a position of tutelage. His uncles, John of Gaunt, duke of Lancaster, and Thomas, duke of Gloucester, were the most influential persons in the kingdom. The evils naturally inherent in a minority were intensified by war abroad, religious and social troubles at home, the existence of a turbulent nobility, and the intrigues and rivalries which broke up the royal house. Under the incapable rule of Lancaster, the southern coasts were ravaged by French fleets, the northern frontier was harried by the Scots, and the taxes collected for national purposes were wasted or embezzled. The weakness and unpopularity of the Government produced a ferment among the lower classes, which, aggravated by the heavy taxation of 1379 and 1380, culminated in the Peasants' Revolt of June 1381. This revolt gave Richard, then a lad of fifteen, his first opportunity of distinguishing himself. On June 14 he met the rebels at Mile End, and, by promising the abolition of villenage, induced the Essex contingent to return home. Next day he met the Kentish men at Smithfield. In the parley which followed, their leader, Wat Tyler, was killed. The mob were about to avenge his death when the young king, riding forward alone, calmed their irritation and induced them to follow him to Islington. Here a body of troops came to the king's aid, but Richard prevented a conflict, and persuaded the rioters to disperse. His presence of mind, extraordinary in one so young, not only saved his own life but averted a general disaster. In January 1382 he married Anne of Bohemia, daughter of the emperor Charles IV. Meanwhile the influence exerted by John of Gaunt was becoming more and more irksome to him. Charges of conspiracy brought against his uncle in 1384, though denied by Lancaster, so worked upon Richard that he attempted to seize him, but a reconciliation was soon afterwards effected. In 1385 the king led an expedition to Scotland. His refusal to allow the army to penetrate beyond Edinburgh is said to have caused another quarrel with the duke of Lancaster. The efforts made by Richard to form a party of personal adherents, in opposition to his uncles, are to be seen in the elevation of De Vere to the marquisate of Dublin and of De la Pole, the chancellor, to the earldom of Suffolk. After John of Gaunt's departure to Portugal (July 1386) the quarrel between the king's party and the opposition headed by Gloucester came to a head. Gloucester, supported by a strong majority in parliament, demanded the dismissal of the chancellor and the treasurer, to which Richard was obliged reluctantly to consent. The blow was followed up by the appointment of a committee of government which, like the baronial committee of 1258, practically superseded the monarchy. Richard submitted, but immediately set about making plans for the recovery of his authority. In November 1387 he came to London in order to overthrow the committee, but was anticipated by Gloucester, who, with Henry of Derby and three others, "appealed," or impeached the king's chief adherents of high treason. The party in power always found it easy to manipulate the elections, and the parliament which met in February 1388 was altogether on the side of the "appellants." The leaders of the king's party were executed, banished, or imprisoned, and Gloucester won a complete triumph. He failed, however, to establish his power on a firm basis, and in May 1389 Richard threw off the yoke. On the ground that he was now of full age, he suddenly informed his council that he intended to rule alone. Gloucester made no resistance; the nation acquiesced; and Richard was at last really king.

Richard did not for some time abuse his power. The "appellants" were not punished, and even remained members of the council. William of Wykeham, however, became chancellor, and it was apparently by his advice and that of John of Gaunt, who returned to England in 1389, that Richard regulated his conduct. For eight years he ruled constitutionally. The country was at peace at home and abroad. In June 1394 the queen died. In October of the same year Richard went to Ireland and received the submission of some of the chiefs. He remained in Ireland till May 1395. Next year he concluded a twenty-five years' truce with France, and engaged to marry Isabella, the French king's daughter. In September 1396 he went to Calais and returned with his bride, a child of eight years old. This alliance seems to have encouraged Richard to carry out a stroke of policy which he had probably long contemplated. In July 1397 he suddenly seized the "appellants," Warwick, Arundel, and Gloucester. The parliament, which met in September, repealed the acts of 1386, and declared the "appellants" guilty of high treason. Arundel was executed, Warwick imprisoned, Gloucester died, probably by violence, in prison. Next year the parliament conferred on Richard tonnage and poundage for life, and delegated their authority to a committee of eighteen, practically chosen by the king, thus making him an absolute monarch. A treasonable conversation between Hereford and Norfolk, reported by the former, gave a pretext for the banishment of both. In February 1399 John of Gaunt died, and Richard seized the Lancaster estates, thus reducing Hereford to desperation. The latter at once began to prepare to recover his inheritance, and Richard, apparently ignorant of the danger, went over to Ireland (May 29), thus leaving the kingdom open to his rival. Henry landed in Yorkshire early in July, and rapidly collected an overpowering force. Richard returned to find Henry in possession of power and himself deserted by the nation. He surrendered to Henry at Flint (August 19) and was conveyed to London. On September 29 he executed a deed by which he resigned the crown. Next day the deed was read in parliament. Formal sentence of deposition was pronounced, and Henry claimed and received the crown. A month afterwards the late king was sentenced to perpetual imprisonment, and was removed to Pontefract. The conspiracy against Henry IV., which was discovered in January 1400, sealed Richard's fate. The manner of his death is unknown, but there can be little doubt that he died by violence. He is said to have been buried at Langley, February 14, 1400.

In person Richard was slight, fair-haired, beardless, with rounded face and elegant but rather feminine features. His character, a strange mixture of strength and weakness, courage and irresolution, indolence and energy, remains an enigma to the historian. He protected Wickliffe, encouraged Chaucer, and made a serious attempt to establish an absolute monarchy. His reign, whether we regard it from the religious, the political, or the social point of view, is one of very great importance, and its history has as yet been by no means fully elucidated.

Chief Authorities.—Knighton, *De Eventibus Angliæ*, ed. Twysden in the Decem Scriptores, 1652; Walsingham, *Historia Anglicana*, ed. Riley (Rolls Series); Adam of Usk, *Chronicon*, ed. Thompson, 1876; *Chronicon Angliæ*, by a monk of St. Albans, ed. Thompson (Rolls Series); *Historia Vitæ et Regni Ricardi II.*, by a monk of Evesham, ed. Hearne, 1729; *Chronique de la Traïson et Mort de Richart Deux*, &c., ed. Williams (Engl. Hist. Society); *Histoire du Roi d'Angleterre Richard*, ed. Webb, in *Archæol. Brit.*, vol. xx.; Froissart, *Chronicles*; Stubbs, *Constitutional History*; vol. ii.; Pauli, *Geschichte von England*, vol. iv. (G. W. P.)

RICHARD III. (1452–1485), king of England, third son of Richard, duke of York, and Cicely Nevil, was born at Fotheringay on October 2, 1452. Having been sent out of England for safety on the death of his father in 1460, he was recalled next year by his brother Edward IV., who created him duke of Gloucester and appointed him lord high admiral. He remained faithful to his brother during the latter's reign, sharing in his flight in 1470, and aiding him on his return in the victories of Barnet and Tewkesbury. In 1474 he married Anne, daughter of the earl of Warwick and widow of Prince Edward. In 1482 he led an army into Scotland to aid the duke of Albany against James III., occupied Edinburgh and captured Berwick. On the death of Edward IV. (April 9, 1483) Richard at once made himself master of the situation by seizing Prince Edward, his nephew. Having assumed the title of Protector, he rapidly developed his plans for securing the crown. Under the pretext of a plot against his life, he seized and beheaded Hastings, Grey, and others (June 13), forced the queen mother to give up her younger son Richard, and, on June 26, 1483, assumed the crown. The children of Edward IV. were set aside on the plea that their father was illegitimate. On July 6 Richard was crowned king. Shortly afterwards it was publicly reported that the sons of Edward IV. were dead; their actual fate is to the present day unknown. In October 1483 the rebellion of the duke of Buckingham was put down; the duke himself was executed on November 2. A parliament which met in January 1484 acknowledged Richard as king, in return for which he assented to an Act abolishing benevolences. His only legitimate son, Edward, died on April 9, 1484, and in March 1485 the boy was followed by his mother. To strengthen his position Richard had made treaties with Scotland and Brittany (1484), and he now proposed to marry his niece Elizabeth. From this course, however, he was dissuaded. His short reign was mainly occupied in preparing to resist the invasion of Henry of Richmond. Unable to prevent Henry's landing (August 7, 1485), Richard met his rival in battle at Bosworth (August 22), and at the same moment lost his crown and his life.

Tradition is divided as to Richard's personal appearance, and the story of his deformity is possibly derived from Lancastrian malignity and from a misunderstanding of his nickname Crouchback. His courage, energy, and ability would have made a great and honoured name had not those qualities been matched by extreme ferocity and unscrupulousness, and perverted to an evil use by the turbulence of the time and his own nearness to the throne.

Chief Authorities.—Fabyan, *Concordance of Histories*, ed. Ellis, 1811; *Historia Croylandensis*, ed. Fell (Quinque Scriptores, 1687; Ross, *Historia Regum Angliæ*; *Paston Letters*, ed. Gairdner, 1875; *Letters and Papers illustrative of the reigns of Richard III. and Henry VII.*, ed. Gairdner (Rolls Series); Sir T. More, *Histories of Edward V. and Richard III.*, 1556; H. Walpole, *Historic Doubts on Richard III.*, 1768; Gairdner, *Life and Reign of Richard III.*, 1878. (G. W. P.)

RICHARD, earl of Cornwall and king of the Romans (1209–1272), second son of John, king of England, and Isabella, was born at Winchester, January 5, 1209. In 1225 he undertook the government of Gascony. In 1240 he went on a crusade, returning in 1241, after concluding a treaty with the sultan of Egypt. In 1242 he accompanied his brother on his unsuccessful expedition to Poitou. In 1244 and 1246 we find him heading the parliamentary opposition against Henry III., and a few years afterwards he befriended Simon de Montfort against his accusers. When Henry went to France in 1253, Richard, together with the queen, acted as regent. He had already (1252) declined the pope's offer of the kingdom of Sicily, but in January 1257 he was elected emperor by a majority of the electors, and soon afterwards was crowned at Aix-la-Chapelle. In 1259 he returned to England and swore to observe the Provisions of Oxford. Next year he acted as peacemaker between Henry and the barons and, after spending another year in Germany, he returned to England in 1263. It was largely owing to his mediation that the two parties submitted to the arbitration of Louis IX., but on the renewal of the civil war he took his brother's side. Taken prisoner at the battle of Lewes, he was kept in confinement by De Montfort for a year, but released after the battle of Evesham. One of his last known acts was his mediation between the earl of Gloucester and the king. In 1269 he went to Germany again for a short time, and returned to England to die at Kirkham in 1272. He was thrice married—(1) to Isabella, sister of the earl of Pembroke; (2) to Sancia, daughter of Raymond, count of Provence; (3) to Beatrice of Falkenstein.

For authorities, see under Henry III. (G. W. P.)

RICHARD, duke of Normandy. See NORMANDY, vol. xvii. p. 541 *sq.*

RICHARD OF BURY. See AUNGERVYLE, RICHARD.

RICHARD OF CIRENCESTER (1335–1401), historical writer, was a member of the Benedictine abbey at Westminster, and his name ("Circestre") first appears on the chamberlain's list of the monks of that foundation drawn up in the year 1355. In the year 1391 he obtained a licence from the abbot to go to Rome, his design being to visit *limina Apostolorum*, and in this licence the abbot gives his testimony to Richard's perfect and sincere observance of religion for upwards of thirty years. In 1400 Richard was in the infirmary of the abbey, where his death took place in the following year. His only known extant work is *Speculum Historiale de Gestis Regum Angliæ, 447–1066*. The manuscript of this is in the university library at Cambridge, and has been edited for the Master of the Rolls by Professor John E. B. Mayor (2 vols., 1863–1869). It is in four books, and at the conclusion of the fourth book Richard expresses his intention of continuing his narrative from the accession of William I., and incorporating a sketch of the Conqueror's career from his birth. This design he does not, however, appear to have carried into effect. The value of the *Speculum* as a contribution to our historical knowledge is but slight, for it is mainly a compilation from Rodger Wendover, Geoffrey of Monmouth, William of Malmesbury, Florence, Asser, Henry of Huntingdon, and other writers; while even in transcribing these the compiler is guilty of great carelessness. He gives, however, numerous charters relating to Westminster Abbey, and also a very complete account of the saints whose tombs were in the abbey church, and especially of Edward the Confessor, with whose reign the fourth book is entirely occupied. The work was, notwithstanding, largely used by historians and antiquaries, until, with the rise of a more critical spirit, its value became more accurately estimated. Besides the *Speculum* Richard also wrote, according to the statement of William Woodford in his *Answer* to Wickliffe (Brown, *Fasciculus Rerum expetendarum*, p. 193), a treatise *De Officiis*; and there was formerly in the cathedral library at Peterborough another tractate from his pen, entitled *Super Symbolum.* Of neither of these works, however, does any known copy now exist.

Of the *Speculum* the main value may be said to be of a negative character, in that it affords the most conclusive proof of the spuriousness of another work attributed to Richard and long accepted by the learned world as his. This was the *De Situ Britanniæ*, an elaborate forgery relating to the antiquities of Roman Britain which first appeared at Copenhagen in the year 1758. It was printed along with the works of Gildas and Nennius, under the editorship of Charles Julius Bertram, professor of English in the academy of Copenhagen in the middle of the last century, with the following special title:—"Richardi Corinensis monachi Westmonasteriensis de situ Britanniæ libri duo. E Codici MS. descripsit, Notisque et Indice adornavit Carolus Bertram."

This forgery was accepted as genuine by a well-known antiquary of the last century, Dr William Stukeley, and under the sanction of his authority continued for a long time to be regarded in the same light by numerous scholars and antiquaries. Among their number were Gibbon, John Whitaker, Richard Gough, and Lingard. On the other hand, critics of a later date, such as J. J. Conybeare, Dr Guest, Wex, Raine, and Woodward, from time to time gave expression, on various grounds, to a contrary conclusion. All doubt on the subject may, however, be held to have been effectually set at rest by the masterly and exhaustive exposure of the whole fraud drawn up by Professor Mayor in the preface to the edition above referred to of the *Speculum*. He has there not only demonstrated, from the external and internal evidence alike, the spuriousness of the whole treatise, but in a collation (extending to nearly a hundred pages) of numerous passages with corresponding passages in classical mediæval authorities, has also traced out the various sources from whence Bertram derived the terminology and the facts which he reproduced in the *De Situ*. "To say nothing," says Professor Mayor, "of antiquaries whose canons of criticism are so lax that they cite a supposed monk of 1400 A.D. as authority for events of 1000 B.C., we find a forger alike contemptible as penman, Latinist, historian, geographer, critic, imposing upon members of the Royal and Antiquarian Societies, and of the two ancient universities, of the youthful Society D. U. K., on the writers of Germany and Denmark, of England, and of Scotland,—the last bribed by the invention of Vespasiana." (J. B. M.)

RICHARD OF ST VICTOR (*ob. c.* 1173), a Scot by birth, was subprior of his convent in 1159 and prior in 1162, and was a friend of St Bernard, to whom some of his books are dedicated. The tendency of his mysticism has been characterized in vol. xvii. p. 132. Of his works, which embrace exegesis, moral and dogmatic subjects, and mystical contemplation, the first edition appeared at Paris in 1528, the best at Rouen in 1650.

RICHARDSON, SIR JOHN (1787–1865), naturalist, was born at Dumfries on November 5, 1787, and died near Grasmere on June 5, 1865. He became a surgeon in the navy in 1807, and is known by his share in the arctic explorations of Parry and Franklin, 1819–22 and 1825–26 (see POLAR REGIONS, vol. xix. p. 319), and in the Franklin search expedition of 1848–49 (*ib.*, p. 321), but especially by his *Fauna Boreali-Americana* (1829–37, 4 vols. 4to). He also wrote *Arctic Searching Expedition* (1851), and other works on the zoology of the Arctic regions. He was knighted in 1846.

RICHARDSON, SAMUEL (1689–1761), as the inventor or the accidental discoverer of a new literary form, the modern novel of domestic life and manners, is entitled to a more prominent place in history than his powers, whether of thought or style, would justify. He stumbled on novel writing by accident and late in life. The son of a Derbyshire joiner (born in 1689), he had been apprenticed at the age of seventeen to a London printer (Wilde of Stationers' Hall), had spent some years as a press reader or proof corrector—not a bad position for acquiring some knowledge of literature—had married his master's daughter, and acquired an extensive business, trying his hand occasionally in composition as a writer of prefaces and dedications to the books that he printed. When he was near the age of fifty some bookseller friends of his, struck perhaps by the excellence of his letters, had suggested to him that he should compose a "familiar letter-writer"—"a little volume of letters, in common style, on such subjects as might be of use to those country readers who were unable to indite for themselves." Richardson improved upon the suggestion. As it happened, he had had a singular experience in the way of writing letters for others. When he was a boy of thirteen three young women who could not write had employed him to conduct their correspondence with their sweethearts, which he did, he tells us, much to the satisfaction of his employers and without betraying their confidence. It occurred to him, turning over the project of the booksellers in his mind, and reverting to this early experience, that he might tell a story in a series of letters which would serve equally well as models for letter-writing and at the same time cultivate the principles of virtue and religion in the minds of the youth of both sexes. Accordingly, the publication being for country readers, he chose a country girl, Pamela, in the service of a young squire Mr B. (Fielding afterwards expanded the initial to "Booby"), and made her relate in letters to her friends her experiences from day to day and week to week in very trying circumstances. Friends write to advise Pamela in her difficulties, and so the story is carried on with circumstantial minuteness, Pamela describing with the most careful elaboration every particular of what happens to her, and adding her own reflexions, surmises, and appeals for approbation and counsel. The natural effect of this method is that, if we have any sympathy with the heroine, we get intensely interested in her perplexities,—the very fulness of the details and the close truth to nature with which the novelist follows every turn in the girl's thoughts compelling us to read on. This effect was fully realized in days when the voluminous moralizing was more in harmony with the general taste than it is now, and the kind of thing was new and fresh. The success of *Pamela* was immediate and widespread, and extended at once far beyond the circle of country cousins for whom it was designed. It is said that ladies at Ranelagh Gardens were to be seen holding up one to another their copies of *Pamela* to show that they had in their possession the most popular book of the day. The industrious antiquary has cast doubt upon this anecdote, pointing out that Ranelagh Gardens were not open to the public till eighteen months after *Pamela* had begun to run through many editions. Vauxhall, however, was open if Ranelagh was not, and the incident may have been observed there. At any rate the fact expressed by the anecdote is true enough, that the novel was at once and universally popular. *Pamela*, the first of one long line of novels, was published in November 1740. In January 1741 the following appeared in the *Gentleman's Magazine*:—"Several encomiums on a series of *Familiar Letters*, published but last month, entitled *Pamela, or Virtue Rewarded*, came too late for this magazine, and we believe there will be little occasion for inserting them in our next, because a second edition will then come out to supply the demands of the country, it being judged in town as great a sign of want of curiosity not to have read *Pamela* as not to have seen the *French* and *Italian* Dancers." This testimony is hardly less quaint and significant than the accredited anecdote.

It was thus that this industrious prosperous printer, a stout, rosy, vain, precise little man, carrying himself with sensitive dignity, not at all the kind of man that might have been expected to be a fashionable novelist, stumbled in the natural course of his business upon a new species of composition for which he had an unsuspected genius.

The fame of *Pamela* made him a great personal favourite, especially with women, of whose hearts and fancies he had shown a knowledge so intimate. Several ladies of quality made a pet of him, deluged him with questions and confidences, and urged him to write more. Under this flattering encouragement, the sedate author, still keeping his head and following his own plans amidst a multitude of counsellors, produced *Clarissa Harlowe* (1749), a model of every virtue in higher life, and *Sir Charles Grandison* (1753), his ideal of a perfect gentleman. *Clarissa* is universally acknowledged to be his masterpiece. An anecdote was given by Macaulay which shows how entrancing the story may become to readers once fairly caught by the current of it. He took the whole eight volumes with him, when he was in India, to a hill station during the hot season, and one day lent the first volume to the governor's wife. She read it and lent it to the governor's secretary, and went to Macaulay for the second. Thus all the eight volumes passed from hand to hand, and for a week or more the whole station was in a ferment over the fortunes of Clarissa, the readers anxiously waiting their turn for the successive volumes. Richardson is long-winded and prolix to a degree; but that, in spite of all his faults, he had the art of interesting his own generation was abundantly proved, and apparently his greatest novel is still capable in favourable circumstances of exerting its spell.

Richardson has long received the honour of being regarded as the founder of the English novel, but of late it has been customary to go a little farther back and trace the beginnings of the novel in the papers of Addison and Steele in the *Tatler* and the *Spectator*. The novel, it is said, was developed, not created, by Richardson. Now this is hardly fair to the ingenious printer, if it is meant to deny him any of the credit generally given to originators of new forms in literature. It is true that the novel was developed and not created, but it is not more true of Richardson's novel than of any other new species of composition, such as Marlowe's tragedy, or Scott's romantic tale, or Byron's personal epic. All alike are not created but developed in this sense that they have strongly marked affinities with kinds of writing immediately anterior to them. Thus in the novel of manners there are two elements—there is description of ordinary character, and there is plot-interest, *i.e.*, there is a story. Both of these elements are found in the generation before Richardson. But not in combination. It was he that combined them in his novel of manners, and therefore he is entitled to the praise of being the father of a new species of composition. There is abundance of description of manners in the *Spectator* and there are many delicate studies of character. And the general reader in the days of Queen Anne and of George I. had abundance of stories to choose from—tales of scandal, of crime, of high-flown romance. But it had not occurred to anybody before Richardson to make a heroine out of such a character as Jenny Simper, or a hero out of her baronet Sir Anthony Love, or a story out of incidents within the probabilities of ordinary life. The epistolary form in which his stories were cast, and which remains as a memorial of their first suggestion, was abandoned by Richardson's first great follower and satirist, Fielding; but it was Richardson that led the way into the new field of literature. He lived long enough to see many imitators. Within twelve years of the publication of *Pamela*, the *Monthly Review* began to complain of the labour of reading the multitude of novels submitted to its judgment, and the masterpieces of Fielding, Smollett, and Sterne were produced before his death in 1761. His correspondence was published in six volumes in 1804. (W. M.)

RICHELIEU, Armand du Plessis, Cardinal de (1585–1642), the greatest French statesman of the 17th century. As the chief events of his life have been recorded in connexion with the sketch of his political career in the article France (vol. ix. pp. 567–570), it only remains briefly to mention here some matters of secondary importance. In the early days of his courtiership when he retired for a time to Avignon Richelieu wrote two religious works which attained to considerable popularity—*Principaux points de la foy défendus contre l'escrit adressé au roy par les quatre ministres de Charenton* (1617), and *La méthode la plus facile et assurée de convertir ceux qui sont séparés de l'Église* (Paris, 1651). After he became master of France, his desire for distinction as a man of letters and especially as a dramatic author led him to resort to various devices that were as undignified and ludicrous as they were high-handed and arbitrary. In the life of Corneille it has already been told how he employed "five poets" to "wash his dirty linen" (as Voltaire described the similar service he rendered Frederick the Great), and how he attempted to revenge himself on Corneille, the greatest of the five, by causing the French Academy to pass a hostile verdict on the *Cid*. Even this high treason against art may perhaps be forgiven in consideration of the practical services the cardinal rendered to the cause of literature. *Les Thuileries*, *La Grande Pastorale*, *Mirame*, and the other plays, over whose fate he trembled as over the result of an embassy or a campaign, have long been forgotten; but a permanent interest attaches to his *Mémoires* and correspondence (though owing to his way of working with substitutes and assistants it has been a difficult task to settle how much of what passes under his name is authentic):—*Mémoire d'Armand du Plessis de Richelieu, évêque de Luçon écrit de sa main, l'année 1607 ou 1610, alors qu'il méditait de paraître à la cour*, edited by Armand Baschet, 1880; *L'Histoire de la Mère et du Fils*, (*i.e.*, of Mary de' Medici and Louis XIII.), Amsterdam, 1730, extending from 1610 to 1624, frequently attributed to Mézeray; *Mémoires* from 1624–1638, published in Petitot's collection (Paris, 1823); *Journal de M. le Cardinal de Richelieu, 1630–1631* (Amsterdam, 1664, 2 vols.); *Testament politique du Cardinal de Richelieu* (Paris, 1764); *Les lettres, instructions diplomatiques, et papiers d'état du Cardinal de Richelieu*, collected and edited by M. Avenel, and forming five volumes of the *Collection de documents inédits sur l'histoire de France* (Paris, 1853–56).

Besides the older works of Aubery (1660) and Leclerc (1694), see A. Jay, *Hist. du ministère de Richelieu*, 1815; Capefigue, *Richelieu, Mazarin, la Fronde*, &c., 1844; Caillet, *L'administration en France sous Richelieu*, 1860; Martineau, *Le Cardinal de Richelieu*, 1865; Topin, *Louis XIII. et Richelieu*, 1877; Sainte-Beauve, *Causeries du lundi*, vol. vii.

RICHELIEU, Louis François Armand du Plessis, Duc de, marshal of France and grand-nephew of Cardinal Richelieu, was born in Paris, 13th March 1696, and died in the same city 8th August 1788. Besides his reputation as the most scandalous Lovelace of a scandalous age, he attained, in spite of a deplorably defective education, distinction as a diplomatist and general. As ambassador to Vienna (1725–1729) he settled in 1727 the preliminaries of peace; in 1745 he helped to gain the victory of Fontenoy; three years afterwards he made a brilliant defence of Genoa; in 1756 he expelled the English from Minorca by the capture of the San Felipe fortress; and in 1757–1758 he closed his military career by those pillaging campaigns in Hanover which procured him the sobriquet of *Petit Père de la Maraude*. In his early days he was thrice imprisoned in the Bastille,—in 1711 at the instance of his stepfather, in 1716 in consequence of a duel, and in 1719 for his share in Alberoni's conspiracy against the Regent. He was thrice married: first, against his will, at the age of fourteen to Mademoiselle de Noailles; secondly, in 1734, by the intrigues (according to the witty Frenchman's own account) of Voltaire, to Mademoiselle de Guise; and thirdly, when he was eighty-four years old, to an Irish lady. Marshal Richelieu's *Mémoires* published by Soulavie in nine volumes (1790) are partially spurious.

RICHELIEU, Armand Emmanuel du Plessis, Duc de (born 25th September 1766, died 17th May 1822), grandson of the marshal, is remembered mainly as the enlightened and heroic governor of Odessa (1803–1813) who guided the city through the terrible years of the plague, and as the minister of foreign affairs under Louis

XVIII. to whom it fell to sign the treaty of 1815. A pension of 50,000 francs, voted to him by the two chambers, he bestowed on the public charities of Bordeaux.

RICHERUS, a chronicler of the 10th century, son of Rodulf, a trusty councillor and captain of Louis IV., studied at Rheims under Gerbert, afterwards Pope Silvester II. His intimacy with this famous man gave him many opportunities of knowing the history of his time, and when Gerbert became archbishop of Rheims he charged Richerus with the task of writing a history of the Gauls. This history in four books begins with Charles the Fat and Eudes, and goes down to the year 995. From 969 onwards Richerus had no earlier history before him, and his work is the chief source for the period when the Capets superseded the Carlovingians. It was first edited in Pertz's *Monumenta Germaniæ*, vol. iii., and there have since been several separate editions.

RICHMOND, a town of Surrey, is situated on the south bank of the Thames, here crossed by a stone bridge of five arches, $8\frac{1}{2}$ miles west of Hyde Park Corner by road, and $9\frac{3}{4}$ from the Waterloo station of the South-Western Railway. The town, anciently called *Syenes* and afterwards *Schene* and *Sheen*, until the name was in 1500 changed to Richmond by command of Henry VII., grew up round the royal manor house, which became a frequent residence of different sovereigns, but of which nothing more than a gateway now remains. Edward I. received the Scotch commissioners at his manor of Sheen in 1300. The palace was rebuilt by Edward III., who died there in 1377. It was frequently resided in by Richard II., and here his wife Anne of Bohemia died, upon which he cursed the place and "caused it to be thrown down and defaced." By Henry V. it was, however, rebuilt, and a great tournament was held at it in 1492 by Henry VII., who after its destruction by fire in 1499 restored it and named it Richmond. Henry VIII. gave it to Wolsey to reside in, after the latter presented him with the new palace of Hampton Court. James I. settled it on his son Henry, prince of Wales, who restored and embellished it at great expense. Charles I. added to it the new deer park generally known as Richmond Park, 2253 acres in extent, which is surrounded by a wall 11 miles in length. After the execution of the king, the parliament presented the park to the citizens of London, who again presented it to Charles II. at the Restoration. Though partly dismantled, the palace was the residence of the queen dowager till 1665, and by James II. it was used as a nursery for the young prince; but, gradually falling into decay, it was, about 1720, parcelled into tenements. In the old deer park extending northwards from the site of the palace towards Kew an observatory was erected in 1769, occupying the site of a Carthusian convent founded by Henry V., and a dwelling house in which Swift for some time resided. To the south-east of the town, at the entrance to Richmond Park, is Richmond Hill, from which is the famous view of the Thames with the surrounding country to the west. The White Lodge in Richmond Park is usually the residence of some member of the royal family. The town itself is without special interest, and consists chiefly of one long and irregular street running north and south. The church of St Mary Magdalen is of considerable antiquity, but has been almost entirely rebuilt; it contains a large number of monuments to celebrated persons. The theatre, first established in 1719, was during his later years leased by Edmund Kean. The town has a Wesleyan theological college founded in 1834, a free public library, and public baths. The population of the urban sanitary district (area 1210 acres) in 1871 was 15,113, and in 1881 it was 19,066.

RICHMOND, a borough in the North Riding of Yorkshire, is finely situated on the Swale, at the terminus of the Richmond branch of the North-Eastern Railway, 44 miles north-west of York and 15 south-west of Darlington. The interest of the town centres in the castle, said to have been founded by Alan Rufus, son of Hoel, count of Bretagne, who is also said to have rebuilt the town on his obtaining the estates of the Saxon Earl Edwin, embracing two hundred manors of Richmond and extending over nearly a third of the North Riding. When Henry VII. came to the throne these possessions reverted to the crown. Henry VIII. gave it to his son Henry by a daughter of Sir John Blount, and Charles II. bestowed the title of duke of Richmond on his son by the duchess of Portsmouth. The castle is situated on a perpendicular rock rising about 100 feet above the Swale, and from its great strength was considered inaccessible. Originally it covered an area of 5 acres, but the only portions of it now remaining are the Norman keep, with pinnacled tower and walls 100 feet high by 11 feet thick, and some other smaller towers. A portion of it is now occupied by the North York Rifles militia. The old church of St Mary, chiefly in the Gothic style, though with some traces of Norman, has been restored under the direction of Sir Gilbert Scott. For the free grammar school founded by Elizabeth a Gothic building was erected in 1850, in memory of the Rev. James Tate, a former master. The tower of the Franciscan abbey founded in 1258 still remains. The chief modern buildings are the town-hall, the masonic hall, and the workmen's hall. The principal trade is in agricultural produce, but there are a paper mill and an iron and brass foundry. The town received its first charter from Elizabeth. Under the Municipal Corporations Act it is governed by a mayor, four aldermen, and twelve councillors. Up to 1885, when it ceased to be separately represented, Richmond was a parliamentary borough, returning two members till 1868, and one after that date. The population of the municipal borough (area 2520 acres) in 1871 was 4443 and in 1881 it was 4502.

RICHMOND, a city of the United States, the county seat of Wayne county, Indiana, is situated in a fine agricultural region on the east branch of the White Water River (a sub-tributary of the Ohio), 68 miles east of Indianapolis. It is an important railway junction, has a city park 135 acres in extent, manufactures machinery, agricultural implements, &c., and contains a public library (15,000 volumes), a museum, two theatres, and two educational institutions (Earlham College, 1859) belonging to the Society of Friends, which is strongly represented in the city. The population was 9445 in 1870, and 12,742 in 1880. The city obtained its charter in 1845.

RICHMOND, a city of the United States, the capital of Virginia, is situated in Henrico county, on the north side of the James River, at the point where the lower falls (100 feet in 6 miles) mark the limit of the tide ascending from Chesapeake Bay. On the other side of the river, and in the county of Chesterfield, but connected with Richmond by bridges, is Manchester. By rail the city is 116 miles south-south-west of Washington. At mean high tides vessels drawing 14 feet of water can come up to Rocketts, as the lower district is called. The town proper occupies a group of hills—Gamble's Hill, Shockoe Hill, Church Hill, &c.—and looks down over the river, from which it is separated by a strip of flat ground. Main Street is a typical street after the old Southern style, the large portion burned in 1865 having been rebuilt in keeping with the remnant that escaped. By far the most conspicuous edifice in the city is the Capitol, on the summit of Shockoe Hill, designed by Thomas Jefferson, after the Maison Carrée of Nîmes. Beneath the dome of the central hall stands Houdon's marble life-size statue of Washington in the uniform of a pre-Revolutionary American general, and in the esplanade near the west gates of Capitol Square is Crawford's famous bronze equestrian statue of the same hero (1858), surrounded by bronze figures of Patrick Henry, Thomas Jefferson, John Marshall, George Mason, Thomas Nelson, and Andrew Lewis. North of the Capitol stands Foley's bronze statue of General "Stonewall" Jackson, the gift of English admirers of that great Confederate leader. A governor's house, a State penitentiary, a custom-house and post office, a city-hall and almshouse, and two market-houses are among the principal public buildings. Libby prison, in which thousands of Federal prisoners were confined during the Civil War, was originally a disused tobacco factory, and is now scarcely distinguishable from the other dilapidated brick warehouses in its vicinity. St John's Episcopal church on Church Hill was, in 1775, the meeting-place of the Virginia convention to which Patrick Henry addressed his famous "Give me liberty or give me death," and in 1788 of another convention summoned to discuss the ratification of the Federal Constitution. Monumental Church (Episcopal) commemorates the disastrous burning in 1811 of the theatre which then occupied the site. The State Library, the Virginia Historical Society, Southern Historical Society, Richmond College, and the Medical College (1838) are institutions of note. Holywood Cemetery, occupying a district of great natural beauty to the west of the city, contains the graves of thousands of Confederate soldiers and the monuments of President Monroe and General J. E. B. Stuart, and the Confederate soldiers' monument. Previous to the Civil War Richmond was the commercial capital of the South and a great entrepôt for the produce of the Southern States, Cuba, South America, and Great Britain. Its clipper ships made fast voyages to the Pacific for tea, silk, and other Eastern wares. Its auction sales (monthly or even fortnightly) drew buyers from every part of the Union, even from the northern cities which now supply it with the very commodities they then visited it to purchase. When the war was over Richmond was without ships, merchants, or capital. The tea trade had gone to London, the South-American to New York and Boston. In recent years, however, a new period of commercial prosperity appears to have set in, and, while several of the old sources of wealth have disappeared, the city still remains the natural centre of some of the principal trades of the South. Before the war more tobacco was sold in Richmond than perhaps in any city of the Union (fifty-six manufacturers were numbered in 1857), and this still remains an important staple. The flour trade is also of great extent. There are a large number of iron works, including those of the Tredegar Company; and granite quarries are worked in the vicinity of the city. In 1857 the real estate of Richmond was assessed at $18,259,816, and the personal property at $10,287,278. By 1885 the corresponding figures were $34,502,903 and $15,000,000. The city is the owner of both gas and water works. The population, which was only 5737 in the beginning of the century, has increased as follows:—9785 in 1810; 12,067 in 1820; 16,060 in 1830; 20,153 in 1840; 27,570 in 1850; 37,910 in 1860; 51,038 in 1870; 63,600 in 1880 (27,832 coloured).

The first settlement on part of the site of Richmond is said to date from 1609, and Fort Charles was erected as a defence against the Indians in 1644-45. But the real origin of the town, which was incorporated in 1745, was Byrd's warehouse, erected by Colonel William Byrd in the close of the 17th century. It was still a small village when in 1779 it was made the capital of the State of Virginia. From May 1861 till April 1865, when it was occupied by the Federal army, Richmond was the seat of government of the Confederate States. On the capture of Petersburg by General Grant the Confederate leaders thought it impossible to hold the city, in spite of the strength of its fortifications; and Ewell, who commanded the rear-guard of the retreating army, set the great tobacco factories and flour-mills and the arsenal on fire; the conflagration lasted till the evening of the following day. In September 1870 part of the city was laid under water bv the floods of the James river.

RICHMOND, LEGH (1772–1827), writer of tracts, was born 29th January 1772 at Liverpool, where his father was a physician. He was educated at Trinity College, Cambridge, where he graduated B.A. in 1794 and M.A. in 1797. In 1798 he was appointed to the joint curacies of Brading and Yaverland in the Isle of Wight. Through the perusal of Wilberforce's *Practical View* an evangelical bias was given to his mind, which led him to devote himself with great earnestness to the reclamation of the masses. He took a prominent interest in the British and Foreign Bible Society, the Church Missionary Society, and various other institutions of a similar kind. In 1805 he became chaplain to the Lock Hospital, London, and in the same year was presented to the rectory of Turvey, Bedfordshire, where he remained till his death, 8th May 1827. He was also appointed chaplain to the duke of Kent. The best known of the tracts of Legh Richmond is the *Dairyman's Daughter*, of which as many as four millions in nineteen languages were circulated before 1849. A collected edition of his tracts was first published in 1814 under the title of *Annals of the Poor.* He was also the author of *Domestic Portraiture*, and *Memoirs of his Three Children*; and he edited a series of the *Fathers of the English Church.*

See *Memoirs* by Grimshawe, 1828; *Life* by Bedell, 1829

RICHTER, ERNST FRIEDRICH EDUARD (1808–1879), writer on musical theory and composition, was born at Grosschönau in Saxony, on October 24, 1808. He first studied music at Zittau, and afterwards at Leipsic, where he attained so high a reputation that in 1843 he was appointed professor of harmony and counterpoint at the conservatorium of music, then newly founded by Mendelssohn. On the death of Hauptmann, January 3, 1868, he was elected cantor of the Thomasschule, which office he retained until his death, April 9, 1879. He is best known by three theoretical works — *Lehrbuch der Harmonie*, *Lehre vom Contrapunct*, and *Lehre von der Fuge*—originally written for the use of his pupils at the Conservatorium, but now everywhere accepted as valuable text-books, and well known to English students through the excellent translation by Mr Franklin Taylor.

RICHTER, JOHANN PAUL FRIEDRICH (1763–1825), usually called JEAN PAUL, the greatest German humorist, was born at Wunsiedel, in Bavaria, on the 21st March 1763. His father was a schoolmaster and organist at Wunsiedel, but in 1765 he became a pastor at Joditz, and in 1776 at Schwarzenbach, where he died in 1779. Having attended the gymnasium at Hof for two years, Richter went in 1780 to the university of Leipsic. His original intention was to enter his father's profession, but theology did not interest him, and he soon devoted himself wholly to the study of literature. Unable to maintain himself at Leipsic, he secretly left it in 1784 and lived with his mother at Hof. From 1787 to 1789 he served as a tutor at Töpen, a village near Hof; and afterwards he taught the children of several families at Schwarzenbach. During all these years he had to struggle with extreme poverty, but he never lost the buoyancy of his temper, nor did he doubt for a moment that his genius would in the end be generally recognized. His hardships left no trace of bitterness on his frank and manly spirit.

Richter began his career as a man of letters by writing the *Grönländische Processe* and *Auswahl aus des Teufels*

Papieren, the former of which was issued in 1783–84, the latter in 1789. These works were not received with much favour, and in later life Richter himself had little sympathy with their satirical tone. His next book, *Die Unsichtbare Loge*, a romance, published in 1793, had all the qualities which were soon to make him famous, and its power was immediately recognized by some of the best critics of the day. Soon after the appearance of this book he abandoned his work at Schwarzenbach, and lived again with his mother at Hof, occasionally paying long visits to a friend at Baireuth. Encouraged by the reception of *Die Unsichtbare Loge*, he sent forth in rapid succession *Hesperus* (1794), *Biographische Belustigungen unter der Gehirnschale einer Riesin* (1796), *Leben des Quintus Fixlein* (1796), *Blumen-, Frucht-, und Dornenstücke, oder Ehestand, Tod, und Hochzeit des Armenadvocaten Siebenkäs* (1796–97), *Der Jubelsenior* (1797), and *Das Kampaner Thal* (1798). This series of writings secured for Richter a great place in German literature, and during the rest of his life every work he produced was welcomed by a wide circle of admirers.

After his mother's death he went in 1797 to Leipsic, and in the following year to Weimar, where he had much pleasant intercourse with Herder, by whom he was warmly appreciated. He did not become intimate with Goethe and Schiller, to both of whom his literary methods were repugnant; but in Weimar as elsewhere his remarkable conversational powers and his genial manners made him a favourite in general society. He was especially liked by women, and Frau von Kalb, who has also a place in the biography of Schiller, even offered to obtain a divorce in order to marry him. In 1801, however, he married Caroline Mayer, a bright, accomplished, and amiable lady whom he met in Berlin in 1800. They lived first at Meiningen, then at Coburg; and finally, in 1804, they settled at Baireuth. Here Richter spent a quiet, simple, and happy life, constantly occupied with his work as a writer. In 1808 he was fortunately delivered from anxiety as to outward necessities by the kindness of the prince primate, who gave him a pension of a thousand florins. Before settling at Baireuth, Richter had published *Das heimliche Klaglied der jetzigen Männer* (1801), and *Titan* (1800–3); and these were followed by *Flegeljahre* (1804–5). *Titan* and *Flegeljahre* he regarded as his masterpieces, and this judgment has been confirmed by posterity. His later imaginative works were *Dr Katzenberger's Badereise* (1809), *Des Feldpredigers Schmelze Reise nach Flätz* (1809), *Leben Fibels* (1812), and *Der Komet, oder Nikolaus Marggraf* (1820–22). In *Vorschule der Aesthetik* (1804) he expounded his ideas on art; he discussed the principles of education in *Levana, oder Erziehungslehre* (1807); and the opinions suggested by current events he set forth in *Friedenspredigt* (1808), *Dämmerungen für Deutschland* (1809), *Mars und Phöbus Thronwechsel im J. 1814* (1814), and *Politische Fastenpredigten* (1817). In his last years he began *Wahrheit aus Jean Paul's Leben*, to which additions from his papers and other sources were made after his death by C. Otto and E. Förster. In 1821 Richter lost his only son, a youth of the highest promise; and he never quite recovered from this shock. He died of dropsy on the 14th November 1825.

Schiller said of Richter that he would have been worthy of admiration "if he had made as good use of his riches as other men made of their poverty." And it is true that in the form of his writings he never did full justice to his great powers. In working out his conceptions he found it impossible to restrain the expression of any powerful feeling by which he might happen to be moved. He was equally unable to resist the temptation to bring in strange facts or notions which occurred to him; and of such facts and notions he had a vast store, for he was an omnivorous reader, and forgot nothing that had ever touched his fancy or awakened his sympathies. Hence every one of his works is irregular in structure, and in some of them it is hard to detect the governing idea by which the relation of the parts to the whole is supposed to be controlled. His style, too, lacks directness, precision, and grace. With the main idea of a sentence he almost invariably associates a crowd of subordinate ideas; and they are often grouped in an order so capricious and so fantastic that the meaning can be made out only by the closest study. The splendour of Richter's genius, however, makes it easy for the class of readers to whom he appeals to forgive even these grave defects. His imagination was one of extraordinary fertility, and he had a surprising power of suggesting great thoughts by means of the simplest incidents and relations. No German prose writer has presented more fascinating pictures of childhood and youth, of friendship and love; nor has any one shown more finely how sordid circumstances may evoke the noblest qualities of loyal and generous minds. The love of nature was one of Richter's deepest pleasures, and he communicates his own delight in its beauty by many a description glowing with all the colour and the radiance of the real world. His expressions of religious feelings are also marked by a truly poetic spirit, for to Richter visible things were but the symbols of the invisible, and in the unseen realities alone he found elements which seemed to him to give significance and dignity to human life. His humour, the most distinctive of his qualities, cannot be dissociated from the other characteristics of his writings. It mingled with all his thoughts, and to some extent determined the form in which he embodied even his most serious reflections. That it is sometimes extravagant and grotesque cannot be disputed, but it is never harsh nor vulgar, and generally it springs naturally from the perception of the incongruity between ordinary facts and ideal laws. There are works of imaginative genius which we may read and enjoy without necessarily thinking of the author. The writer may reflect nature with so much fidelity that at first sight no element may seem to be imported into his conceptions from his personal peculiarities. But we appear always to see Richter's face and to hear his voice behind the printed page; and his creations are true and suggestive only in so far as they are manifestations of his own inward life. This means, of course, that his genius was not in any important sense dramatic, and that he was much more closely akin to the romantic than to the classic school; but it does not imply that his works produce a monotonous impression. Richter's personality was so deep and many-sided that in every new book he had some fresh secret to disclose. And the more he is known through his unconscious self-revelation the more he is loved and honoured; for we soon learn that with all his wilfulness and eccentricity he was a man of a pure and sensitive spirit, with a passionate scorn for pretence and an ardent enthusiasm for truth and goodness.

In 1826–38 a complete edition of Richter's works was published in sixty-five volumes, including several posthumous works. The second edition (1840–42) was in thirty-three volumes, the third (1860–63) in thirty-four. There are also a good many volumes of Richter's correspondence. See Döring, *Leben und Charakteristik Richter's* (1826); Kunz, *Jean Paul Friedrich Richter* (1839); and Nerrlich, *Jean Paul und seine Zeitgenossen* (1876). There are two admirable articles on Richter in Carlyle's *Miscellanies*.

RICIMER, created "comes" of the empire under Valentinian III., was the son of a chief of the Suevi, who had married a daughter of Wallia king of the Visigoths. He was brought up at Valentinian's court, and served with distinction under Aetius. In 456 a decisive naval victory over the Vandals off Corsica, followed soon afterwards by the defeat of their land forces near Agrigentum, earned for him the title of "Deliverer of Italy" and brought him within sight of the goal of his ambition. Having vanquished and deposed the emperor Avitus in October of that year, he for some time exercised every function of sovereignty over Italy under the title of "patrician," which he received from Leo in February 457. Precluded by his barbarian origin from aspiring to the imperial title, he consented to the elevation of Majorian in April 457, but, encouraged by the misfortunes of that brave but simple-minded soldier, he was equally ready to force his deposition four years afterwards (August 461). The puppet on whom the imperial dignity was now bestowed was Libius Severus, but Ricimer continued to command armies, negotiate alliances, and wield an independent and despotic authority over the Italian peninsula, although his power throughout the rest of the Western empire was practically neutralized by the influence of Marcellinus in Dalmatia and Ægidius in Gaul. When Anthemius, invested with the purple by Leo, arrived at

Rome in 467. Ricimer was politic enough to acquiesce with a good grace, and was rewarded by being made the son-in-law of the new emperor; but subsequently a quarrel with his father-in-law occasioned his withdrawal to Milan, whence he marched at the head of an army upon Rome, which he besieged and sacked, Anthemius being among the slain (July 11, 472). Olybrius was next made emperor at the instance of the Roman "kingmaker," who died of a malignant fever on August 18, 472.

RICKETS, a disease of childhood characterized chiefly by a softened condition of the bones and by other evidences of perverted nutrition. As regards its nature and causation rickets has been so fully considered under PATHOLOGY that all that appears now necessary is to give a few details as to its chief manifestations, and to refer briefly to some points in relation to its prevention and treatment.

Although, as already indicated, rickets may have its origin (at least in some instances) during intra-uterine life, it is seldom that it can be recognized until several months after birth, and it most commonly attracts attention at about the end of the first year. The symptoms which precede the outward manifestation of the disease are marked disorders of the digestive and alimentary functions. The child's appetite is diminished, and there is frequent vomiting together with diarrhœa or irregularity of the bowels, the evacuations being clay-coloured and unhealthy. Along with this there is a falling away in flesh. Importance is to be attached, as pointed out by Sir William Jenner, to certain other symptoms present in the early stages, namely, profuse sweating of the head and upper parts of the body, particularly during sleep, with at the same time dry heat of the lower parts and a tendency in the child to kick off all coverings and expose the limbs. At the same time there is great tenderness of the bones, as shown by the pain produced on moving or handling the child. The urine contains a large amount of calcareous salts. Gradually the changes in the shape of the bones become visible, at first chiefly noticed at the ends of the long bones, as in those of the arm, causing enlargements at the wrists, or in the ribs, producing a knobbed appearance at the junction of their ends with the costal cartilages. The bones also from their softened condition tend to become distorted and misshapen, both by the action of the muscles and by the superincumbent weight of the body. Those of the limbs are bent outwards and forwards, and the child becomes "bow-legged" or "in-kneed" often to an extreme degree. The trunk of the body likewise shows various alterations and deformities owing to curvatures of the spine, the flattening of the lateral curves of the ribs, and the projection forwards of the sternum. The cavity of the chest may thus be contracted and the development of the thoracic organs interfered with as well as their functions more or less embarrassed. The pelvis undergoes distortion, which may reduce its capacity to a degree that in the female may afterwards lead to serious difficulties in parturition. The head of the rickety child is large-looking in its upper part, the individual bones of the cranium sometimes remaining long ununited, while the face is small and ill-developed, and the teeth appear late and fall out or decay early. The constitutional conditions of ill-health continue, and the nutrition and development of the child are greatly retarded.

The disease may terminate in recovery, with more or less of deformity and dwarfing, the bones although altered in shape becoming firmly ossified, and this is the common result in the majority of instances. On the other hand, during the progress of the disease, various intercurrent ailments are apt to arise which may cause death, such as the infectious fevers, bronchitis and other pulmonary affections, chronic hydrocephalus, convulsions, laryngismus stridulus, &c.

An acute form of rickets of rare occurrence has been described by writers on diseases of children, in which all the symptoms are of more rapid development and progress, the result in many instances being fatal.

The treatment of rickets is necessarily more hygienic than medicinal, and includes such preventive measures as may be exercised by strict attention to personal health and nutrition on the part of mothers, especially where there appears to be any tendency to a rickety development in any members of the family. Very important also is the avoidance of too prolonged nursing, which not only tends directly to favour the development of rickets in the infant nursed, but by its weakening effects upon the mother's health is calculated to engender the disease in any succeeding children. At the same time it must be admitted that, when the mother is healthy, her milk abundant, and nursing discontinued before the lapse of the first year, there is no better means of preventing the occurrence of rickets than this method of feeding an infant, the disease, as is well known, being far more frequently met with in children brought up by hand. The management of the child exhibiting any tendency to rickets is of great importance, but can only be alluded to in general terms. The digestive disorders characteristic of the setting in of the disease render necessary the greatest care and watchfulness as to diet. Any one system of feeding the infant may at times be found to disagree and may require to be changed or modified in some particulars. Thus, if the child be not nursed but fed artificially, milk, either fresh or condensed, should be almost the only article of diet for at least the first year, and the chief element for the next. When not digested well, as may at times be shown by its appearance as a curd in the evacuations, it may be diluted with water or lime water, or else discontinued for a short time, carefully-made gruel or barley water being substituted. Many of the so-called "infant's foods" which are now so extensively used appear to be well adapted for their purpose, but when employed too abundantly and to the exclusion of the due amount of milk are often productive of digestive and intestinal disorders, probably from their containing a greater amount of starchy matter than can be utilized. From the end of the first year light animal soups may occasionally be given with advantage. The medicinal remedies most to be relied on are those which improve the digestive functions and minister to nutrition, and include such agents as the preparations of iron, quinine, and especially cod-liver oil. The administration of lime salts in large quantity has been proposed by some physicians under the idea that in this way the deficient earthy matter might be supplied to the bones. M. Piorry recommended for this purpose powdered fresh bones which contain a large amount of phosphate of lime. No great success can be claimed for this plan, and it is generally recognized that the most useful method of treatment is that which is directed to the feeble assimilative powers, and seeks to supply food of a kind which will be at once readily digested and nutritious. Of no less importance, however, are abundance of fresh air, cleanliness, warm clothing, and attention to the general hygiene of the child and to regularity in all its functions.

When the disease is showing evidence of advancing, it is desirable to restrain the child from walking, as far as possible. But this precaution may be to some extent rendered unnecessary by the use of splints and other apparatus as supports for the limbs and body, enabling the child to move about without the risk of bending and deformity of the bones which otherwise would probably be the result. (J. O. A.)

RICKMAN, Thomas (1776–1841), architect and writer on the styles of the Middle Ages, was born in 1776 at Maidenhead, Berkshire, where his father practised as a surgeon, and was brought up as a member of the Society of Friends. In 1797 he was apprenticed to a London druggist as a step towards entering his father's profession, but finding the work distasteful he gave it up, and for several years tried one employment after another with little success. He married early, and lost his wife, who was his cousin, in 1808. At that time he was a partner in a corn-factor's business in London, but he afterwards went to live in Liverpool as assistant to an insurance broker, and was soon led to take a very keen interest in the study of ancient buildings, especially churches. All his spare time was spent in sketching and making careful measured drawings, till he gained a knowledge which was very remarkable at a time when but little taste existed for the beauties of the Gothic styles. In this way Rickman was led to make designs of his own, founded upon his study of old examples; and, when a large grant of money was made by the Government to build new churches, he sent in a design of his own which was successful in an open competition; thus he was fairly launched upon the profession of an architect, for which his natural gifts strongly fitted him. Rickman then moved to Birmingham, and at first worked at his new profession with Mr H. Hutchinson as managing clerk; and when he died in 1830 Rickman entered into partnership with Mr Hussey, having become one of the most successful architects of his time. He built an immense number of churches, chapels, and other buildings, among which some of the chief are churches at Hampton Lucy, Ombersley, and Stretton-on-Dunsmore, St George's at Birmingham, St Philip's and St Matthew's both in Bristol, two in Carlisle, St Peter's and St Paul's at Preston, St David's in Glasgow, Grey Friars at Coventry, and many others. He also designed the new court of St John's College, Cambridge, a palace for the bishop of Carlisle, and several large country houses. These are all in the Gothic style, but, though superior perhaps to the buildings of his predecessors, they show more knowledge of the outward form of the mediæval style than any real acquaintance with its spirit, and are little better than dull copies of old work, disfigured by much poverty of detail. Rickmann nevertheless was an important stage in the revival of taste for mediævalism, perhaps in that respect only second to Pugin. His book entitled *An Attempt to Discriminate the Styles of Architecture in England* is a work which deserves great credit for its painstaking research; a great many editions of it were published, and it was eventually much improved and enlarged. Rickman died in 1841.

RIDDLES are probably the oldest extant form of humour. They spring from man's earliest perception that there are such things as analogies in nature. Man observes an example of analogy, puts his observations in the form of a question, and there is the riddle ready made. Some Bœotian humorist, for example, detected the analogy between the life of humanity—the child on all fours, the man erect on two legs, old age with its staff—on one side, and on the other the conception of an animal with a varying number of limbs. Put this in a question, and it is the riddle of the Sphinx. Another instance is the question—"What we caught we threw away, what we could not catch we kept." Homer is said to have died of vexation at not being able to discover the answer to this riddle, still current on the coast of Brittany, in Germany, and in Gascony. After inventing the riddle, men began to use it in a kind of game; bets were staked on the answer, and sides were made, each side backing its champion. These sports in Marriner's time were common in Tonga; they are no less popular among the African Woloffs. The example of Samson's riddle set to the Philistines is an instance of the sport in a Semitic country. In mährchen and ballads, the hero's chance of winning his beloved, or of escaping threatened punishment, is often made to turn on his power of answering riddles. It follows from the artless and primitive character of the riddle that regular popular riddles (*Devinettes*) are widely distributed, like popular tales, popular songs, and popular customs. The Woloffs ask, "What flies for ever and rests never?" Answer. The Wind. The Basutos put this riddle—"What is wingless and legless, yet flies fast and cannot be imprisoned?" Answer, The Voice. The German riddle runs—"What can go in face of the sun yet leave no shadow?" Answer, The Wind. In riddles may perhaps be noticed the animistic or personalizing tendency of early human thought, just beginning to be conscious of itself. The person who asked these riddles had the old sense of wind, for example, as a person, yet probably, unlike the Bushmen, he would never expect to see the personal wind. He knew the distinction between the personal and impersonal well enough to be sure that his enigma would present some difficulty. The riddle, to be brief, is an interrogatory form of the fable, and like the fable originates among rude people, and is perpetuated in the folklore of peasantry.

Probably the best book on the riddle (a subject less frequently studied than the mährchen or the myth) is Eugène Rolland, *Devinettes ou Énigmes Populaires*, with a preface by M. Gaston Paris. The power of answering riddles among the people who invented the legend of Solomon and the queen of Sheba seems to have been regarded as a proof of great sagacity. The riddle proper is all but extinct outside folklore and savage life, and has been replaced by the conundrum, which is a pun in the interrogative form.

RIDING. See HORSEMANSHIP, vol. xii. p. 195.

RIDLEY, NICHOLAS (*c.* 1500–1555), bishop of London, and a martyr to the Reformation, was descended from a family long seated in Northumberland. The second son of Nicholas Ridley of Unthank near Willimoteswick in that county, he was born in the beginning of the 16th century. From the grammar school of Newcastle-upon-Tyne he was sent to Pembroke College, Cambridge, about 1518, being supported there by his uncle, Dr Robert Ridley, fellow of Queen's College. At the university he specially distinguished himself in Greek. He proceeded B.A. 1522–23, became a fellow of his college, and, having taken orders, was sent about 1527 at the expense of his uncle to study on the Continent, first at the Sorbonne, Paris, and afterwards at Louvain. On his return to Cambridge he was in 1530 chosen under-treasurer of the university; and in 1534 he was senior proctor, when along with the vice-chancellor and the other proctor Richard Wilkes he signed the decree of the university against the jurisdiction of the pope in England. About this time he began to distinguish himself as an orator and disputant, and was chosen chaplain of the university, and "Magister Glomeriæ,"—an office in which most probably (for its duties have been much disputed) he had to instruct the university entrants in Latin. Cranmer, archbishop of Canterbury, after Ridley had proceeded B.D. in 1537, appointed him one of his chaplains, and in April 1538 collated him to the vicarage of Herne, Kent, where he began to preach the doctrines of the Reformation. In 1540, having commenced doctor of divinity, he was made king's chaplain; and in the same year he was elected master of his college in Cambridge. Soon after he was appointed a canon of Canterbury. At the instigation of Bishop Gardiner he was accused in the bishop's court of preaching against the doctrine of the Six Articles, but after the matter had been referred to commissioners specially appointed by the king he was acquitted. In 1545 he renounced the doctrine of transubstantiation, and was made a canon of Westminster. In 1547 he was presented by the fellows of Pembroke Hall to the living of Soham, Cambridgeshire, and the same year was consecrated bishop of Rochester. In 1550 he was one of the commissioners for examining Bishops Gardiner and Bonner. He concurred in their deprivation, and succeeded the latter in the see of London. In 1552, returning from Cambridge, he paid a visit to the princess, afterwards Queen Mary, at Hunsdon, Hertfordshire. On account of her unqualified condemnation of the Reformed doctrines, he from this time concurred in the proposals to exclude her from the throne, and he signed the will of Edward VI. settling the crown on Lady Jane Grey. On the death of the king, he, in a sermon at St Paul's Cross, 16th July

1553, affirmed that Mary was illegitimate, and predicted that her accession would be disastrous to the religious interests of England. After the proclamation of Mary he set out for Framlingham to confess his offences against her, but was met with a warrant for his arrest and was committed to the Tower. In March 1554 he was sent down, along with Cranmer and Latimer, to Oxford to be tried before a committee of convocation. He was convicted of heresy, and after refusing to recant was sentenced to death. The trial having been declared irregular, he was, in September 1555, along with Cranmer and Latimer, tried by special commissioners, and on the 16th October he, in company with Latimer, was burnt at the stake at Oxford.

The collected edition of the works of Ridley, published in 1841 with a biographical notice by Rev. Henry Christmas, includes *A Treatise concerning Images in Churches*; *A brief Declaration of the Lord's Supper*; *Certain godly and comfortable Conferences between Bishop Ridley and Mr Hugh Latimer during their imprisonment*; *A Comparison between the comfortable Doctrine of the Gospel and the Traditions of the Popish Religion*; and a variety of other pamphlets. His life by his relative Dr Gloucester Ridley appeared in 1763. See also Foxe's *Acts and Monuments*; Strype's *Cranmer*; Burnet's *History of the Reformation*; Wood's *Athenæ Oxon.*; Cooper's *Athenæ Cantab.*; and Froude's *History of England.*

RIEMANN, Georg Friedrich Bernhard (1826–1866), mathematician, was born on the 17th September 1826, at Breselenz, near Dannenberg in Hanover. His father Friedrich Bernhard Riemann came from Mecklenburg, had served in the war of freedom, and had finally settled as pastor in Quickborn. Here with his five brothers and sisters Riemann spent his boyhood and received, chiefly from his father, the elements of his education. He showed at an early age well-marked mathematical powers, and his progress was so rapid in arithmetic and geometry that he was soon beyond the guidance not only of his father but of schoolmaster Schulz, who assisted in the mathematical department of his training.

In 1840 he went to live with his grandmother at Hanover, where he attended the lyceum. After her death, two years later, he entered the Johanneum at Lüneburg, where he finished in four years more his gymnasial education. Notwithstanding some disadvantages due to defects in his earlier training, and more particularly to shyness arising from his rustic upbringing, he speedily distinguished himself in all the branches of the gymnasial course, and was already known by the school authorities as a mathematician of great promise. The director, Schmalfuss, encouraged him in his mathematical studies by lending him books (among them Euler's works and Legendre's *Theory of Numbers*), and readily understood that he had no ordinary schoolboy to deal with when he found that works of such profoundity were read, mastered, and returned within a few days. In 1846, in his twentieth year, Riemann entered himself as a student of philology and theology in the university of Göttingen. This choice of a university career was dictated more by the natural desire of his father to see his son enter his own profession, and by the poverty of his family, which rendered the speedy earning of his living a matter of importance, than by his own preference. He sacrificed so far to the bent of his genius as to attend lectures on the numerical solution of equations and on definite integrals by Stern, on terrestrial magnetism by Goldschmidt, and on the method of least squares by Gauss. It soon became evident that his mathematical studies, undertaken at first probably as a relaxation, were destined to be the chief business of his life; and he obtained his father's permission to devote himself entirely to a scientific career. By this time he had exhausted the resources of Göttingen in the shape of mathematical lectures; and he proceeded in the beginning of 1847 to Berlin, attracted thither by that brilliant constellation of mathematical genius whose principal stars were Dirichlet, Jacobi, Steiner, and Eisenstein. He appears to have attended Dirichlet's lectures on theory of numbers, theory of definite integrals, and partial differential equations, and Jacobi's on analytical mechanics and higher algebra. It was during this period that he first formed those ideas on the theory of functions of a complex variable which led to most of his great discoveries. One stirring social incident at least marked this part of his life, for, during the revolutionary insurrection in March 1848, the young mathematician, as a member of a company of student volunteers, kept guard in the royal palace from 9 o'clock on the morning of the 24th March till 1 o'clock on the afternoon of the following day.

In 1850 he returned to Göttingen and began to prepare his doctor's dissertation, busying himself meanwhile with "Naturphilosophie" and experimental physics. In pursuit of the latter he entered the mathematical and physical seminary, then newly started by Weber, Ulrich, Stern, and Listing. This double cultivation of his scientific powers, doubtless due more to the influence of Göttingen as represented by Gauss than to Berlin, had the happiest effect on his subsequent work; for the greatest achievements of Riemann were effected by the application in pure mathematics generally of a method (theory of potential) which had up to this time been used solely in the solution of certain problems that arise in mathematical physics.

In November 1851 he obtained his doctorate, the thesis being "Grundlagen für eine allgemeine Theorie der Functionen einer veränderlichen complexen Grösse." This memoir excited the admiration of Gauss, and at once marked its author's rank as a mathematician. The fundamental method of research which Riemann employed has just been alluded to; the results will be best indicated in his own words:—

"The methods in use hitherto for treating functions of a complex variable always started from an expression for the function as its definition, whereby its value was given for every value of the argument; by our investigation it has been shown that, in consequence of the general character of a function of a complex variable, in a definition of this sort one part of the determining conditions is a consequence of the rest, and the extent of the determining conditions has been reduced to what is necessary to effect the determination. This essentially simplifies the treatment of such functions. Hitherto, in order to prove the equality of two expressions for the same function, it was necessary to transform the one into the other, *i.e.*, to show that both expressions agreed for every value of the variable; now it is sufficient to prove their agreement to a far less extent" [merely in certain critical points and at certain boundaries].

The time between his promotion to the doctorate and his habilitation as privat-docent was occupied by researches undertaken for his Habilitationsschrift, by "Naturphilosophie," and by experimental work partly as Weber's assistant in the mathematical physical seminary, and partly as collaborateur with Weber and Kohlrausch in special researches on electricity. In connexion with the results of Kohlrausch regarding the residual discharge of condensers, Riemann worked out a theory of this phenomenon which he intended to have published in *Poggendorff's Annalen.* For some reason not fully explained it was not published at all during his lifetime, and its place in the *Annalen* was taken by an elegant little paper on Nobili's rings.

The subject he had chosen for his Habilitationsschrift was the "Representation of a Function by means of a Trigonometrical Series," a subject which Dirichlet had made his own by a now well-known series of researches. It was fortunate no doubt for Riemann that he had the kind advice and encouragement of Dirichlet himself, who was then on a visit at Göttingen during the preparation of his essay, but the result was a memoir of such originality and refinement as showed that the pupil was fully the equal of the master. Of the customary three themes which he suggested for his trial lecture, that "On the Hypotheses which form the Foundation of Geometry" was chosen at the instance of Gauss, who was curious to hear what so young a man had to say on this difficult subject, on which he himself had in private speculated so profoundly (see PARALLELS, vol. xviii. p. 254). Dedekind tells us that Riemann's lecture, which surpassed his utmost expectation, filled him with the greatest astonishment, and that on the way back from the faculty meeting he spoke to Wilhelm Weber with the highest appreciation, and with an excitement rare with him, regarding the depth of the thoughts to which Riemann had given utterance.

In 1855 Gauss died and was succeeded by Dirichlet, who along with others made an effort to obtain Riemann's nomination as extraordinary professor. In this they were not successful; but a Government stipendium of 200 thalers was given him, and even this miserable pittance was of great importance, so straitened were his circumstances. But this small beginning of good fortune was embittered by the deaths of his father and his eldest sister, and by the breaking up of the home at Quickborn, where he had so often found solace when ill and dejected. Meantime he was lecturing and writing the great memoir (*Borchardt's Journal*, vol. liv., 1857) in which he applied the theory developed in his doctor's dissertation to the Abelian functions. It is amusing to find him speaking jubilantly of the unexpectedly large audience of eight which assembled to hear his first lecture (in 1854) on partial differential equations and their application to physical problems. The rustic shyness which had troubled his schoolboyhood seems still to have haunted him; for he says, speaking of these lectures, "The nervousness which I had at first has pretty well subsided, and I accustom myself to think more of my hearers than of myself, and to read in their faces whether I may go on, or whether the matter requires further explanation."

Riemann's health had never been strong. Even in his boyhood he had shown symptoms of consumption, the disease that was working such havoc in his family; and now under the strain of work he broke down altogether, and had to retire to the Harz with his friends Ritter and Dedekind, where he gave himself up to excursions and "Naturphilosophie." After his return to Göttingen (November 1857) he was made extraordinary professor, and his salary raised to three hundred thalers. As usual with him, misfortune followed close behind; for he lost in quick succession his brother Wilhelm and another sister. In 1859 he lost his friend Dirichlet; but his reputation was now so well established that he was at once appointed to succeed him. It now seemed for a little as if the world was to go smoothly with him. Well-merited honours began to reach him; and in 1860 he visited Paris, and met with a warm reception there. He married, and married happily, Fräulein Elise Koch in June 1862, but the following month he had an attack of pleurisy which proved the beginning of a long illness that ended only with his death. His physician recommended a sojourn in Italy, for the benefit of his health, and Weber and Sartorius von Waltershausen obtained from the Government leave of absence and means to defray the cost of the journey. At first it seemed that he would recover; but on his return in June 1863 he caught cold on the Splügen Pass, and in August of the same year had to go back to Italy. In November 1865 he returned again to Göttingen, but, although he was able to live through the winter, and even to work a few hours every day, it became clear to his friends, and clearest of all to himself, that he was dying. He was very desirous to finish some of the many investigations which had presented themselves to him, and eagerly asked his doctors to tell him how long he might reasonably expect to live, so that he might take up what he had most chance of finishing. In order to husband his few remaining days he resolved in June 1866 to return once more to Italy. Thither he journeyed through the confusion of the first days of the Austro-Prussian war, and settled in a villa at Selasca near Intra on Lago Maggiore. Here his strength rapidly ebbed away, but his mental faculties remained brilliant to the last. On the 19th of July 1866, attended by his wife, he lay under a fig-tree greatly enjoying the beautiful landscape and working at his last unfinished investigation on the mechanism of the ear. The day following he died.

There are few more pathetic stories than the life of Riemann, few finer instances of victory gained by inborn genius over a host of adverse circumstances. Few as were the years of work allotted to him, and few as are the printed pages covered by the record of his researches, his name is, and will remain, a household word among mathematicians. Most of his memoirs are masterpieces—full of original methods, profound ideas, and far-reaching imagination. Few sources, we imagine, have been fuller of inspiration for the younger mathematicians of our day than the octavo volume of five hundred pages or so that contains his works; and many an advance in mathematical science will yet be made, with increase of reputation to the maker, by carrying out his suggestions.

The collected works of Riemann were published by H. Weber assisted by R. Dedekind (8vo, Leipsic, 1876). At the end of this volume there is a touching account of his life by the latter, from which the above sketch is almost entirely taken. (G. CH.)

RIENZI, COLA DI (1313–1354). See ROME.

RIESENER, JEAN HENRI (1725–1806), the celebrated cabinet-maker of Louis XVI., was born at Gladbeck near Cologne in 1725. He was employed by Jean François Oeben in the arsenal, and in 1769 married Oeben's widow, by whom he had one son. A number of fine examples of Riesener's cabinets are described in the catalogue of furniture in the South Kensington Museum. He employed tulip, rosewood, holly, maple, laburnum, and purple wood in their construction. Wreaths and bunches of flowers form the centres of his panels; on the sides are diaper patterns in quiet colours. The name of Riesener is stamped sometimes on the panel itself, sometimes on the oak lining of the furniture made by him. The best pieces at the South Kensington Museum are from the collection of Sir Richard Wallace; perhaps the most remarkable is the bureau made for Stanislaus, king of Poland, which is signed by the maker, as is also a similar piece in the Louvre which is accompanied by gilt bronze candle branches by Gouthière. This last work, which bears the date 1769, it is believed that Riesener only finished; and indeed towards the close of his life, after his second marriage (1782) to Marie A. C. Grezel (from whom he was divorced), he ceased to produce anything, and became a collector, buying up his own works. He died January 6, 1806. His son, HENRI FRANÇOIS (1767–1828), was one of the most noted portrait-painters of the first empire. The portrait of M. Ravrio, a worker in bronze (Louvre), is a good example of his talent.

RIESENGEBIRGE (Bohemian *Krkonose*), or Giant Mountains, a lofty and rugged group on the common boundary of Silesia and Bohemia, between the upper courses of the Elbe and the Oder. They form the highest portion of the Sudetic system, which separates south-east Prussia from the Austrian empire, and finds its natural continuation towards the north-west in the Erzgebirge, the Thuringian Forest, and the Harz Mountains. Adjoining the Isergebirge and the Lausitzergebirge on the west, and the Eulengebirge and the Adlergebirge on the east and south east, the Riesengebirge proper run south-east and north-west between the sources of the Zacken and the Bober, for a distance of 23 miles, with a breadth of 14 miles. They cover an area of about 425 square miles, three-fourths of which is in Austrian and the remainder in Prussian territory. The boundary line follows the crest of the principal chain or ridge (Riesenkamm), with the highest summits, which stretches along the northern side of the group, with an average height of over 4000 feet. Its principal peaks are the Reifträger (4130 feet), the Hohe Rad (4968 feet), the Great Sturmhaube (4862 feet), the Little Sturmhaube (4646 feet), and, near the east extremity, the Schneekoppe or Riesenkoppe (5266 feet), the loftiest mountain in northern or central Germany. Roughly parallel to this northern ridge, and separated from it by a long narrow valley known as the Siebengründe, there extends on the south a second and lower chain, of broad massive "saddles," with comparatively few peaks. The chief heights here are the Kesselkoppe (4708 feet), the Krkonose (4849 feet), the Ziegenrücken, and the Brunnenberg (5072 feet). From both ridges spurs of greater or less length are sent off at various angles,—those from the Bohemian ridge being longer, broader, and less abrupt than those from the Riesenkamm. On its northern side this mountain group rises ruggedly and precipitously from the Hirschberg valley; but on its southern side its slope towards Bohemia is very much more gradual. The scenery is in general bold and wild,—the projecting crags and deep rocky gorges and precipices often presenting striking, sometimes even sublime, landscapes. The Bohemian ridge is cleft about the middle by a deep gorge through which pour the headwaters of the river Elbe, which finds its source in the Siebengründe. The Iser, Bober, Aupa, Zacken, Queiss, and a great number of smaller streams also rise among these mountains or on their skirts, and small lakes and tarns are not unfrequent in the valleys. The Great and Little Schneegruben,—two deep rocky gorge-like valleys in which snow remains all the year round—lie to the north of the Hohe Rad. Nearly the whole of the Riesenkamm and the western portion of the southern chain are granite; the eastern extremity of the main ridge and several mountains to the south-east are formed of a species of gneiss; and the greater part of the Bohemian chain, especially its summits, consists of mica-slate. Blocks of these minerals lie scattered on the sides and ridges of the mountains and in the beds of the streams; and extensive turf moors occupy many of the mountain slopes and valleys. The lower parts of the Riesengebirge are clad with forests of oak, beech, pine, and fir; above 1600 feet only the last two kinds of trees are found, and beyond about 3950 feet only the dwarf pine (*Pinus Pumilio*). Various alpine plants are found on the Riesengebirge,—some having been artificially introduced on the Schneekoppe. Wheat is grown at an elevation of 1800 feet above the sea-level, and oats as high as 2700 feet. The inhabitants of this mountain region, who are tolerably numerous, especially on the Bohemian side, live for the most part, not in villages, but in scattered huts called "Bauden." They support themselves by the rearing of cattle, tillage, glass-making, and linen-weaving. Mining is carried on only to a small extent for arsenic, although there are traces of former more extensive workings for other metals. Several spots in the Riesengebirge are a good deal frequented as summer resorts; and the Schneekoppe and other summits are annually visited by a considerable number of travellers, who find shelter in the Bauden. The Riesengebirge is the legendary home of Number Nip (Rübezahl), a half-mischievous half-friendly goblin of German folklore; and various localities in the group are more or less directly associated with his name.

RIETI, a city of Italy, in the province of Perugia, 18½ miles south-east of Terni, which is 69 miles by rail from Rome. It occupies a fine position 1396 feet above the sea on the right bank of the Velino (a torrent sub-tributary to the Tiber), which at this point issues from the limestone plateau; the old town occupies the declivity and the new town spreads out on the level. While with its quaint red-roofed houses, its old town walls (restored about 1250), its castle, its cathedral (13th and 15th centuries), its episcopal palace (1283, Andrea Pisano), and its various churches and convents Rieti has no small amount of mediæval picturesqueness, it also displays a good deal of modern activity in wine-growing, cattle-breeding, and sugar-boiling. The fertility of the neighbourhood is celebrated both by Virgil and by Cicero. A Roman bridge over the Velino, Thorwaldsen's monument to Isabella Alfani, and a statue of St Barbara by Berdini, both in the cathedral, and the Palazzo Vincentini by Vignola deserve to be mentioned. The population was 7875 in 1871, and 9618 (with suburbs, 13,679; in the commune, 16,822) in 1881.

According to Terentius Varro (himself perhaps of Reatine birth) and others who have followed him, the people who founded Cures, and afterwards settled on the Palatine at Rome, were natives of the Reatine territory; but this is of somewhat the same questionable character as the other story about the companion of Hercules who was buried at this point near the Via Salaria. About the Via Salaria itself, there is no doubt it led from the sea to Reate and onwards towards Ancona, and was from a very early date the great route for the conveyance of salt to the Sabine country. While hardly mentioned in connexion with the Punic or Civil Wars, Reate is described by Strabo as exhausted by those long contests. Its inhabitants received the Roman franchise at the same time with the rest of the Sabines (290 B.C.), but it appears as a præfectura and not as a municipium down to the beginning of the empire. It was never made a colonia, though veterans of the Prætorian and of the legions Octava and Decima Augusta were settled there by Vespasian, who belonged to a Reatine family and was born in the neighbourhood. For the contests of the Reatines with the people of Interamna see TERNI. About the middle of the 12th century the town was besieged and captured by Roger I. of Sicily. In the struggle between church and empire it always held with the former; and it defied the forces of Frederick II. and Otho IV. Pope Nicholas IV. long resided at Reati, and it was there he crowned Charles II. of Anjou king of the Two Sicilies. In the 14th century Robert, and afterwards Joanna, of Naples managed to keep possession of Reati for many years, but it returned to the States of the Church under Gregory IX. About the year 1500 the liberties of the town, long defended against the encroachments of the popes, were entirely abolished. An earthquake in 1785 was in 1799 followed by the much more disastrous pillage of Reati by the papal troops for a space of fourteen days.

See Aldus Manutius, "Dissert. epistolica de Reati," in *Nov. Thes. Antiq. Rom.*, i.; Angeletti, *Descrizione*, 1635; Schenardi, *Antiche lapidi*, 1820; and Michaeli, *Note per la storia di Rieti*, 1868, 1870.

RIETSCHEL, ERNST FRIEDRICH AUGUST (1804–1861), one of the most distinguished of modern German sculptors. Born at Pulsnitz in Saxony in 1804, at an early age he became an art student at Dresden, and subsequently a pupil of Rauch in Berlin. He there gained an art studentship, and studied in Rome in 1827–28. After returning to Saxony he soon brought himself into notice by a colossal statue of Frederick Augustus, king of Saxony, was elected a member of the academy of Dresden, and thenceforth became one of the chief sculptors of his country. In 1832 he was elected to the Dresden professorship of sculpture, and had many foreign orders of merit conferred on him by the Governments of different countries. His death occurred at Dresden in 1861.

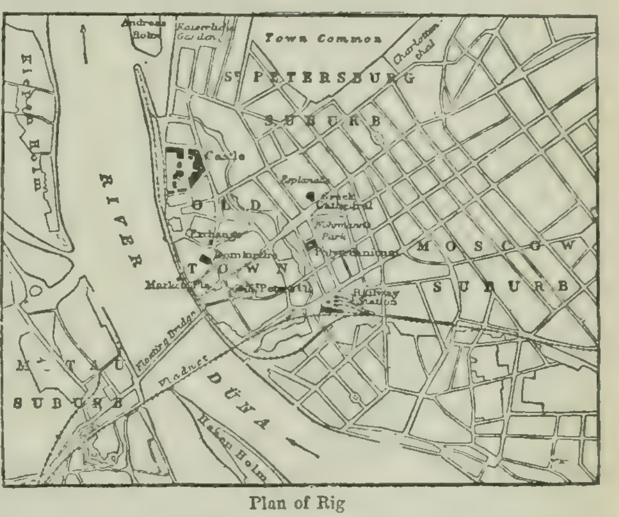
Rietschel's style was very varied, he produced works imbued with much religious feeling, and to some extent occupied the same place as a sculptor that Overbeck did in painting. Other important works by Rietschel were purely classical in style. He was specially famed for his portrait figures of eminent men, treated with much idealism and dramatic vigour; among the latter class his chief works were colossal statues of Goethe and Schiller for the town of Weimar, of Weber for Dresden, and of Lessing for Brunswick. He also designed the memorial statue of Luther for Worms, but died before he could carry it out. The principal among Rietschel's religious pieces of sculpture are the well-known Christ-Angel, and a life-sized Pietà, executed for the king of Prussia. He also worked a great deal in rilievo, and produced many graceful pieces, especially a fine series of bas-reliefs representing Night and Morning, Noon and Twilight, designed with much poetical feeling and imagination.

For a good biography of Rietschel and account of his works see Appermann, *Ernst Rietschel*, Leipsic, 1863. (J. H. M.)

RIFLE. See Gunmaking, vol. xi. p. 281–5.

RIFLEMAN-BIRD, or Rifle-Bird, names given by the English in Australia to a very beautiful inhabitant of that country,[1] probably because in coloration it resembled the well-known uniform of the rifle-regiments of the British army, while in its long and projecting hypochondriac plumes and short tail a further likeness might be traced to the hanging pelisse and the jacket formerly worn by the members of those corps. Be that as it may, the cock bird is clothed in velvety-black generally glossed with rich purple, but having each feather of the abdomen broadly tipped with a chevron of green bronze, while the crown of the head is covered with scale-like feathers of glittering green, and on the throat gleams a triangular patch of brilliant bluish emerald, a colour that reappears on the whole upper surface of the middle pair of tail-quills. The hen is greyish-brown above, the crown striated with dull white; the chin, throat, and a streak behind the eye are pale ochreous, and the lower parts deep buff, each feather bearing a black chevron. According to James Wilson (*Ill. Zoology*, pl. xi.), specimens of both sexes were obtained by Sir T. Brisbane at Port Macquarie, whence, in August 1823, they were sent to the Edinburgh Museum, where they arrived the following year; but the species was first described by Swainson in January 1825 (*Zool. Journal*, i. p. 481) as the type of a new genus *Ptiloris*, more properly written *Ptilorrhis*,[2] and it is generally known in ornithology as *P. paradisea*. It inhabits the northern part of New South Wales and southern part of Queensland as far as Wide Bay, beyond which its place is taken by a kindred species, the *P. victoriæ* of Gould, which was found by John Macgillivray on the shores and islets of Rockingham Bay. Further to the north, in York Peninsula, occurs what is considered a third species, *P. alberti*, very closely allied to and by some authorities thought to be identical with the *P. magnifica* (Vieillot) of New Guinea—the "Promerops" of many writers. From that country a fifth species, *P. wilsoni*, has also been described by Mr Ogden (*Proc. Acad. Philadelphia*, 1875, p. 451, pl. 25). Little is known of the habits of any of them, but the Rifleman-bird proper is said to get its food by thrusting its somewhat long bill under the loose bark on the boles or boughs of trees, along the latter of which it runs swiftly, or by searching for it on the ground beneath. During the pairing-season the males mount to the higher branches and there display and trim their brilliant plumage in the morning sun, or fly from tree to tree uttering a note which is syllabled "yass" greatly prolonged, but at the same time making, apparently with their wings, an extraordinary noise like that caused by the shaking of a piece of stiff silk stuff. Verreaux informed Mr Elliot that he believed they breed in the holes of trees and lay white eggs; but on that score nothing is really known. The genus *Ptilorrhis*, thought by Gould to be allied to *Climacteris*, has been generally placed near *Epimachus*, which is now considered, with *Drepanornis* and *Seleucides*, to belong to the *Paradiseidæ*, or Birds-of-Paradise, and in his *Monograph* of that Family all the species then known are beautifully figured by Mr Elliot. (A. N.)

RIGA (Esth. *Ria-Lin*), a seaport of Russia, in 56° 57′ N. lat. and 24° 6′ E. long., 375 miles south-west of St Petersburg, is in population the fifth city of the empire, while in foreign trade it ranks next to St Petersburg and Odessa. It is the seat of the governor-general of the Russian Baltic provinces, and also the capital of the province of Livonia. The Gulf of Riga, 115 miles long and 100 miles in width, with shallow waters of inconsiderable salinity (greatest depth 27 fathoms), freezes to some extent every year. The town is situated at the southern extremity of the gulf, 8 miles above the mouth of the Düna (Dwina), which brings Riga into water communication with an extensive region, as also with the basins of the Dnieper and Volga. Below the town the Düna, from 580 to 2300 yards in breadth, divides into several branches, among islands and sand banks, receiving before it enters the sea the Bolderaa river, and expanding towards the east into wider lacustrine basins. At its sea entrance the water on the bar has an average depth of only 14 feet, and the entrance of the river is protected by the fortress of Dünamünde, connected by rail with Riga, while another line on the right bank connects the city with the Mühlgraben village opposite. As the Düna freezes at Riga for an average of 127 days annually, the port remains closed for navigation from December to March. The roadstead at the mouth of the river, though now protected by a mole, is still too much exposed, so that only such vessels as cannot pass the bar remain there, the others discharging part of their cargo at Bolderaa or Mühlgraben and then entering the Düna, which also they leave only partially laden. Improvements designed to obviate these inconveniences are now going on both at the outer harbour and at the new one, the "Zollhafen."



Plan of Rig

Riga consists of four parts—the old town and the St Petersburg and the Moscow suburbs standing on the right bank of the Düna, and the Mitau suburb on the left bank, connected by a floating bridge which is removed in winter, and by a viaduct, 820 feet long, resting on light piers of solid stone, and leaving a passage for ships. The old town still preserves its Hanseatic features—high storehouses, with spacious granaries and cellars, lining the narrow, winding, and busy streets. The only open spaces are the market-place and two other squares, one of which, facing the citadel, is ornamented by a granite column erected in commemoration of the defeat of Napoleon I. The old city is so limited that its population increases very slowly. The so-called suburbs on the other hand, with their broad and quiet boulevards on the site of the former fortifications, are steadily growing and undergoing new improvements. The St Petersburg suburb, connected with the city by an avenue of trees, is the seat of the wealthy German aristocracy and merchant community. The rich "polytechnicum" and the new theatre are situated there.

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[1] Curiously enough its English name seems to be first mentioned in ornithological literature by Frenchmen—Lesson and Garnot—in 1828, who say (*Voy. "Coquille," Zoologie*, p. 669) that it was applied "pour rappeler que ce fut un soldat de la garnison [of New South Wales] qui le tua le premier,"—which seems to be an insufficient reason, though the statement as to the bird's first murderer may be true.

[2] Some writers have amended Swainson's faulty name in the form *Ptilornis*, but that is a mistake.

Few antiquities of the mediæval town still remain. The oldest church, the "Domkirche," founded in 1204, was burned in 1547, and the present building dates from the second half of the 16th century. Its organ, with a gas-engine of 4-horse power, and 6826 pipes—dating from 1883—is said to be the largest in the world. St Peter's church, with a beautiful tower 440 feet high, was erected in 1406. The castle, built in 1494–1515 by the master of the Knights of the Sword, Walter von Plettenberg—a spacious building often rebuilt—is now the seat of the governor-general and the Russian authorities. The "House of the Black Heads" (opposite the elegant new town-house), which was the seat of a military corporation founded in 1232, and subsequently became the meeting place of the wealthier youth of the place, has some valuable contents. Of the recent erections, the polytechnic, the exchange, the municipal picture gallery, the monument of Herder, who lived at Riga towards the end of the last century, the gymnasiums of Lomonossoff and Alexander I., and the large bonded warehouse are worthy of notice. The esplanade (where a Greek cathedral now stands), the quiet Wöhrmann's Park, and the well-shaded "Kaiserliche" Park are much visited. The environs of Riga are undergoing constant improvement, and some of them, such as Dubbeln and the sea-bathing resorts of Bilderlingshof and Majorenhof, have numerous visitors in summer.

In 1867 Riga had a population of 102,590 (city, 18,246; St Petersburg suburb, 27,155; Moscow suburb, 41,318; Mitau suburb, 15,871). On December 25, 1881 it had 168,728 inhabitants, the suburbs alone showing an increase of 64,263 (city, 20,091; suburb of St Petersburg, 45,345; of Moscow, 73,705; and of Mitau, 29,587). About one half of the population is German, the remainder being Russian and Lettish in nearly equal proportions, with some 2600 Esthonians and nearly 5000 foreigners. The life of the city has a German character throughout, but the Russians (many of whom were serfs until 1861), and still more the Letts and Esthonians, also display a steadily progressive intellectual life. Both are seeking to counteract the German influence by increasing the number of their educational institutions, the Letts also by the stage and the press. The larger commerce is wholly in German and (to a less extent) English hands. Owing to its communication by water and rail with the forests of White Russia and Volhynia, Riga is a great mart for timber, which in value stands third among the exports. Flax and linseed occupy the first place, Riga being the chief Russian port for the extensive flax-producing region of north-west Russia. Owing to the great railway which crosses the country from Riga to Smolensk, afterwards dividing into two branches, to Orenburg and Tsaritsyn on the lower Volga respectively, Riga is also the great storehouse and place of export for hemp coming by rail from west central Russia, and for corn, Riga merchants sending their buyers as far east as Tamboff. Oats, in particular, are extensively exported to England from the central provinces. Tallow, leather, tobacco, rugs, feathers, and other minor items add considerably to the total value of the exports. The competition of the port of Libau (with exports amounting in 1882 to 31,473,590 roubles) is counterbalanced by the steady development of the Russian railway system, so that the exports of Riga, which in 1851–1860 averaged 17,737,000 roubles, and were 23,964,000 in 1866, amounted in 1882 to 64,159,076 roubles or £6,415,900 (food stuffs, £1,706,300; raw produce, £4,690,170, including timber, £1,295,520; and manufactured wares, £19,436). The imports, consisting chiefly of salt, fish, wine, and cotton, with metals, machinery, coal, oils, fruits, tobacco, and other minor articles, are also rapidly increasing (4,876,000 roubles in 1851–1860, 6,751,000 roubles in 1866, and 34,304,100 roubles in 1882). The food stuffs (salt, fish, tobacco, wine, oils, &c.) reached £514,847; raw produce (chiefly cotton, coal, and metal), £2,043,804; and manufactured wares, £871,132. In 1882 the port was visited by 2517 foreign vessels of 906,200 tons burden; of these 537 (367,110 tons) were from Great Britain; 161 vessels of 89,990 tons, engaged in the coasting trade, also entered the port. Riga is in railway communication with Libau (via Mitau), and with St Petersburg (via Dunaburg), Warsaw, and central Russia; the traffic is very active,—no less than 11,247,000 cwts. of various wares having been brought to Riga by rail, and 844,000 cwts. shipped on the Düna.

The manufactures of the town and neighbourhood are yearly developing; the chief items are woollen cloth, cottons, machinery, metal wares, cigars, corks, glass, and paper.

The educational institutions include, besides the polytechnic, a Greek seminary, four gymnasiums, some ten private schools for secondary education of boys and girls, and a comparatively large number of primary schools. The municipal library contains very interesting materials relating to the history of the Baltic provinces. The book trade is rapidly extending.

History.—Riga was founded in 1158, as a storehouse at the mouth of the Düna, by a few Bremen merchants. Its name is supposed to be derived from Righ-ö, an island formerly separated from the mainland by a branch of the Düna. About 1190 the Augustinian monk Meinhard erected a monastery there, and in 1199–1201 Bishop Albert I. of Livonia obtained from Innocent III. permission for German merchants to land at the new settlement, and chose it for his seat, exercising his power over the neighbouring district in connexion with the Teutonic Knights. As early as the first half of the 13th century the young city obtained the right of electing its own magistracy, and enlarged the walls erected during Albert I.'s time. It joined the Hanseatic League, and from 1253 refused to recognize the rights of the bishop and the knights. Early in the 14th century Riga repelled the attack of the Kuron ruler Lamebinas, and during the next century it had to contend with the knights. In 1420 it fell once more under the rule of the bishop, who maintained his authority until 1566, when it was abolished in consequence of the Reformation. Sigismund III., king of Poland, took Riga in 1547, and in 1558 the Russian commander Prince Serebryanyi reached the town, burned its suburbs and many ships on the Düna, and remained for three days under the walls of the fort. In 1561 Gotthard Kettler publicly abdicated his mastership of the order of Knights of the Sword, and Riga, together with southern Livonia, became a Polish possession; after some unsuccessful attempts to reintroduce Roman Catholicism, Stephen Batory recognized the religious freedom of the Protestant population. Throughout the 17th century Riga—which for nearly three centuries had been a wealthy centre of the commerce of the whole region, and was at this time visited by from three to five hundred ships annually—became a bone of contention between Sweden, Poland, and Russia. In 1621 Gustavus Adolphus took it from Poland, and held it against the Poles and the Russians who besieged it in 1656. During the Northern War it was courageously defended, but after the battle of Poltava it succumbed, and was taken in July 1710 by Sheremetyeff. In 1781 it was made by Russia the capital of the Riga viceroyalty, but fifteen years later, the viceroyalty having been abolished, it was made and still remains the capital of Livonia. In 1812, the approach of the French being apprehended, the suburbs were burnt. Riga still maintains many of its old municipal institutions. The "magistrate" of Riga exercises patrimonial rights over a district comprising several communes around the city. (P. A. K.)

RIGAUD, Hyacinthe (1659–1743), French painter, born at Perpignan 20th July 1659, was the descendant of a line of painters. Having early lost his father, he was sent by his mother to Montpellier, where he studied under Pezet and was helped by Ranc, then to Lyons, and in 1681 to Paris. There, whilst following the regular course of academical instruction, Rigaud produced a great number of portraits so good that Lebrun advised him to give up going to Rome and to devote himself wholly to this class of work. Rigaud, although he had obtained the Great Prize, followed this advice, and for sixty-two years painted at the rate of thirty to forty portraits a year, all carried through with infinite care by his own hand. He had a magnificent emphatic manner appropriate to the rendering of the pompous types of the age, but, although some of his most famous works belong to the class of official portraiture, his talent showed to even greater advantage in the painting of subjects whose life and position admitted of less formal treatment. His portraits of himself, of the sculptor Desjardins (Louvre), of Mignard, and of Lebrun (Louvre) may be cited as triumphs of a still more attractive, if less imposing, character than that displayed in his grand representations of Bossuet (Louvre) and Louis XIV. (Louvre), while his beautiful portraits of his mother, Marie Serre

(Louvre), must for ever remain amongst the masterpieces of French art. Rigaud, although the great successes to which he owed his fame were won without exception in portrait painting, persisted in pressing the Academy to admit him as an historical painter. This delayed his reception, and it was not until January 2, 1700, that he succeeded in obtaining his desire. He presented as his diploma works a St Andrew (Louvre) and the portrait of Desjardins already mentioned, exhibited at the salon of 1704, and filled in turn all the various posts of academical distinction. Having attained a professional position of unsurpassed eminence, Rigaud died at the age of eighty-four on 27th December 1743, having never recovered from the shock of losing his wife in the year previous. He had many pupils, and his numerous works had the good fortune to be reproduced by the greatest of French engravers—Edelinck, Drevet, Wille, Audran, and others.

RIGGING. See SEAMANSHIP.

RIGHT, PETITION OF. See PETITION, vol. xviii. p. 705.

RIGHTS, BILL OF. On the 13th February 1688–89 the Declaration of Right was delivered by the Lords and Commons to the prince and princess of Orange. In October 1689 the rights claimed by the declaration were enacted with some alterations by the Bill of Rights, 1 Will. and M., sess. 2, c. 2, next to Magna Charta the greatest landmark in the constitutional history of England and the nearest approach to the written constitutions of other countries. The Act (the full name of which is "An Act declaring the Rights and Liberties of the Subject, and settling the Succession of the Crown"), after reciting the unconstitutional proceedings of James II., the abdication of that king, the consequent vacancy of the crown, and the summons of the convention parliament, declared, on the part of the Lords and Commons, "for the vindicating and asserting their ancient rights and liberties—

> "1. That the pretended power of suspending of laws or the execution of laws by regal authority without consent of parliament is illegal. 2. That the pretended power of dispensing with laws or the execution of laws by regal authority, as it hath been assumed and exercised of late, is illegal. 3. That the commission for erecting the late court of commissioners for ecclesiastical causes, and all other commissions and courts of like nature, are illegal and pernicious. 4. That levying money for or to the use of the crown, by pretence of prerogative, without grant of parliament, for longer time or in other manner than the same is or shall be granted, is illegal. 5. That it is the right of the subjects to petition the king, and all commitments and prosecutions for such petitioning are illegal. 6. That the raising or keeping a standing army within the kingdom in time of peace, unless it be with consent of parliament, is against law. 7. That the subjects which are Protestants may have arms for their defence suitable to their conditions, and as allowed by law. 8. That elections of members of parliament ought to be free. 9. That the freedom of speech, and debates or proceedings in parliament, ought not to be impeached or questioned in any court or place out of parliament. 10. That excessive bail ought not to be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted. 11. That jurors ought to be duly impanelled and returned, and jurors which pass upon men in trials for high treason ought to be freeholders. 12. That all grants and promises of fines and forfeitures of particular persons before conviction are illegal and void. 13. And that for redress of all grievances, and for the amending, strengthening, and preserving of the laws, parliament ought to be held frequently. And they do claim, demand, and insist upon all and singular the premises, as their undoubted rights and liberties."

The further provisions of the Act were concerned with the settlement of the crown upon the prince and princess of Orange, with the exception of § 12, which negatived the right of dispensation by *non obstante* to or of any statute or any part thereof, unless a dispensation be allowed in the statute itself or by bill or bills to be passed during the then session of parliament. An example of an Act giving a dispensing power is 7 & 8 Will. III., c. 37, by which the crown is empowered to grant licences to hold in mortmain *non obstante* the Mortmain Acts.

It is to be noticed that the Declaration of Right and the Bill of Rights introduced no new principle into the English constitution. In the words of Lord Macaulay, "the Declaration of Right, though it made nothing law which had not been law before, contained the germ of every good law which has been passed during more than a century and a half, of every good law which may hereafter in the course of ages be found necessary to promote the public weal, and to satisfy the demands of public opinion" (*History of England*, vol. ii. p. 396). In the United States, the main provisions of the Bill of Rights, so far as they are applicable, have been adopted both in the constitution of the United States and in the State constitutions.

RIMINI. The city of Rimini is bounded on three sides by water. It faces the Adriatic to the north, has the torrent Aprusa, now called Ausa, on the east, and has the river Marecchia, the Arimnum of the ancients and later known as the Ariminum, on the west. It stands in a fertile plain, which on the southern side soon swells into pleasant slopes backed by the jagged peaks of the Umbrian Apennines. The foremost foothill of the range is the steep crag of Mons Titanus crowned by the towers of San Marino. This oldest and smallest of republics commands a prospect of almost unrivalled beauty over hill and plain—to Ravenna on one side, Pesaro on the other, the mountains of Montefeltro, Rimini and its rivers, and across the Adriatic to the Dalmatian coast.

Of the foundation of Rimini nothing certain is known. It was first inhabited by the Umbrians, then by the Etruscans for many centuries. In the 4th century B.C. it was invaded by the Senones, who advanced as far as Sinigaglia. Brennus established himself in Rimini, and marched thence upon Rome, which he destroyed by fire in 390 B.C. After more than a century of dominion the Senones were expelled by the Romans, who founded a military colony in Rimini and made it the seat of the prætor governing the province designated as Ariminum or Gallia Togata. Owing to its position, Rimini rose to increased importance under its new masters. The Romans reopened the mint formerly established by the Gauls, which had issued the "æs grave," the heaviest Italic coin that has been preserved. Rimini was the starting point of the Flaminian Way leading to Rome, and of the Emilian Way to Piacenza. Later, 134 B.C., the Popilian Way leading as far as Venice was made. In 82 B.C. Rimini was withdrawn from the province of Gaul and included in Italy, of which the frontier was now extended from the Esino to the Rubicon, about ten miles from Rimini near Cesena. This added to the city's importance. We find continual mention of it in the wars of Marius and Sulla, and by the latter it was afterwards sacked. In 49 B.C. Julius Cæsar crossed the Rubicon with the 13th legion, entered Rimini, and harangued his troops in the great square that still bears his name. A pillar marks the spot on which, according to tradition, he delivered his address.[1] From Rimini, after having assembled the tribunes of the people and summoned the other legions, he went forth on the great expedition that was to lead to the battle of Pharsalia and ultimately to the foundation of the empire.

Rimini was highly favoured under Augustus. That emperor restored the Flaminian Way, and the senate decreed the erection in his honour of the famous arch that is still one of the grandest of ancient monuments. It seems that this arch was originally crowned by a statue of Augustus mounted on a triumphal car (*quadriga*);

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[1] A stone originally stood there, mentioned by 15th-century writers as "the big stone (*petrone*), on which he (Cæsar) stood to make his speech." But this stone, *vetustate collapsum* was replaced in 1555 by the existing column.

But in the Middle Ages this was removed and replaced by the turrets which remain still. Contemporaneously with the arch was built the beautiful bridge over the Marecchia, the only other ancient monument to be found in Rimini, since of the amphitheatre scarcely a stone is left.

During the Middle Ages the history of Rimini has no importance. Alternately captured by Byzantines and Goths, it was rigorously besieged by the latter in 538 A.D. They were, however, compelled to retreat before the reinforcements sent by Belisarius and Narses; thus the Byzantines, after various vicissitudes, became masters of the town, appointed a duke as its governor, and included it in the exarchate of Ravenna. It afterwards fell into the power of the Longobards, and then of the Franks, who yielded it to the pope, for whom it was governed by counts to the end of the 10th century. Soon after this period the imperial power became dominant in Rimini. In 1157 Frederick I. gave it, by imperial patent, the privilege of coining money and the right of self-government; and in the 13th century we find Rimini an independent commune waging war on the neighbouring cities. But throughout these times the main feature of its history is its alternate subjection to pope and emperor. And, weak as the sway of either was, it was strong enough to prevent any genuine local prosperity. During the continued struggle between church and empire, the withdrawal of the one was the signal for the other to advance, and these speedy mutations gave the commune no chance of achieving independence. This state of things went on until the rise of the despots, who, for similar reasons, were powerless to establish themselves on a firm and independent footing. Such indeed was the fate of nearly every city of Romagna excepting Bologna.

In the year 1216 Rimini, being worsted by Cesena, adopted the desperate plan of granting citizenship to two members of the powerful Malatesta tribe, Giovanni and Malatesta, for the sake of their aid and that of their vassals in the defence of the state and the conduct of the war. This family quickly struck root in the town and gave birth to future tyrants; for in 1237 Giovanni was named podestà, and this office was the first step towards the sovereign power afterwards assumed by his descendants. Meanwhile Rimini was torn by the feuds of Guelf and Ghibelline. The latter were the dominant party in the days of Frederick II., although very unpopular on account of the grievous taxes imposed by the empire. Accordingly the majority of the urban nobles joined the Guelfs and were driven into exile. But before long, as the Swabian power declined in Italy, the Guelf party was again predominant.

Then followed a long period of confusion in which, by means of conspiracies and crimes of every kind, the Malatesta succeeded in becoming masters and tyrants of Rimini. And, albeit this string of events is of no historic value, it may serve nevertheless to give an idea of what was occurring throughout Romagna at that time. Giovanni Malatesta had died in 1247 and been succeeded by his son Malatesta, born in 1212, and surnamed Malatesta da Verrucchio. This chieftain, who lived to be a hundred years old, had ample time to mature his ambitious designs, and was the real founder of his house. Seizing the first suitable moment, he placed himself at the head of the exiled Guelfs and restored them to Rimini. Then, as the empire acquired fresh strength in Italy, he quietly bided his time and, on the descent of the Angevins, again assumed the leadership of the Guelfs, who now had the upper hand for a long time. Being repeatedly elected podestà for lengthy terms of office, he at last became the virtual master of Rimini. Nor was he checked by Rome. Pope Boniface VIII. was fully aware of the rights and traditional pretensions of the Holy See, but preferred to keep on good terms with one who had so largely contributed to the triumph of the Guelfs in Romagna. Accordingly he not only left Malatesta unmolested, but in 1299 conferred on him fresh honours and estates, so that his power went on increasing to the day of his death in 1312.

Four sons had been born to Malatesta—Malatestino, Giovanni the Lame, Paolo the Handsome, and Pandolfo; but only the oldest and youngest survived him. Giovanni the Lame (*Sciancato*), a man of a daring impetuosity only equalled by his ugliness, had proved so useful a general to Giovanni da Polenta of Ravenna as to win in reward the hand of that potentate's beautiful daughter, known to history as Francesca da Rimini. But her heart had been won by the handsome Paolo, her brother-in-law; and the two lovers, being surprised by Giovanni, were murdered by him on the spot (1285). This episode of the story of the Malatesta has been immortalized in Dante's *Inferno*. Giovanni died in 1304. Thus in 1312 Malatestino became lord of Rimini, and on his decease in 1317 bequeathed the power to his brother Pandolfo. Even in his father's lifetime the new lord had helped to extend the dominions of his house in Pesaro, Fano, Sinigaglia, and Fossombrone. He quickly perceived that, however willing Boniface VIII. might have been to tolerate the increased power of a chief who, like Malatesta da Verrucchio, had rendered such excellent service to the Holy See, it could not be expected that the papacy would really sanction the establishment of a strong and independent state in Romagna. He accordingly turned to the empire, and, siding with Louis the Bavarian, won that monarch's favour for himself and his sons, who in 1342 were appointed imperial vicars.

Pandolfo died in 1326, leaving two heirs, Malatesta and Galeotto. The former was nicknamed Guastafamiglia, because, although at first willing to let his brother share his power, he rid himself by violence and treachery of other kinsmen who claimed their just rights to a portion of the state. His intent was to become sole lord and to aggrandize his tiny principality. But the reigning pope Innocent VI. despatched the terrible Cardinal Albornoz to Romagna and it was speedily reduced by fire and sword. In 1355 the Malatesta shared the fate of the other potentates of the land. Nevertheless it was the cardinal's policy to let existing Governments stand, provided they promised to act in subordination to the papal see. Thus, he granted the Malatesta brothers the investiture of Rimini, Pesaro, Fano, and Fossombrone, and they arranged a division of the state. Guastafamiglia took Pesaro, which was held by his descendants down to the brothers Carlo and Galeazzo. The former of these, who died in 1439, was father to the Parisina beheaded in Ferrara, whose tragic love story has been sung by Byron. The latter won the title of "l'Inetto" (the Incapable) by the foolish sale of his rights over Pesaro to the Sforza in 1447.

Galeotto, on the other hand, retained the lordship of Rimini, ruling tranquilly and on good terms with the popes, who allowed him to add Cervia, Cesena, and Bertinoro to his states. Dying in 1385 at the age of eighty, he left two sons—Carlo, who became lord of Rimini, and Pandolfo, who had Fano for his share. Carlo (1364–1429) was energetic, valiant, and a friend of the popes, who named him vicar of the church in Romagna. He was a patron of letters and the arts, and during his reign his court began to be renowned for its splendour. As he left no issue, his inheritance was added to that of his brother Pandolfo, and Fano was once more united to Rimini. Pandolfo (1370–1427) had led the life of a condottiere, taking a prominent part in the Lombard wars following on the death of Galeazzo Maria Visconti, and held rule for some time in Brescia and Bergamo. He left three natural sons, who were declared legitimate by Pope Martin V. The eldest, Galeotto (1411–32), was an ascetic, gave little or no attention to public business, and, dying early, bequeathed the state to his brother Sigismondo Pandolfo. The third son, Novello Malatesta (1418–65), ruled over Cesena.

Sigismondo (1417–68) is the personage to whom Rimini owes its renown during the Renaissance, of which indeed he was one of the strangest and most original representatives. He was born in Brescia, and when called to the succession, at the age of fifteen, had already given proofs of valour in the field. Of a robust and handsome person, he was a daring soldier and an astute politician. His knowledge of antiquity was so profound as to excite the admiration of all the learned men with whom he discoursed, even when, as in the case of Pius II., they chanced to be his personal enemies. A captain of renown and a skilful military engineer, he was also a generous patron of the fine arts and of letters. To him is due the erection of the church of St Francis, or temple of the Malatesta, one of the rarest gems of the Renaissance and the greatest of Rimini's treasures. Sigismondo devoted enormous sums of money and much time and care to this building, giving it so original a stamp and one so thoroughly expressive of his own mind and character that, to a great extent, it may be considered his work. But he too was a man devoid of all faith and conscience, of all respect human or divine. Of so dissolute a life that, although married, he had children by several mistresses at the same time, he gave vent to all his passions with a ferocity that was bestial rather than human. And—as the crowning contradiction of his strange nature—from his youth to the day of his death he remained the devoted lover of the woman for whose sake he became a poet, whom he finally made his wife, and whom he exalted in every way, even to the point of rendering her almost divine honours. Yet this love never availed to check his excesses. The blood in his veins resembled that of the Borgia; and of him, as of that iniquitous race, tradition has added much to the evil recorded by history, and truth and falsehood have been so subtly mingled that it is often difficult, sometimes impossible, to distinguish the one from the other.

On assuming power in 1432 Sigismondo was already affianced to the daughter of Count Carmagnola, but when that famous leader was arraigned as a traitor by the Venetians, and ignominiously put to death, he promptly withdrew from his engagement, under the pretext that it was impossible to marry the child of a criminal. In fact he aimed at a higher alliance, for he espoused Ginevra d'Este, daughter of the duke of Ferrara, and his entry into Rimini with his bride in 1434 was celebrated by splendid festivities. In 1437 a son was born to him, but died within the year, and in 1440 the young mother followed it to the grave. Every one declared that she died by poison administered by her husband. This, however, was never proved. The duke of Ferrara remained his friend, nor is it known what motive Sigismondo could have for wishing to get rid of his wife. Two years afterwards he married Polissena, daughter of the famous condottiere Francesco Sforza, who in 1443 bore him a son named Galeotto Roberto. But by this time he was already madly in love with Isotta degli Atti, and this was the passion that endured to his death. The lady succeeded in gaining an absolute ascendency over him, which increased with time. She bore him several children, but this did not prevent his having others by different concubines. Nor was this the sum of his excesses. He presently conceived a frantic passion for a German lady, the wife of a certain Borbona, who repulsed his advances. Thereupon he planned an ambuscade on the road to Fano in order to seize her by force. The lady arrived escorted by armed men, but Sigismondo attacked her so furiously that she was killed in the struggle, and it is said that he then wreaked his lust on her corpse (19th December 1448) Such being the nature of the man, it is not astonishing that, as his ardour for Isotta increased, he should have little scruple in ridding himself of his second wife. On the 1st June 1450 Polissena died by strangling, and on the 30th of the same month Isottà's offspring were legitimated by Nicholas V.

It is only just to record that, although Malatesta's intrigue with Isotta had long been notorious to all, and he had never sought to conceal it, no one ever accused her of either direct or indirect complicity in her lover's crimes. Isotta's history, however, is a strange one, and opens up many curious questions. She was of noble birth and seems to have attracted Sigismondo's notice as early as 1438, for at the age of twenty he produced verses of some merit in praise of her charms. She was indeed widely celebrated for her beauty and intellect, culture, firmness, and prudence; and even Pope Pius II. proclaimed her worthy to be greatly loved. When Sigismondo was absent she governed Rimini wisely and well, and proved herself a match for the statesmen with whom she had to deal. The leading poets of the court dedicated to her a collection of verses entitled *Isottæi*, styled her their mistress and the chosen of Apollo. Artists of renown perpetuated her features on canvas, on marble, and on many exquisite medals, one of which has a closed book graven on the reverse, with the inscription "Elegiæ" in allusion to poems she was said to have written. Nevertheless M. Yriarte, in his well-known book on the Malatesta and Rimini, asserts that there is documentary evidence to prove that Isotta was unable to sign her own name. He has arrived at this conclusion on the strength of certain documents found in the archives of Siena. These consist mainly of two letters addressed to Malatesta in 1454, when he was encamped near Siena, and both written and signed by the same hand. The first, signed Isotta, gives him news of his children, affectionately reproaches him with having betrayed her for the daughter of one Messer Galeazzo, and winds up by saying that she cannot be happy until he fulfils his often renewed promise, *i.e.*, to make her his wife. The second, bearing the same date, is signed with the initials of another woman: "De la V. S. serva" (Your Highness's servant) "S. de M."—probably one of the Malatesta. This correspondent says that she had already written to him that day, by command of Isotta, who had gone with her to see Messer Galeazzo's daughter, and freely vented her just indignation. Therefore M. Yriarte maintains that, had Isotta been able to write herself, she would not have employed another to speak of her love and jealousy and of the desired marriage. He feels assured that Isotta must have been altogether illiterate, since even the signature was written by another.[1] But, as the second letter proves that Isotta went with her confidant to vent her rage on her rival, it is plain that she had no secrets from that friend. It is also possible that S. de M. (particularly if a Malatesta) had been charged by Sigismondo to watch over Isotta, and therefore not only acted as her amanuensis, but also wrote privately to explain or confirm that which she had already written to him by Isotta's wish. For the tyrant of Rimini was of a brutally jealous nature. At any rate the second letter solves the doubts suggested by the first. Nor is it at all surprising that Isotta should have her letters written and signed by another hand, when such was by no means an uncommon practice among the princes and nobilities of her day. Lucrezia Borgia, for instance, frequently did the same. It is besides simply incredible that a woman of the Italian Renaissance, of Isotta's birth, standing, and reputation, should have been unable to write.

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[1] The two letters are dated respectively 20th and 21st December; but this must be an error, inasmuch as the second begins thus—"To-day Madonna Isotta made me write to you." The year is not given, but it must have been 1454, since it was then, as we shall presently see, that the Sienese seized the papers of their general Malatesta, who, after betraying them, had hastily fled from the camp. Thus these letters, and other Malatestian documents, came to be preserved among the archives of Siena where they are still to be seen.

Her marriage with Malatesta did not take place until 1456; but of the ardent affection that had long bound them together there are stronger proofs than the lover's juvenile verses, or than even the children Isotta had borne to him. For, more than all else, the temple of St Francis has served to transmit to posterity the history of their loves. Malatesta decided on building this remarkable church as a thankoffering for his safety during a dangerous campaign undertaken for Pope Eugenius IV. about the year 1445.

The first stone was laid in 1446, and the work was carried on with so much alacrity that mass was performed in it by the close of 1450. Sigismondo entrusted the execution of his plans to L. B. Alberti, who had to encase in a shell of classic architecture a 13th-century Franciscan church. The original edifice being left intact, it was a difficult question how to deal with the windows and the Gothic arches of the interior. Alberti solved the problem with marvellous skill, blending the old architecture with the new style of the Renaissance, and giving it variety without destroying its unity of effect.

Being eager to adorn his temple with the most precious marbles, Sigismondo's veneration for antiquity did not prevent him from pillaging many valuable classical remains in Rimini, Ravenna, and even in Greece. Such was the zeal with which Alberti pursued his task that the exterior of the little Rimini church is one of the finest and purest achievements of the Renaissance, and surpasses in beauty and elegance all the rest of his works. But it is much to be deplored that he should have left the upper part of the façade unfinished. Alberti came to Rimini, made his design, saw the work begun, and then left it to be carried out by very skilful artists, on whom he impressed the necessity of faithfully preserving its general character so as "not to spoil that music."

The internal decorations, especially the enormous quantity of wall ornaments, consisting chiefly of scrolls and bas-reliefs, were executed by different sculptors under the personal direction of Malatesta, who, even when engaged in war, sent continual instructions about their work. It is difficult to give an exact idea of this extraordinary church to those who have no personal acquaintance with it. The vault was never finished, and still shows its rough beams and rafters. The eight side chapels alone are complete, and their pointed arches spring from Renaissance pilasters planted on black marble elephants, the Malatesta emblems, or on baskets of fruit held by children. The surface of the pilasters is divided into compartments encrusted with bas-reliefs of various subjects and styles. Everywhere—on the balustrades closing the chapels, round the base of the pilasters, along the walls, beneath the cornice of both the exterior and the interior of the church—there is one ornament that is perpetually repeated, the interwoven initials of Sigismondo and Isotta. This monogram is alternated with the portrait and arms of Malatesta; and these designs are enwreathed by festoons linked together by the tyrant's second emblem, the rose. The most singular and characteristic feature of this edifice is the almost total absence of every sacred emblem. Rather than to St Francis and the God of the Christians it was dedicated—and that while Sigismondo's second wife still lived—to the glorification of an unhallowed attachment. Nature, science, and antiquity were summoned to celebrate the tyrant's love for Isotta. The bas-reliefs of one of the chapels represent Jupiter, Venus, Saturn, Mars, and Diana, together with the signs of the zodiac. And these subjects are derived, it appears, from a poem in which Sigismondo had invoked the gods and the signs of the zodiac to soften Isotta's heart and win her to his arms. The pageants of Mars and Diana seem to have been suggested by the *Trionfi* of Petrarch. Elsewhere we see prophets and sibyls, personifications of the theological virtues and of the sciences. The delicate bas-reliefs of botany and medicine, history and astronomy, have been judged by some writers to be Grecian, on account of the ancient appearance of their marble, their inscriptions in Greek and Latin, and others that have never been deciphered. But a moment's examination of the sculptures is enough to destroy this hypothesis. Besides, some of the inscriptions are very easily read and record "Apollo Ariminæus" and "Jupiter Ariminæus."

In the first chapel on the left is the family tomb of the Malatesta, with sculptured records of their triumphs and of their alleged descent from Scipio Africanus. Better worthy of notice is the third chapel to the right, known as that of the Angels, on account of the angels and children carved on its pillars. It is nominally dedicated to the archangel Michael, whose statue is enshrined in it; but the figure has the face of Isotta, the ruling deity of this portion of the church. For here is the splendid and fantastic tomb erected to this lady, during her life and previous to the death of Sigismondo's second wife. No monument, be it remarked, is raised over the burial-place of Ginevra and Polissena. The urn of Isotta's sarcophagus is supported by two elephants, and bears the inscription, "D. Isottæ Ariminensi B. M. Sacrum, MCCCCL." The "D." has been generally interpreted as "Divæ" and the "B. M." as "Beatæ Memoriæ." But some, unwilling to credit such profanity, allege that the letters stand for "Bonæ Memoriæ." Nevertheless all who have seen the church must admit the improbability of similar scruples.

The numerous artists employed on the interior of the church were under the direction of the *proto-maestro* Matteo de Pasti, the celebrated medallist. And indeed the peculiar and fantastic character of the sculptures in this chapel frequently recalls the designs of his famous works. All this decoration is in strange contrast with the grandly austere simplicity of the façade and outer walls of the church. There no ornament disturbs the harmony of the lines. The frieze beneath the cornice, reproducing the lovers' initials and the Malatestian ensigns, is in such very low relief that it only enhances the perfection of "that music" produced by the marvellous skill of Leo Battista Alberti. Also the colour of the stone, a soft creamy white, adds to the general beauty of effect. And everything both within and without contributes to the profane and pagan character which it was Sigismondo's purpose to impress on the Christian church. On each of its outer walls are seven arched recesses, intended to contain the ashes of the first literati and scientists of his court. In the first, to the right, is the urn of the poet Basinio, one of his pensioners, in the second that of Giusto de' Conti, author of some rhymes on the *Bella Mano*, while the third bore the more famous name of Gemisthus Pletho. This well-known Byzantine philosopher was the diffuser of Platonism in Florence during the time of Cosimo de Medici, and had faith in the revival of paganism. Returning to his own people, he had died in the Morea. Sigismondo, having gone there in command of the Venetian expedition against the Turks, exhumed the philosopher's bones as holy relics, and brought them to Rimini for worthy sepulture in his Christian pantheon. All this is solemnly recorded in the inscription, which is dated 1465. The fourth sarcophagus was that of Roberto Valturio, the engineer, author of *De Re Militari*, who had been Sigismondo's minister and had aided him in the construction of the castle of Rimini. The other urns on this side were placed by Malatesta's successors, and the arches on the left wall remained untenanted.

Sigismondo understood the science of fortification. He was also the first to discard the use of wooden bomb shells, and substitute others cast in bronze. As a soldier his numerous campaigns had shown him to be possessed of all the best qualities and worst defects of the free captains of his time. He began his military career in 1432 in the service of Eugenius IV.; but, when this pope doubted his good faith and transferred the command to another, he sided with the Venetians against him, though at a later date he again served under him. On the decease of Filippo Maria Visconti in 1447, he joined the Aragonese against Venice and Florence, but, presently changing his flag, fought valiantly against Alphonso of Aragon and forced him to raise the siege of Piombino. In 1454 he accepted a command from the Sienese, but suddenly, after his usual fashion, he made peace with the enemies of the republic, and had to save himself by flight from arrest for his perfidy. It was then that the letters from Isotta were confiscated. After this he began scheming to hasten the coming of the Angevins, and took part in new and more hazardous campaigns against adversaries such as the duke of Urbino, Sforza of Milan, Piccinino, and, worst of all, the Sienese pope, Pius II., his declared and mortal foe. This time Sigismondo had blundered; for the cause of Anjou was hopelessly ruined in Italy. He was therefore driven to make his submission to the pope but, again rebelling, was summoned to trial in Rome (1460) before a tribunal of hostile cardinals. All the old charges against him were now revived and eagerly confirmed. He was pronounced guilty of rapine, incendiarism, incest, assassination, and heresy. The murder and violation of Borbona's wife was brought up; he was accused of having tortured his former preceptor, in revenge for punishments received in his youth, and of having killed three wives—although it seems that he had only two besides his ever-beloved Isotta, who survived him. He was also severely blamed for the erection of a temple which, as the pope justly remarked, was better adapted for the worship of pagan demons than of the Christian God. Nor was it forgotten how, when Pius II. had proclaimed a crusade against the infidels at the assembly at Mantua, Sigismondo had secretly invited the Grand Turk to make a descent upon Italy. Consequently he was sentenced to the deprivation of his state (which was probably the main object of the trial), and to be burnt alive as a heretic.

This sentence, however, could not easily be executed, and Sigismondo was only burnt in effigy. But the pope marked the intensity of his hatred by causing the dummy to be carved and dressed with such life-like resemblance that he was almost able to persuade himself that his hated enemy was really consumed in the flames. Malatesta could afford to laugh at this farce, but he nevertheless prepared in haste for a desperate defence (1462). He knew that the bishop Vitelleschi, together with the duke of Urbino and his own brother Novello Malatesta, lord of Cesena, were advancing against him in force; and, being defeated by them at Pian di Marotta, he was driven to Rome in 1463 to again make submission to the pope. This time he was stripped of all his possessions excepting the city of Rimini and a neighbouring castle, but the sentence of excommunication was withdrawn. For, now that Malatesta's power was crushed, the object of the war was attained. Its continuance would have been inexpedient, and might have too suddenly roused the fears of the other potentates of Romagna, who were all destined, sooner or later, to share the same fate. The once mighty tyrant of Rimini found himself reduced to penury with a state chiefly composed of a single town. He therefore took service with the Venetians, and in 1464 had the command of an expedition to the Morea. Here his movements were so hampered by the interference of the commissioners of the republic that, with all his valour, he could achieve no decisive success. In 1466 he was able to return to Rimini, for Pius II. was dead, and the new pope, Paul II., was less hostile to him. Indeed the latter offered to give him Spoleto and Foligno, taking Rimini in exchange; but Malatesta was so enraged by the proposal that he went to Rome with a dagger concealed on his person, on purpose to kill the pope. But, being forewarned, Paul received him with great ceremony, and surrounded by cardinals prepared for defence: whereupon Sigismondo changed his mind, fell on his knees and implored forgiveness. His star had now set for ever. For sheer subsistence he had to hire his sword to the pope and quell petty rebellions with a handful of men. At last, his health failing, he returned to his family, and died in Rimini on the 7th October 1468, aged fifty-one years.

He was succeeded, according to his desire, by Isotta and his son Sallustio. But there was an illegitimate elder son by another mother, named Roberto Malatesta, a valiant and unscrupulous soldier. Befriended by the pope, this man undertook to conquer Rimini for the Holy See, but came there to further his own ends instead (20th October 1469), and, while feigning a desire to share the government with Isotta and her son, resolved, sooner or later, to seize it for himself. This aroused the pope's wrath, and Roberto instantly prepared for defence. Finding an ally in the duke of Urbino, whose eyes were now opened to the aggressive policy of the church, he was able to repulse its forces. Paul II. died soon after, and was succeeded by Sixtus IV. Roberto's position was now more secure, and in order to strengthen his recent alliance he betrothed himself to the daughter of the duke of Urbino. The next step was to dispose of his rival kindred. On the 8th August 1470 Isotta's son was found murdered in a well belonging to the Marcheselli family; and a blood-stained sword, placed in their courtyard by Roberto, made it appear as though they had been guilty of the crime. Towards the end of the same year Isotta died also, apparently of a slow fever, but really, it was believed, by poison. Another of her sons, Valerio, born in 1453, still lived, but he was openly put to death by Roberto on a trumped-up charge of treason. In 1475 the new tyrant celebrated his nuptials with the duke of Urbino's daughter, and, being again taken into favour by the pope, valiantly defended him in Rome against the attacks of the duke of Calabria, and died there in 1482 of the hardships endured in the war. His widow was left regent during the minority of his son Pandolfo, who was nicknamed Pandolfaccio on account of his evil nature. Directly he was of age, he seized the reins of government by killing some relations who had plotted against him, and crushed another conspiracy in the same way. A daring soldier, he distinguished himself at the battle of the Taro against the French; but his tyranny made him hated by his subjects. In 1500, when Cesare Borgia fell on Romagna with violence and fraud, this Malatesta shared the fate of other petty tyrants and had to fly for his life. After the fall of the Borgia he returned, but, being bitterly detested by his people, decided to sell his rights to the Venetians, who had long desired to possess Rimini, and who gave him in exchange the town of Cittadella, some ready money, and a pension for life.

This arrangement was naturally disapproved by Rome, and especially by Julius II., who had already repeatedly vowed that, unless Venice restored the cities she had so unjustly seized—Cervia, Ravenna, and Rimini—he would turn the world upside down to regain them. And he kept his word. For he contrived the league of Cambray on purpose to ruin the Venetians, who were crushingly defeated in 1509. Thereupon the pope, having accomplished his own ends, made alliance with the Venetians, who were now prostrate at his feet, and, with them, the Spaniards, and the Swiss, fought against the French at Ravenna in 1512. Here the French were victors, but owing to their heavy losses and the death of their renowned leader, Gaston de Foix, were compelled to retreat. Thus Julius became master of Rimini and the other coveted lands. Malatesta made more than one attempt to win back his city, but always in vain, for his subjects preferred the papal rule. He returned there for the last time while Marshal Bourbon was laying siege to Rome; but in 1528 Pope Clement VII. became definitive master of the town. Thus, after two hundred and fifty years, the sway of the Malatesta came to an end, and Pandolfo was reduced to beggary. In fact, we find him petitioning the duke of Ferrara for the gift of a couple of crowns and promising to ask for no more. He died in 1534, leaving a daughter and two sons in great poverty. The elder, Sigismondo, after various military adventures, died at Reggio d'Emilia in 1543; and Malatesta, the younger, went to fight in the Scotch and English wars, and was never heard of again. Sigismondo had left male heirs who made another attempt to regain Rimini in 1555, but Pope Paul IV. declared them deposed in perpetuity in punishment of Pandolfaccio's misdeeds.

From that time the Malatesta became citizens of Venice, their names were inscribed in the Golden Book, and they were admitted to the grand council. With the death, in 1716, of Christina Malatesta, the wife of Niccolo Boldu, the Rimini branch of the family became extinct. The descendants of Giovanni, brother of Malatesta da Verrucchio, who married one of the Sogliano, were known as the Sogliano-Malatesta. The representatives of this branch settled in Rome.

The history of Rimini practically ends with its independence. It fell into obscurity under the rule of the popes, and was not again mentioned in history until, in 1831 and 1845, it took a prominent part in the revolutionary movements against papal despotism and in favour of Italian independence. Although Rimini, like many other cities of Romagna, is now harassed by republican and socialistic sects, it is a thriving town and enjoys increasing prosperity. It had in 1881 a population of 37,248 souls, being the centre of a district containing 88,110 inhabitants, and is part of the province of Forlì, which, divided into the three districts of Cesena, Forlì, and Rimini, has a total population of 252,883 souls. Many small manufactures are carried on at Rimini, but agriculture is its principal resource, and its produce in corn and wine is considerably in excess of the local consumption. Its sea-bathing establishment attracts many visitors during the summer months, and conduces to the prosperity of the town. Rimini also boasts a good public library of 28,000 volumes, inclusive of 850 MSS.; and it has a record office containing several thousand ancient MSS.

Authorities.—Moroni, *Dizionario di erudizione storico-ecclesiastica* (vol. lviii., *s.v.* "Rimini"); Ch. Yriarte, *Rimini: Un Condottiere au XV^{e} Siècle: Études sur les lettres et les arts à la cour des Malatesti* (Paris, 1882); Tonini, *Storia di Rimini* (Rimini, 1848-82). (P. V.)

RINDERPEST. See MURRAIN, vol. xvii. p. 59.

RING (Gr. *δακτύλιος*, Lat. *annulus*).[1] At an early period, when the art of writing was known to but very few, it was commonly the custom for men to wear rings on which some distinguishing sign or badge was engraved (*ἐπίσημον*), so that by using it as a seal the owner could give a proof of authenticity to letters or other documents. Thus, when some royal personage wished to delegate his power to one of his officials, it was not unusual for him to hand over his signet ring, by means of which the full royal authority could be given to the written commands of the subordinate. The enlarged part of a ring on which the device is engraved is called the "bezel," the rest of it being the "hoop."

The earliest existing rings are naturally those found in the tombs of ancient Egypt. The finest examples date from about the 18th to the 20th dynasty; they are of pure gold, simple in design, very heavy and massive, and have usually the name and titles of the owner deeply sunk in hieroglyphic characters on an oblong gold bezel. Rings worn in Egypt by the poorer classes were made of less costly materials, such as silver, bronze, glass, or pottery covered with a siliceous glaze and coloured brilliant blue or green with various copper oxides. Some of these had hieroglyphic inscriptions impressed while the clay was moist. Other examples have been found made of ivory, amber, and hard stones, such as carnelian. Another form of ring used under the later dynasties of Egypt had a scarab in place of the bezel, and was mounted on a gold hoop which passed through the hole in the scarab and allowed it to revolve.

In ancient Babylonia and Assyria finger rings do not appear to have been used. In those countries the signet took a different form, namely, that of a cylinder cut in crystal or other hard stone, and perforated from end to end. A cord was passed through it, and it was worn on the wrist like a bracelet. This way of wearing the signet is more than once alluded to in the Old Testament (Gen. xxxviii. 18, Revised Version, and Cant. viii. 6).

The Etruscans used very largely the gold swivel ring mounted with a scarab, a form of signet probably introduced from Egypt. Some found in Etruscan tombs have real Egyptian scarabs with legible hieroglyphs; others, probably the work of Phœnician or native engravers, have rude copies of hieroglyphs, either quite or partially illegible. A third and more numerous class of Etruscan signet rings have scarabs, cut usually in sard or carnelian, which are a link between the art of Egypt and that of Greece, the design cut on the flat side being Hellenic in style, while the back is shaped like the ordinary Egyptian scarabæus beetle.

Among the Greeks signet rings were very largely worn, and were usually set with engraved gems. In Sparta a sumptuary law was passed at an early time to forbid any substance more valuable than iron to be used for signet rings; but in other parts of the Hellenic world there appears to have been no restriction of this sort. In some of the numerous tombs of Etruria and Kertch (Panticapæum) in the Cimmerian Bosphorus gold rings of great magnificence have been discovered, apparently of the finest Greek workmanship. One from Etruria, now in the British Museum, is formed by two minutely modelled lions whose bodies form the hoop, while their paws hold the bezel, a scarab engraved with a lion of heraldic character. Many other examples of this design have been found, some of which are among the finest existing specimens of Hellenic or Græco-Etruscan jewellery. Another remarkable specimen from an Etruscan tomb is of Etrusco-Latin work. The hoop of the ring is formed by two minute gold figures of Hercules and Juno Sospita, the stone being set between their heads. Many of the Greek rings are of thin repoussé gold, so as to make the most show for the least cost; one fine example, early in date, has its hoop formed of two dolphins, holding a plain white stone.

The Romans appear to have imitated the simplicity of Lacedæmonia. Throughout the republic none but iron rings were worn by the bulk of the citizens. Ambassadors were the first who were privileged to wear gold rings, and then only while performing some public duty. Next senators, consuls, equites, and all the chief officers of state received the *jus annuli aurei*. One early Roman ring of the highest historical interest still exists; it belonged to Cornelius Scipio Barbatus, consul in 298 B.C., in whose sarcophagus, now in the Vatican, it was found in 1780.[2] It is of plain rudely hammered gold, and is set with an intaglio on sard of a figure of Victory, purely Roman in style, dating before 300 B.C. In the Augustan age many valuable collections of antique rings were made, and were frequently offered as gifts in the temples of Rome. One of the largest and most valuable of the *dactyliothecæ* was dedicated in the temple of Apollo Palatinus by Augustus's nephew Marcellus, who had formed the collection (Pliny, *H. N.*, xxxvii. 5). The temple of Concord in the Forum contained another; among this latter collection was the celebrated ring of Polycrates, king of Samos, the story of which is told by Herodotus (see vol. xix. p. 417); Pliny, however, doubts the authenticity of this relic (*H. N.*, xxxvii. 2).

Different laws as to the wearing of rings existed during the empire: Tiberius made a large property qualification necessary for the wearing of gold rings; Severus conceded the right to all Roman soldiers; and later still all free citizens possessed the *jus annuli aurei*, silver rings being worn by freedmen and iron by slaves. Under Justinian even these restrictions passed away.

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[1] Compare GEMS, vol. x. p. 136.

[2] This ring afterwards passed into the Beverley collection.

In the 3d and 4th centuries Roman rings were made engraved with Christian symbols. Fig. 1 shows two silver rings of the latter part of the 4th century, which were found in 1881 concealed in a hole in the pavement of a Roman villa at Fifehead Neville, Dorset, together with some coins of the same period. Both have the monogram of Christ, and one has a dove within an olive wreath rudely cut on the silver bezel. These rings are of special interest, as Roman objects with any Christian device have very rarely been found in Britain.

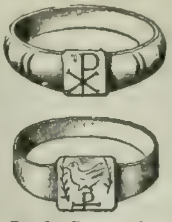
Fig. 1.—Roman silver rings.

Large numbers of gold rings have been found in many parts of Europe in the tombs of early Celtic races. They are usually of very pure gold, often penannular in form—with a slight break, that is, in the hoop so as to form a spring. They are often of gold wire formed into a sort of rope, or else a simple bar twisted in an ornamental way. Some of the quite plain penannular rings were used in the place of coined money.

Throughout the Middle Ages the signet ring was a thing of great importance in religious, legal, commercial, and private matters.

piscopal rings.

The episcopal ring[1] was solemnly conferred upon the newly made bishop together with his crozier, a special formula for this being inserted in the Pontifical. In the time of Innocent III. (1194) this was ordered to be of pure gold mounted with a stone that was not engraved; but this rule appears not to have been strictly kept. Owing to the custom of burying the episcopal ring in its owner's coffin a great many fine examples still exist. Among the splendid collection of rings formed by the distinguished naturalist Edmund Waterton, and now in the South Kensington Museum, is a fine gold episcopal ring decorated with niello, and inscribed with the name of Alhstan, bishop of Sherborne from 824 to 867 (see fig. 2).[2] In many cases an antique gem was mounted in the bishop's ring, and often an inscription was added in the gold setting of the gem to give a Christian name to the pagan figure. The monks of Durham, for example, made an intaglio of Jupiter Serapis into a portrait of St Oswald by adding the legend CAPVT S. OSWALDI. In other cases the engraved gem appears to have been merely regarded as an ornament without meaning, as, for example, a magnificent gold ring found in the coffin of Seffrid, bishop of Chichester (1125–1151), in which is mounted a Gnostic intaglio. Another in the Waterton collection bears a Roman cameo in plasma of a female head in high relief; the gold ring itself is of the 12th century. More commonly the episcopal ring was set with a large sapphire, ruby, or other stone cut *en cabochon*, that is, without facets, and very magnificent in effect (see fig. 3). It was worn over the bishop's gloves, usually on the fore-finger of the right hand; and this accounts for the large size of the hoop of these rings. In the 15th and 16th centuries bishops often wore three or four rings on the right hand in addition to a large jewel which was fixed to the back of each glove.

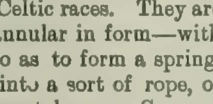
Fig. 2.—Ring of Bishop Alhstan.

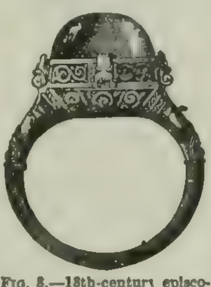
Fig. 3.—13th-century episcopal ring of Italian workmanship, of gold, set with a sapphire *en cabochon*.

Cramp rings were much worn during the Middle Ages as a preservative against cramp. They derived their virtue from being blessed by the king; a special form of service was used for this, and a large number of rings were consecrated at one time, usually when the sovereign touched patients for the king's evil.

Decade rings were not uncommon, especially in the 15th century; these were so called from their having ten knobs along the hoop of the ring, and were used, after the manner of rosaries, to say nine aves and a paternoster. In some cases there are only nine knobs, the bezel of the ring being counted in, and taking the place of the *gauds* in a rosary. The bezel of these rings is usually engraved with a sacred monogram or word.

Gemel or gimmel rings, from the Latin *gemellus*, a twin, were made with two hoops fitted together, and could be worn either together or singly; they were common in the 16th and 17th centuries, and were much used as betrothal rings.

Posy rings.

Posy rings,[3] so called from the "poesy" or rhyme engraved on them, were specially common in the same centuries. The name posy ring does not occur earlier than the 16th century. A posy ring inscribed with "love me and leave me not" is mentioned by Shakespeare (*Mer. of Ven.*, act v. sc. 1). The custom of inscribing rings with mottoes or words of good omen dates from a very early time. Greek and Roman rings exist with words such as ZHCAIC, XAIPE, KAAH, or *votis meis Claudia vivas*. In the Middle Ages many rings were inscribed with words of cabalistic power, such as *anam zapta*, or Caspar, Melchior, and Balthasar, the supposed names of the Magi. In the 17th century they were largely used as wedding rings, with such phrases as "love and obaye," "fear God and love me," or "mulier viro subjecta esto."

Memorial rings.

In the same century memorial rings with a name and date of death were frequently made of very elaborate form, enamelled in black and white; a not unusual design was two skeletons bent along the hoop, and holding a coffin which formed the bezel.

Merchants' rings.

In the 15th and 16th centuries signet rings engraved with a badge or trademark were much used by merchants and others; these were not only used to form seals, but the ring itself was often sent by a trusty bearer as the proof of the genuineness of a bill of demand.[4] At the same time private gentlemen used massive rings wholly of gold with their initials cut on the bezel, and a graceful knot of flowers twining round the letters. Of this kind is Shakespeare's ring, now in the British Museum, which was found near the church of Stratford; on it is cut a cord arranged in loops between the letters W and S. Other fine gold rings of this period have coats of arms or crests with graceful lambrequins.

Poison rings with a hollow bezel were used in classical times; as, for example, that by which Hannibal killed himself, and the poison ring of Demosthenes. Pliny records that, after Crassus had stolen the gold treasure from under the throne of Capitoline Jupiter, the guardian of the shrine, to escape torture, "broke the gem of his ring in his mouth and died immediately." The mediæval *anello della morte*, supposed to be a Venetian invention, was actually used as an easy method of murder. Among the elaborate ornaments of the bezel a hollow point made to work with a spring was concealed; it communicated with a receptacle for poison in a cavity behind, in such a way that the murderer could give the fatal scratch while shaking hands with his enemy. This device was probably suggested by the poison fang of a snake.

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[1] See a paper by Edm. Waterton, in *Arch. Jour.*, xx. p. 224.

[2] See NIELLO (vol. xvii. p. 494) for a cut of another specimen of an early ring decorated in a similar way.

[3] See Waterton, in *Arch. Jour.*, xvi. p. 307.

[4] The celebrated ring given to Essex by Queen Elizabeth was meant to be used for a similar purpose. It is set with a fine cameo portrait of Elizabeth cut in sardonyx, of Italian workmanship.

The so-called papal rings, of which many exist dating from the 15th to the 17th centuries, appear to have been given by the popes to new-made cardinals. They are very large thumb rings, usually of gilt bronze coarsely worked, and set with a foiled piece of glass or crystal. On the hoop is usually engraved the name and arms of the reigning pope, the bezel being without a device. They are of little intrinsic value, but magnificent in appearance.

Another very large and elaborate form of ring is that used during the Jewish marriage service. Fine examples of the 16th and 17th centuries exist. In the place of the bezel is a model, minutely worked in gold or base metal, of a building with high gabled roofs, and frequently movable weathercocks on the apex. This is a conventional representation of the temple at Jerusalem.

Perhaps the most magnificent rings from the beauty of the workmanship of the hoop are those of which Benvenuto Cellini produced the finest examples. They are of gold, richly chased and modelled with caryatides or grotesque figures, and are decorated with coloured enamels in a very skilful and elaborate way. Very fine jewels are sometimes set in these magnificent pieces of 16th-century jewellery.

Thumb rings were commonly worn from the 14th to the 17th century. Falstaff boasts that in his youth he was slender enough to "creep into any alderman's thumb ring" (Shakes., *Hen. IV.*, *Pt. I.*, act ii. sc. 4).

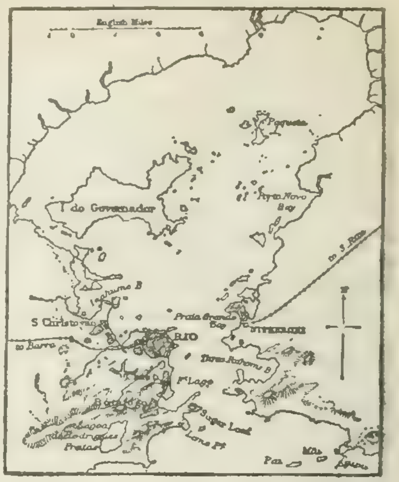
The finest collections of rings formed in Britain have been those of Lord Londesborough, Edmund Waterton (now in the South Kensington Museum), and those still in the possession of Mr A. W. Franks and Mr Drury Fortnum.

See Gorlæus, *Dactyliotheca*, Lyons, 1601; King, *Antique Gems and Rings*, 1872; Jones, *Finger-Rings*, 1878; Edwards, *History of Rings*, New York, 1875; and various articles by Waterton and others in the *Archæological Journal*. (J. H. M.)

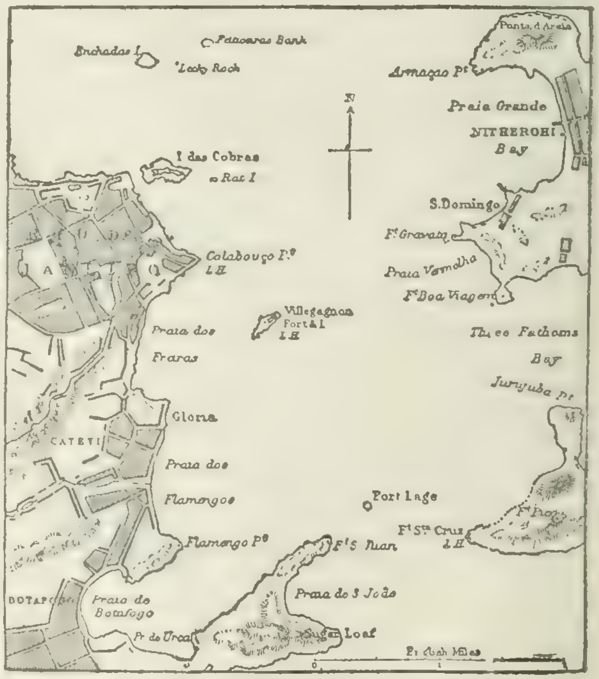
RINGWORM. See PARASITISM, vol. xviii. p. 269, and SKIN DISEASES.

RIOBAMBA, or ROYABAMBA, a town in the South-American republic of Ecuador, situated on the road from Guayaquil to Quito in "a sand valley or plain of the great central highland of the Andes—Chimborazo, Carguairazo, Tunguragua, and Altar all being visible from its plaza." The town has occupied its present site only since the close of the 18th century; in 1797 the old town, which lay about 12 miles to the west at Cajabamba, was completely destroyed by a vast landslip (still recognizable) from Mount Cicalfa in one of the most terrific convulsions recorded even in that region of volcanic activity. Ruins still remain to show that Riobamba was a much larger and finer place then than at the present day. Though said to have 16,000 inhabitants, and to manufacture woollen gloves, sacking, and coverlets, the town is poorly built and comparatively lifeless.

RIO DE JANEIRO (in full form SÃO SEBASTIÃO DO RIO DE JANEIRO, and colloquially shortened to RIO), the capital of Brazil, and one of the principal seaports of South America, is situated on the western side of one of the finest natural harbours in the world in 25° 54′ 23″ S. lat. and 43° 8′ 34″ W. long. (the position of the observatory). Along with its environs it is separated from the province of Rio de Janeiro (whose chief town is Nitherohi) and constitutes an independent municipality (municipio neutro), with an area of about 540 square miles, divided into nineteen (formerly sixteen) parishes or frequezias. Most of the streets are narrow and mean-looking; even the fashionable Rua do Ouvidor, which is lined on both sides with handsome shops, is a mere alley. The Rua Direita, or, as it is now called officially, Rua Primeiro de Março, is the principal business street, and is wide and pleasant. It runs from the gate of the royal palace (a building of small pretensions) to the convent of São Bento, and contains the exchange, the post office, and the custom-house, as well as the imperial chapel (1761) and several other churches. The churches and monastic buildings of Rio de Janeiro number upwards of fifty, mostly built in the 'Jesuit" style, but striking from their size and the barbaric magnificence of their decorations, as well as on account of their well-chosen sites. La Candellaria (17th century) is conspicuous from the height of its towers, and La Gloria crowns a beautiful eminence on the bay. The monastery of São Bento is reputed to be the wealthiest in the empire, with large possessions in land and mines; and its chapel is not unworthy of that reputation. Besides the famous hospital of Dom Pedro II., better known as La Misericordia, because built (1841) on ground belonging to the fraternity of that name, there are several smaller institutions of the same class in the city; and a large and handsome lunatic asylum, founded in 1841 with funds obtained by selling titles of nobility at a fixed tariff, occupies a good position in the Botafogo suburb. The military hospital is also an extensive establishment. Among the literary and scientific institutions of the city, the College Dom Pedro



Harbour of Rio de Janeiro.



Rio de Janeiro and its Environs.

II. (which is well organized), national museum, institute of history, geography, and ethnology (1838), polytechnic institute, national educational museum, polytechnic school, military, naval, and normal schools, lyceum of arts, musical conservatory, geographical society, and astronomical and meteorological observatory deserve special mention. The great national library owes its foundation to the bequest of João VI., and now numbers upwards of 120,000 volumes open to the public daily (see LIBRARIES, vol. xiv. p. 530, where the lesser libraries are also mentioned). One of the pleasant features of the city is the abundant supply of excellent water distributed to numerous stately fountains in the streets and public squares. The chief aqueduct, begun in the middle of the 17th century, starts at Tijuca, about 12 miles distant. and crosses the valley (740 feet wide and 90 feet deep) between Monte de Santa Theresa and Monte de Santo Antonio by a beautiful double tier of arches (erected in 1750), which form a striking feature in some of the finest views of the city. Its entire length being covered in with stone work, the water is kept remarkably cool. As the city has extended, other aqueducts of less architectural pretensions have had to be constructed; and a good deal has been done by an English company in recent years to provide a proper system of sewers. The bay of Rio de Janeiro has been the subject of poetic panegyric ever since it was discovered; and the traveller who comes to it after a voyage round the world seems as susceptible to its charm as if it were his first tropical experience.[1] The actual entrance, between Fort St Juan and Fort Santa Cruz, is 1700 yards wide. Within there are fifty square miles of anchorage, or even more for vessels of light draught, the bay having a width varying from 2 to 7 miles and stretching inland from the sea for 16 miles. Its coast-line, neglecting minor indentations, measures 60 miles. Such a sheet of water would be beautiful anywhere; but, when on all sides it is surrounded by hills of the most varied contour, the beauty is enhanced a thousandfold. Its surface is broken by a large number of islands—from the Ilha do Governador (6 miles long and 2 broad; population 2500) down to the little cluster of the Jerubahibas.

Rio is the seat of the principal arsenal in the empire, and most of the Brazilian cruisers have been built in its dockyards. The roadstead for vessels of war is between Villegagnon Island, with its fort, and the islands at the north-east angle of the town called respectively Ilha das Cobras (Snake Island) and Ilha dos Ratos (Rat Island). On the north side of Ilha das Cobras is the naval arsenal with two large docks. On Ilha das Enchadas (Coaling Island) there is a fine commercial dock 385 feet long, on keel blocks, 45 feet wide at the entrance and 23 feet deep. Between 1846 and 1855 the average number of vessels that cleared from the port of Rio was over 680 with an average total burden of 221,280 tons. In 1867 1311 vessels (522,407 tons) entered and 1032 (596,663 tons) cleared; in 1883 1218 (1,220,330 tons) entered and 1067 cleared, while, besides, the coasting trade was represented by 1414 vessels (454,739) entering. England has the greatest share of the foreign shipping trade, Germany ranking next, and France third. How completely (in spite of the fact that Santos and Rio Grande have become more independent) Rio de Janeiro is the commercial as well as the political capital of Brazil is evident from the fact that the exports from Rio are on the average fully equal in value to those from the rest of Brazil; for instance, the value of the exports from the capital in 1859-60 was £5,933,850 out of £11,826,121 from the empire, in 1879-80 £10,566,800 out of £18,928,635, and in 1881-82 £7,550,966 out of £18,522,050. To this large total coffee has long contributed 40-50 per cent., and in 1880-81 (an exceptional year) the ratio rose to 86 per cent. Though the coffee plant was not introduced till 1770, Brazil is the greatest coffee-producing country in the world, and Rio de Janeiro is consequently the largest coffee-exporting city. The other exports of moment are brandy (in decreasing quantities), sugar, hides, diamonds, tapioca (mainly to France), tobacco and cigars, medicinal herbs, gold dust, and jacaranda, rosewood, and other timbers. The imports comprise cotton goods, machinery, pitch pine, and petroleum. Among the comparatively few local industries are the weaving of coloured buckskins (by a German firm) and other woollen and half woollen stuffs, the extensive manufacture of artificial mineral waters and liquors, brewing, carriage-building, and hat-making. Rio de Janeiro is the terminus of the Dom Pedro II. Railway, and thus of nearly the whole railway system of the country; and it communicates regularly by steamer with Nitherohi on the other side of the bay, which is the terminus of another line. The population of the municipality of Rio de Janeiro was in 1850 stated at 266,466, of which 205,906 were in the town proper; but this, like most of the earlier figures, appears to be an exaggeration, as the census in 1872 gave only 274,972, of which about 190,000 were in the town and suburbs, the slaves numbering 48,939 and the foreigners (mainly Germans, French, and Italians) 84,279. The Italian element has been rapidly increasing. The bulk of the population is Portuguese with a mixture of Negro blood. The native Indian races are scarcely represented.

The annual rainfall at Rio de Janeiro is about 60 inches, the greatest precipitation taking place in February (12 inches), and the least in August (under 1 inch). The monthly ranges of temperature for 1882 were—January 97°-68°, February 95°-68°; March 95°-69°; April 87°-64°; May 84°-60°; June 82°-59°; July 85°-59°; August 98°-54°; September 80°-50°; October 92°-59°.; November 97°-59°; December 96°-62°.

The bay of Rio de Janeiro, the Nitherohi or "Hidden Water" of the natives, was first observed on 1st January (hence the name) by Alphonso de Souza, who supposed, as the Rio indicates, that he had discovered the mouth of a large river. How Villegagnon in 1558 took possession of the island which now bears his name but was then called after his patron Coligny, and how his colony was destroyed by the Portuguese, has been told in the article BRAZIL (vol. iv. p. 229). The city of Rio de Janeiro did not become the capital of the viceroyalty till 1763, when José I. chose it in preference to Bahia because it was a better centre for defensive operations against the Spaniards. In 1711 it had been captured by Duguay-Trouin, who exacted 70,000 cruzados as ransom. It became the residence of the Portuguese royal family in 1808; in the same year its port was declared free to foreign trade; and in the course of a short time it was made by Dom João VI. the seat of so many important institutions that Portugal became jealous at finding the relation between mother country and colony practically reversed. When João VI. returned to Portugal and Pedro was declared emperor of Brazil in 1822, Rio de Janeiro naturally remained the capital of the new state. Ecclesiastically the city was at first (from the foundation of the church of São Sebastião by Mendo de Sá in 1567) subject to the diocese of Bahia (San Salvador). It was made a suffragan bishopric of Bahia by papal bull of 19th July 1576; and when Bahia was by the bull of 16th November 1676 created the metropolitan archbishopric of Brazil, Rio de Janeiro was (along with Pernambuco) declared a bishopric, the bishop's authority extending over the province of Espirito Santo northwards and southwards to the Rio de la Plata (Rio da Prata). The first bishop relinquished his dignity without taking possession; and the second did not reach his diocese till 1682, when he made the church of St Sebastian on the Castle Hill his cathedral. This distinction was in 1734 transferred to the Church of the Cross and in 1738 to that of the Rosary. A new cathedral was begun in 1749 by D. Frei Antonio do Desterro, but the works were discontinued on his death, and in 1840 the materials served for the military academy.

See Milliet de Saint-Adolphe, *Diccionario . . . . do Imp. do Brazil*, Paris, 1845, G. Gardiner, *Travels in the Interior of Brazil*, 1846; Burmeister, *Reise nach Brasilien*, Berlin, 1853; Herbert H. Smith, *Brazil*, 1880; C. F. van Delden Laerne, *Brazil and Java*, 1885. (H. A. W.)

RIO GRANDE (that is, "Great River" in both Spanish and Portuguese), a descriptive epithet which in a vast number of cases has become a proper name. (1) RIO GRANDE (or RIO BRAVO) DEL NORTE, which rises in the Rocky Mountains between the La Plata and San Juan ranges in the south-west of Colorado, has a total course of about 1800 miles, and forms for 1100 miles the boundary between the United States and Mexico, but owing to the shallowness of its ordinary current is navigable for steamers only to Kingsbury's Rapids, 450 miles from the sea. (2) RIO GRANDE DO NORTE, or Potengi, or Potingi, which gives its Portuguese name to a northern province of Brazil, rises in the Serra dos Cairiris-Novos, passes Natal, the capital of the province, and falls into the sea to the south of São Roque. (3) Rio Grande do Sul, the outlet of the Lagôa dos Patos, wrongly supposed by the early explorers to be the mouth of a great river, gives its name to a city and province of Brazil (see below). (4) Rio Grande, a river of Western Africa, enters the sea opposite the Bissagos Archipelago (see Senegambia).

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[1] "This bay," says Mr Gallenga, "is the very gate to a tropical paradise. There is nowhere so bold a coast, such a picturesque cluster of mountains, such a maze of inlets and outlets, such a burst of all-pervading vegetation. The city itself is like Lima or Buenos Ayres, a mere chess-board of shabby narrow streets. But the environs all round—the Botafogo Bay, the vale of Larangerias, the height of Tejuca, San Cristoval, Santa Teresa, and others . . . . may well challenge comparison with any of the loveliest localities of either hemisphere. You are bidden drive out to the Botanic Gardens (at Botafogo), but the whole road inland or along the water is nothing but a continuous garden."

RIO GRANDE DO SUL, or in full São Pedro do Rio Grande do Sul, a city of Brazil, in the province of the same name, near the mouth of the estuary of Rio Grande. Including the suburbs it is a place of from 30,000 to 35,000 inhabitants (1880), with a considerable trade and various manufactures. The bar at the mouth of the "Rio" does not admit vessels of full 10-feet draught; but dredging operations undertaken by the Government in 1882 are considerably increasing the depth. In 1881–84 a railway was constructed from Rio Grande do Sul to Bage, 125 miles inland. The average annual value of the imports in the six official years ending June 30, 1882, was about £589,043, reckoning the milreis at 2s. In 1881 651 vessels (133,779 tons) crossed the bar inwards, and 555 (133,276) outwards. Among the foreign vessels the British are most numerous. The imports are very various, to supply the colonies of Germans, Italians, &c., settled throughout the province; the exports on the other hand are mainly hides, skins, bones, hair, tallow, &c.

Rio Grande do Sul was a long time the chief town of the captaincy of El Rei (which included both the present province of Rio Grande do Sul and that of Santa Catharina). It was first founded as an encampment of Portuguese troops in 1737 on the south side of the Rio Grande. The settlement was removed to its present site by Gomes Freire d'Andrade in 1745. The Spaniards occupied this part of the country from 1763 to 1776. In 1807 the two districts of São Pedro and Santa Catharina were united and erected into a province with São José de Porto Alegre for its chief town; and, though Rio Grande was declared a city in 1809, Porto Alegre retained its position even after the separation into two comarcas in 1812. The name of the province has been rendered familiar in Europe through the remarkable success which has attended the establishment of German and Italian agricultural colonies. In 1872 there were 36,458 foreigners in the province to 330,564 free-born Brazilians and 67,791 slaves; and by 1882 it was estimated that the German population alone amounted to 102,000, while the Italians, who began to immigrate in 1875, were rapidly approaching 50,000. The first German settlement was that of São Leopoldo on the Rio do Sino, founded by Dom Pedro I. in 1825. By 1830 the inhabitants numbered 5000, and in 1854 the town was made a municipium. Others of the same nationality are Novo Mundo (1850), Nova Petropolis (1858), Santa Maria da Soledade, Marato, São Benedicto, São Salvador, Montenegro, Feliz, Teutonia (1858), Estrella (1856), Santa Cruz (1849), Mont Alverne, Germania, São Lorenzo (1858), Santa Clara, São Silvano, Domingos, &c. The principal Italian colonies are Caxias, Conde d'Eu, Donna Isabel, and Silviera Martins, which in 1884 had respectively 13,680, 6287, 9595, and 6000 inhabitants. The success of these colonies is one of the most important elements in the development of the Brazilian empire.

See works by Hörmeyer (Coblentz, 1854); Mulhall (London, 1873); Cantatt (Berlin, 1877); H. Lange (Leipsic, 1881); Richard Dilthey (Berlin, 1882); for the Italian colonies, Breitenbach's paper in *Globus* (1885); and, for the Lagôa dos Patos, Ihering in *Deutsche geogr. Blätter* (Bremen, 1885).

RIOM, a town of France, with 9590 inhabitants, at the head of an arrondissement in the department of Puy-de-Dôme, 8 miles north of Clermont-Ferrand on the railway to Paris, occupies an eminence on the left bank of the Ambène (a left-hand tributary of the Allier) rising above the fertile plain of Limagne. It is surrounded with boulevards and has wide streets, but the houses, being built of black lava, have a rather sombre appearance. Some date from the 15th and 16th centuries, with turrets and ancient carved work. The church of St Amable goes back to the 12th century, but has suffered by repeated restorations. The old ducal palace (now occupied by the court of appeal, &c.) has a collection of portraits of Auvergne celebrities. A feature in the town is the fountains, of which some are of the Renaissance period. Riom trades in the products of Limagne—grain, wine, hemp, preserved fruits, and especially a conserve of apricots—and has a tobacco manufactory.

Riom (*Ricomagus* or *Ricomum* of the Romans) was long the rival of Clermont. Along with Auvergne it was seized for the crown by Philip Augustus, and it was the capital of this province under the dukes of Berri and Bourbon. During the religious wars it long held with the League. Its courts of law, always famous, are associated with the memory of D'Aguesseau.

RIONERO IN VOLTURE, a city of Italy, in the province of Potenza, 4 miles from Atella, is pleasantly situated at the foot of Monte Volture, has the repute of being the best built and best kept of the towns of the Basilicata, and has long been distinguished by the industrious character of its inhabitants (11,383 in 1881). It does not seem to be older than the first half of the 17th century. In 1851 it suffered severely from the earthquake.

RIOT is "an unlawful assembly which has actually begun to execute the purpose for which it assembled by a breach of the peace and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose to the terror of the people, although they had not that purpose when they assembled" (Stephen, *Digest of the Criminal Law*, art. 73). The above is the definition of a riot at common law in England. The offence is the most grave kind of breach of the peace known to the law, short of treason. In its previous stages it may be an affray, an unlawful assembly, or a riot, according to circumstances, and it may, if carried far enough, become treason. An affray is the fighting of two or more persons in the public street. An unlawful assembly is an assembly of three or more persons with intent to commit a crime by force or carry out a common purpose, lawful or unlawful, in such a way as to give reasonable grounds for fearing a breach of the peace. A rout is an unlawful assembly which has made a motion towards the execution of its common purpose. If the unlawful assembly should begin to demolish a particular inclosure, that would be a riot; if it should proceed to pull down all inclosures, that would be treason. It was considered as early as the 14th century that the common law gave an insufficient remedy against riot. In 1360 the statute of 34 Edw. III. c. 1 gave jurisdiction to justices to restrain, arrest, and imprison rioters. In 1393 the statute of 17 Ric. II. c. 8 conferred similar powers on the sheriff and *posse comitatus*. Numerous other Acts extending the common law were passed, especially in the Tudor reigns (see Stephen, *History of the Criminal Law*, vol. i. p. 202). The effect of existing legislation is to constitute certain statutory offences similar to riot at common law. The earliest Act now in force is one commonly called the Riot Act, 1 Geo. I. st. 2, c. 5. That Act makes it the duty of a justice, sheriff, mayor, or other authority, wherever twelve persons or more are unlawfully, riotously, and tumultuously assembled together to the disturbance of the public peace, to resort to the place of such assembly and read the following proclamation:—"Our Sovereign Lady the Queen chargeth and commandeth all persons being assembled immediately to disperse themselves, and peaceably to depart to their habitations or to their lawful business, upon the pains contained in the Act made in the first year of King George for preventing tumultuous and riotous assemblies. God save the Queen." It is a felony punishable with penal servitude for life to obstruct the reading of the proclamation or to remain or continue together unlawfully, riotously, and tumultuously for one hour after the proclamation was made or for one hour after it would have been made but for being hindered. The Act requires the justices to seize and apprehend all persons continuing after the hour, and indemnifies them and those who act under their authority from liability for injuries caused thereby. Any prosecution for an offence against the Act must be commenced within twelve months after the offence.

By 24 & 25 Vict. c. 97, § 11, it is a felony punishable with penal servitude for life for persons riotously and tumultuously assembled together to the disturbance of the public peace to unlawfully and with force demolish or begin to demolish or pull down or destroy any building, public building, machinery, or mining plant. By § 12 it is a misdemeanour punishable with seven years' penal servitude to injure or damage such building, &c. A riotous assembly of three or more seamen unlawfully and with force preventing, hindering, or obstructing the loading or unloading or the sailing or navigation of any vessel, or unlawfully and with force boarding any vessel with intent to do so, constitutes a misdemeanour punishable with twelve months' hard labour, 33 Geo. III. c. 67. In addition to these Acts, there are others aimed at crimes of a somewhat similar nature, such as assembly for the purpose of smuggling, going armed in pursuit of game by night, forcible entry and detainer, political meetings in the city of Westminster, tumultuous petitioning, and unlawful drilling. For these offences see Stephen, *Digest of the Criminal Law*, art. 76–82.

It is the duty of a magistrate at the time of a riot to assemble subjects of the realm, whether civil or military, for the purpose of quelling a riot. In this duty he is aided by the common law, under which all subjects of the realm are bound to assist on reasonable warning, and by various enactments enabling the authorities to call out the auxiliary and reserve forces for the suppression of riot, and to close public houses where a riot is apprehended. It is his duty to keep the peace; if the peace be broken, honesty of intention will not avail him if he has been guilty of neglect of duty. The question is whether he did all that he knew was in his power and which could be expected from a man of ordinary prudence, firmness, and activity. The law as thus stated is gathered from the opinions of the judges on the trials of the lord mayor of London and the mayor of Bristol on indictments for neglect of duty at the time of the Gordon riots of 1780 and the Bristol riots in 1831.[1] In addition to his liability to an indictment at common law, a defaulting magistrate is subject under the provisions of 13 Hen. IV. c. 7 and 2 Hen. V. st. 1, c. 8, to a penalty of £100 for every default, the default to be inquired of by commission under the great seal. A matter of interest is the extent of the protection afforded by the Riot Act to soldiers acting under the commands of their officers. The soldier is at the same time a citizen, and the mere fact of his being a soldier is not sufficient to exonerate him from all responsibility. No case in which the question has called for decision seems to have arisen. It is the opinion of Mr Justice Stephen that a soldier would be protected by orders for which he might reasonably believe his superior officer to have good grounds (*History of the Criminal Law*, vol. i. 206). On the other hand, he would probably not be protected by an order plainly unnecessary, such as an order to fire into a crowd of women and children when no violence was observable.

The civil remedy given to those whose property has suffered by riot is of an exceptional character. The action is brought against the hundred in which the riot took place. This liability of the hundred is a survival of the pre-Conquest obligation of the hundred and tithing to pursue and do justice on the thief: the hundred is supposed to guarantee the orderly conduct of its inhabitants, and is liable to damages for its failure to preserve order. The liability of the hundred in case of robbery was enacted as early as the Statute of Winchester, 13 Edw. I. st. 2. That and subsequent Acts were repealed by 7 & 8 Geo. IV. c. 27, and their provisions were consolidated and amended by 7 & 8 Geo. IV. c. 31. The Act gives a remedy against the hundred in the case of any church, chapel, house, machinery, &c., being "feloniously demolished, pulled down, or destroyed, wholly or in part, by any persons riotously and tumultuously assembled together." A summary remedy is given for damage not exceeding £30. The remedy is extended to injury to threshing machines by 2 & 3 Will. IV. c. 72. It has been held that damage to a house will not entitle the owner to compensation from the hundred unless the intention of the rioters was to totally destroy the house.

The Riot Act does not extend to Ireland. But similar provisions are contained in the Act of the Irish Parliament of 27 Geo. III. c. 15, as amended by 5 & 6 Vict. c. 28. An offence peculiar to Ireland and punishable with penal servitude for life under the provisions of the Acts above mentioned is the sending of a notice, letter, or message exciting or tending to excite a riot. The Prevention of Crimes Act, 1882, enabled summary proceedings to be taken against rioters. The Act was temporary only, expiring with the session of Parliament 1885.

In Scotland a riot may be either rioting and mobbing or rioting and breach of the peace. The first is much the same as the riot of English law. "Mobbing consists in the assembling of a number of people and their combining against order and peace to the alarm of the lieges" (Macdonald, *Criminal Law*, 180). The second offence occurs where concourse or a common purpose are wanting. Numerous Acts against riot and unlawful convocation were passed by the Scottish parliament at different times, beginning as early as 1457. The Riot Act (1 Geo. I.) applies to Scotland. The liability of the county or burgh for destruction of property by riot is provided for by the Riot Act and by several Acts of Parliament of the reign of George III.

In the United States the law is based upon that of England. In some States there is a statutory proclamation for the dispersion of rioters in words almost identical with those of the British Riot Act. The city, town, or county, according to circumstances, is liable for the damage caused by rioters. In some cases a remedy over against the rioters is given by legislation. (J. Wt.)

RIPARIAN LAWS. By the law of England the property in the bed and water of a tidal river as high as the tide ebbs and flows at a medium spring tide is presumed to be in the crown or a grantee of the crown, generally the lord of a manor, and the bed and water of a non-tidal river are presumed to belong to the person through whose land it flows, or, if it divide two properties, to the riparian proprietors, the rights of each extending to mid-stream (*ad medium filum aquæ*). In order to give riparian rights, the river must flow in a defined channel, or at least above ground. The diminution of underground water collected by percolation does not give a cause of action to the owner of the land in which it collects, though he is entitled to have it unpolluted unless a right of pollution be gained against him by prescription. As a general rule a riparian proprietor, whether on a tidal or a non-tidal river, has full rights of user of his property. The most important limitations of these rights will be found under the headings FISHERIES and NAVIGATION LAWS. In both these cases the rights of the riparian proprietors are subject to the intervening rights of other persons. These rights vary according as the river is navigable or not, or tidal or not. For instance, all the riparian proprietors might combine to divert a non-navigable river, though one alone could not do so as against the others, but no combination of riparian proprietors could defeat the right of the public to have a navigable river maintained undiverted. It is proposed in this place to consider shortly the rights enjoyed by, and the limitations imposed upon, riparian proprietors, in addition to those falling under the head of fishery or navigation. In these matters English law is in substantial accordance with the law of other countries, most of the rules being deduced from Roman law. Perhaps the main difference is that running water is in Roman law a *res communis*, like the air and the sea. In England, owing to the greater value of river water for manufacturing and other purposes, it cannot be said to be common property, even though it may be used for navigation. The effect of this difference is that certain rights, public in Roman law, such as mooring and unloading cargo, bathing and towing, are only acquirable by prescription or custom in England. A hut might lawfully be built on the shore of a tidal river by Roman law; in England such a building would be a mere trespass.

The principal rights enjoyed by riparian owners as such are the right of increase of property by means of alluvion and the right of use of the water.

Alluvion is the gradual and imperceptible increase of land by deposit; a sudden and violent changing of the course of a stream by a flood does not change the property. The addition to property by alluvion is occasionally of considerable practical importance. In the reign of Charles I. the estate of Lord Berkeley was increased by 300 acres left dry by the Severn. The land was claimed for the crown, but judgment was given in favour of Lord Berkeley. If an island be formed in the stream, it belongs to the proprietor to whose land it is nearest; if it be exactly in mid-stream, it belongs to the riparian proprietors equally. The right of use of the water of a natural stream cannot be better described than in the words of Lord Kingsdown:—"By the general law applicable to running streams, every riparian proprietor has a right to what may be called the ordinary use of water flowing past his land,—for instance, to the reasonable use of the water for domestic purposes and for his cattle, and this without regard to the effect which such use may have in case of a deficiency upon proprietors lower down the stream. But, further, he has a right to the use of it for any purpose, or what may be deemed the extraordinary use of it, provided he does not thereby interfere with the rights of other proprietors, either above or below him. Subject to this condition, he may dam up a stream for the purposes of a mill, or divert the water for the purpose of irrigation. But he has no right to intercept the regular flow of the stream, if he thereby interferes with the lawful use of the water by other proprietors, and inflicts upon them a sensible injury," (Miner *v.* Gilmour, 12 *Moore's Privy Council Cases*, 156). The rights of riparian proprietors where the flow of water is artificial rest on a different principle. As the artificial stream is made by a person for his own benefit, any right of another person as a riparian proprietor does not arise at common law, as in the case of a natural stream, but must be established by grant or prescription. The rights of a person not a riparian proprietor who uses land abutting on a river by the licence or grant of the riparian proprietor are not as full as though he were a riparian proprietor, for he cannot be imposed as a riparian proprietor upon the other proprietors without their consent. The effect of this appears to be that he is not entitled to sensibly affect their rights, even by the ordinary as distinguished from the extraordinary use of the water.

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[1] Reports of these trials will be found in Carrington and Payne's *Reports*, vol. v., p. 254.

The limitations to which the right of the riparian proprietor is subject may be divided into those existing by common right, those imposed for public purposes, and those established against him by crown grant or by custom or prescription. Under the first head comes the public right of navigation, of anchorage and fishery from boats (in tidal waters), and of taking shell-fish (and probably other fish except royal fish) on the shore of tidal waters as far as any right of several fishery does not intervene. Under the second head would fall the right of eminent domain by which the state takes riparian rights for public purposes, compensating the proprietor, the restrictions upon the fishery rights of the proprietor, as by Acts forbidding the taking of fish in close time, and the restrictions on the ground of public health, as by the Rivers Pollution Act, 1876. The jurisdiction of the state over rivers in England may be exercised by officers of the crown, as by commissioners of sewers or by the Board of Trade under the Crown Lands Act, 1866. A bridge is erected and supported by the county authorities, and the riparian proprietor must bear any inconvenience resulting from it. An example of an adverse right by crown grant is a FERRY (*q.v.*) or a port. The crown, moreover, as the guardian of the realm, has jurisdiction to restrain the removal of the foreshore, the natural barrier of the sea, by its owner in case of apprehended danger to the coast. The rights established against a riparian proprietor by private persons must as a rule be based on prescription or custom, only on prescription where they are in the nature of profits *à prendre* (see PRESCRIPTION). Among such rights are the right to bathe, to land, to discharge cargo, to tow, to dry nets, to beach boats, to take sand, shingle, or water, to have a sea-wall maintained, to pollute the water (subject to the Rivers Pollution Act). In some cases the validity of local riparian customs has been recognized by the legislature. The right to enter on lands adjoining tidal waters for the purpose of watching for and landing herrings, pilchards, and other sea-fish was confirmed to the fishermen of Somerset, Devon, and Cornwall by 1 Jac. I. c. 23. The digging of sand on the shore of tidal waters for use as manure on the land was granted to the inhabitants of Devon and Cornwall by 7 Jac. I. c. 18. The public right of taking or killing rabbits in the daytime on any sea bank or river bank in the county of Lincoln, so far as the tide extends, or within one furlong of such bank, was preserved by 24 & 25 Vict. c. 96, § 17. It should be noticed that rights of the public may be subject to private rights. Where the river is navigable, although the right of navigation is common to the subjects of the realm, it may be connected with a right to exclusive access to riparian land, the invasion of which may form the ground for legal proceedings by the riparian proprietor (see Lyon *v.* The Fishmongers' Company, *Law Reports—Appeal Cases*, vol. i., 662).

A freshwater lake appears to be governed by the same law as a non-tidal river. The preponderance of authority is in favour of the right of the riparian proprietors as against the crown.

Unlawful and malicious injury to sea and river banks, towing paths, sluices, floodgates, milldams, &c., or poisoning fish is a crime under 24 & 25 Vict. c. 97.

Scotland.—The law of Scotland is in general accordance with that of England. One of the principal differences is that in Scotland, if a charter state that the sea is the boundary of a grant, the foreshore is included in the grant, subject to the burden of crown rights for public purposes. Persons engaged in the herring fishery off the coast of Scotland have, by 11 Geo. III. c. 31, the right to use the shore for 100 yards from high water mark for landing and drying nets, erecting huts, and curing fish. Similar powers were given to those engaged in any white fish fishery by 29 Geo. II. c. 23, but the section of the Act giving these powers was repealed by the Sea Fisheries Act, 1868.

United States.—In the United States the common law of England was originally adopted, the State succeeding to the right of the crown. This was no doubt sufficient in the thirteen original States, where rivers of the largest size do not occur, but was not generally followed in later times when it had become obvious that English law was insufficient to meet the case of the vast rivers and lakes of North America. "In Pennsylvania, North Carolina, South Carolina, Iowa, Mississippi, and Alabama, it has been determined that the common law does not prevail, and that the ownership of the bed or soil of all rivers navigable for any useful purpose of trade or agriculture, whether tidal or fresh water, is in the State" (Bouvier, *Law Dict.*, *s.v.* "River"). The supreme court of the United States in 1857 declared constitutional an Act of Congress of 1845, extending the admiralty jurisdiction of the United States to all public navigable rivers and lakes where commerce is carried on between different States or with foreign nations (The Propeller Genesee Chief *v.* Fitzhugh, 12 *Howard's Reports*, 443). The right of eminent domain has been exercised to a much greater extent than in England in the acquisition of sites for mills under the powers of State legislation in encouragement of trade. Such a course has never been necessary in England (see Angell, *Law of Watercourses*, § 478). The law as to subterranean water seems to be still unsettled. Some State decisions have recognized a public right to moor vessels and place cargo on the shore. (J. Wt.)

RIPH (רי״ף or ראי״ף), *i.e.*, RABBENU YIṢHAḲ B. YA'AḲOB HAKKOHEN[1] AL-PHASI or AL-FEZI, after the death of his teachers the greatest rabbi of Africa, and subsequently of the Peninsula, in the 11th and 12th centuries, was born in 1013 at Kal'at-Ibn-Ḥammad near Fez, and died at Lucena in 1103. His teachers were the great rabbins Rabbenu Nissim and Rabbenu Ḥananeel, both of Ḳairawan (*ob.* 1055). What RASHI (*q.v.*) was to the Ashkenazic Riph was for the Sepharadic Jews,[2] not only a teacher of the deepest learning, but also one who made new paths altogether for the students of the Talmud. Otherwise these two great men differed widely from one another in their activity. Rashi left the Babylonian Talmud, corrections of the text excepted (which he, however, confined to his own commentary, and by which his own disciples and publishers corrected the Talmud text), in its old state. Al-phasi, however, first separated from it the Agadah, which he cast aside almost entirely, and then he sifted the Halakhah[3] thoroughly, retaining only the practical part of it. Thus either title his book has received is correct, the *Little Talmud* or the *Decisions of Rab Al-phez.* Late in the 12th century and in the 13th a host of rabbins respectively attacked and defended Al-phasi (see RABAD III., and RAMBAN), whilst others commented on him (see below). One of the commentaries accompanying the Riph is by Rashi. This commentary, however, which is now an integral part of the book, was not written for it by Rashi himself, who could scarcely have known of Riph's existence, and much less of his work. The fact is the enterprising publisher of the second edition (Venice, 1521–22, fol.), the famous Daniel Bombergi, had one of the three recensions which Rashi had made on the Talmud excerpted and applied to corresponding parts of the Riph which has the very wording of the Talmud, or something near it. Where no Rashi was to be found in the passages of the

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[1] That Riph was a Kohen, or Aaronite, will be seen from the epitaph given in *Haggahoth Hariph* in the collection ***Tummath Yesharim*** (Venice, 1622, fol.).

[2] On these names see MAḤZOR, vol. xv. p. 293.

[3] On these terms see MIDRASH, vol. xvi. p. 285, and MISHNAH, p. 503.

Talmud (see RASHI). RASHBAM (*q.v.*) was utilized. Riph was not only a great Talmudist, but also a man of the greatest magnanimity and highest morality, as may be seen from the following two facts. When R. Yiṣhak Ibn Albalia, who had been his bitterest enemy, lay at the point of death, he recommended his son to Riph, who received him with the greatest kindness, and at once adopted him as son.[1] Again, when Riph himself was at the point of death he recommended to the congregation of Lucena for successor, not his own learned and virtuous son Ya'akob, but the yet more learned, though not more virtuous, R. Yoseph Ibn Migash,[2] who became the teacher of the teachers of MAIMONIDES (*q.v.*).

Although Riph's works which are known are only two, the editions of one of these and the commentaries thereon are very numerous; we can only mention a few of them.

I. *Hilckhoth Rab Al-phez.* (1) With the *Novellæ* of Rabbenu Nissim b. Reuben, the *Decisions* of R. Mordekhai b. Hillel (see ROSH), the *Novellæ* of one of the disciples of Rabbenu Yonah, the commentaries of R. Yehonathan Hakkohen of Lunel and R. Yoseph Habibo (Constantinople, 1509, fol.). (2) The second edition we have already mentioned. (3) With the *Strictures* by R. Zeraḥyah Hallevi (author of the *Maor*) and Nachmanides's defence called *Milḥamoth Adonai* (see RAMBAN), &c. (Venice, 1552, fol.). Each subsequent edition contains additional matter.

II. *Responsa*, originally some, if not all of them, written in Arabic (Leghorn, 1781, and reprint, Vienna 1794, both in 4to).

For more literature by about Riph see *Temim De'im* in the collection *Tummath Yesharim*. (S. M. S.-S.)

RIPLEY, a well-built market town of Derbyshire, situated near the river Derwent and the Cromford Canal, and on a branch line of the Midland Railway 10 miles north of Derby and 10 south of Chesterfield. The principal public building is the market-hall erected in 1880. In the neighbourhood there are extensive collieries, and coke is largely manufactured. Besides the large concern of the Butterley Iron Company, which includes foundries, blast furnaces, and boiler works, the town possesses silk and cotton mills. The charter for the market was granted by Henry III. The population of the urban sanitary district (area 1211 acres) in 1871 was 5639, and in 1881 it was 6087.

RIPLEY, GEORGE (1802–1880), critic and man of letters, was born at Greenfield, in western Massachusetts, on October 3, 1802. He was educated at local schools and at Harvard College, where he took his degree in 1823, ranking first in his class, and then studying theology was in 1826 ordained pastor of a Unitarian church in Boston. Here his success as a thoughtful preacher was marked; but in 1840 he resigned his charge, and he subsequently retired from the active ministry altogether.

It was during those years that there grew up in New England that form of thought or philosophy known as Transcendentalism—a name, as Emerson said, "given nobody knows by whom, or when it was applied." Its growth was part of what Dr Holmes has termed the "intellectual or, if we may call it so, spiritual revival" which during the period from 1820 to 1840 was so strongly marked in the New England "churches, in politics, in philanthropy, in literature." Ripley was prominent, if not the leader, in all practical manifestations of the movement; and it was by his earnestness and practical energy that certain of its more tangible results were directed. The first meeting of the Transcendental Club was held at his house in September 1836 He was a founder and a chief supporter of the famous magazine *The Dial*, which was the organ of the school from 1840 to 1844. Most important of all, however, he was the originator and conductor of an experiment which was the most interesting practical result of the thought and tendencies of the time,—the foundation of "The Brook Farm Association for Education and Agriculture." This project, in the words of its originator, was intended "to insure a more natural union between intellectual and manual labour than now exists; to combine the thinker and the worker, as far as possible, in the same individual; to guarantee the highest mental freedom by providing all with labour adapted to their tastes and talents, and securing to them the fruits of their industry; to do away with the necessity of menial services by opening the benefits of education and the profits of labour to all; and thus to prepare a society of liberal, intelligent, and cultivated persons whose relations with each other would permit a more simple and wholesome life than can be led amidst the pressure of our competitive institutions." In short, its aim was to bring about the best conditions for an ideal civilization, reducing to a minimum the labour necessary for mere existence, and by this and by the simplicity of its social machinery saving the maximum of time for mental and spiritual education and development. At a time when Emerson could write to Carlyle, "We are all a little wild here with numberless projects of social reform; not a reading man but has a draft of a new community in his waistcoat pocket,"—the Brook Farm project certainly did not appear as impossible a scheme as many others that were in the air. At all events it enlisted the co-operation of men whose subsequent careers show them to have been something more than visionaries. The association bought a tract of land in West Roxbury, some ten miles from Boston, and with about twenty members actually began its enterprise in the summer of 1841.

For three years the undertaking went on quietly and simply, subject to few outward troubles other than financial difficulties, the number of associates increasing to seventy or eighty. Pictures of the life they led have been preserved by many hands. It was during this period that Hawthorne had his short experience of Brook Farm, of which so many suggestions appear in the *Blithedale Romance*, though his preface to later editions effectually disposed of the idea—which gave him great pain—that he had either drawn his characters from persons there, or had meant to give any actual description of the colony. Emerson, though he refused in a kind and characteristic letter to join in the undertaking, and though he afterwards wrote of Brook Farm with not uncharitable humour as "a perpetual picnic, a French Revolution in small, an age of reason in a patty-pan," yet spoke of the design as "noble and generous," and among its founders were many of his near friends.

In 1844 the growing need of a more scientific organization, and the influence which Fourier's doctrines had gained in the minds of Ripley and many of his associates, combined to change the whole plan of the community. It was transformed, with the strong approval of all its chief members and the consent of the rest, into a Fourierist "phalanx" in 1845. There was an accession of new members, a momentary increase of prosperity, a brilliant new undertaking in the publication of a journal, *The Harbinger*, in which Ripley, Charles A. Dana, Francis G. Shaw, and John Dwight were the chief writers, and to which Lowell, Whittier, George William Curtis, Parke Godwin, Story, Channing, Higginson, Horace Greeley, and many more now and then contributed. But the individuality of the old Brook Farm was gone. The association was not rescued even from financial troubles by the change. With increasing difficulty it kept on till the spring of 1846, when a fire which destroyed its building or "phalanstery" brought losses which caused, or certainly gave the final ostensible reason for, its dissolution. Its failure left Ripley poor and feeling keenly the defeat of his project; but the event forced him at last to devote himself to that career of literary labour in which the real success of his life was achieved. He wrote for *The Harbinger* during the year of its continuance, but in 1849 he joined the staff of *The Tribune*, founded eight years before by Horace Greeley in New York, and in a short time became its literary editor. This position, which, through his steadiness, scholarly conservatism, and freedom from caprice as a critic, soon became one of great influence, he held until his death on July 4, 1880.

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[1] See *Sepher Hakkabbalah* of RABAD I. (*q.v.*).

[2] See *Ḥemdah Genuzah* (Konigsberg, 1856, 8vo), leaf 30a.

During the greater part of the time of his connexion with *The Tribune*, Ripley was also the adviser of a leading publishing house, an occasional contributor to the magazines, and a co-operator in several literary undertakings. The chief of these, and the most lasting work that bears his name, was the *American Cyclopædia*. Begun under the editorship of Ripley and Charles A. Dana in 1857, the first edition was finished in 1862, under the title of the *New American Cyclopædia*—distinguishing it from its only important American predecessor in the field, the small *Encyclopædia Americana* of many years before, which Dr Francis Lieber had edited, and which had been largely an adaptation of Brockhaus's *Conversations-Lexikon*. The new undertaking was upon a much larger scale, and enlisted a great number of well-known contributors. It proved exceedingly popular; and its commercial success led the publishers to undertake a complete revision of it ten years later—still under the same editors—the result of which, with the dropping of the word "new" from the title, was the *American Cyclopædia* now before the public.

Ripley's *Life*, written by the Rev. O. B. Frothingham, forms one of the volumes of the series *American Men of Letters*. (E. L. B.)

RIPON, a cathedral city and borough in the West Riding of Yorkshire, is situated at the confluence of the Ure with the Laver and the Skell, and on the Great Northern Railway, 22 miles north-west of York and 11 north of Harrogate. The Ure is crossed by a fine bridge of 9 arches. The streets are for the most part narrow and irregular, and, although most of the houses are comparatively modern, some of them still retain the picturesque gables characteristic of earlier times. In the spacious market-place there is a modern cross, erected in 1781. The cathedral, although not ranking among those of the first class, is celebrated for its fine proportions, and is of great interest from the various styles of architecture which it includes. Its entire length from east to west is 266 feet, the length of the transepts 130 feet, and the width of the nave and aisles 87 feet. Besides a large square central tower, there are two western towers. The cathedral was founded on the ruins of St Wilfrid's abbey about 680 A.D. in the reign of Egfrid, but of this Saxon building nothing now remains except the crypt, called St Wilfrid's Needle. The present building was begun by Archbishop Roger (1154–81), and to this Transition period belong the transepts and portions of the choir. The western front and towers, fine specimens of Early English, were probably the work of Archbishop Gray (1215–55), and about the close of the century the eastern portion of the choir was rebuilt in the Decorated style. The nave and portions of the central tower were rebuilt towards the close of the 15th century in the Perpendicular style. The whole building underwent renovation under the direction of Sir G. G. Scott from 1862 to 1876 at a cost of £40,000. There are a number of monuments of historical and antiquarian interest. The bishop's palace, a modern building in the Tudor style, is situated in extensive grounds about a mile from the town. The principal secular buildings are the town-hall, the public rooms, and the mechanics' institution. There are several old charities, including the hospital of St John the Baptist founded by the archbishop of York in 1109, the hospital of St Mary Magdalene for women founded by the archbishop of York in 1341, and the hospital of St Anne founded about the time of Edward IV. by an unknown benefactor. From an early period till the 16th century Ripon was celebrated for its manufactures of woollen cloth. After this industry declined the town became so well known for its spurs that "as true steel as Ripon rowels" became a current phrase; and both Ben Jonson and Davenant refer to Ripon spurs in their verses. This manufacture, with those of buttons and various kinds of hardware, continued to prosper till the beginning of the present century, when the rise of the mechanical industries in the large towns caused it to decline. The population of the borough (area 1580 acres) in 1871 was 6806; and in 1881 it was 7390.

The city is first mentioned under the name of *Inhrypum* in connexion with the establishment of a monastery in 660 by Abbot Eata of Melrose. A few years after it was bestowed on St Wilfrid, who was elevated to the see of Northumbria. After the division of the bishopric in 678, a see was erected at Ripon. The city suffered severely in connexion with the incursions of the Danes and the invasion of William the Conqueror, and was burnt by Robert Bruce in 1319 and 1323. During the Civil War it was for a time occupied by the Parliamentary forces, but it was retaken by the Royalists in 1643. It was first represented in parliament in the reign of Edward I. It lost one of its two members in 1868, and ceased to be separately represented in 1885. Surrounding the town is an extensive district called the liberty of Ripon, over which the archbishop of York at one time exercised special jurisdiction, not yet altogether annulled.

RIPPERDA, John William, Baron (1680–1737), a political adventurer, was born of noble parents in the province of Groningen in the Netherlands, in 1680, and was educated in the college of the Jesuits at Cologne. Shortly after leaving the college he married a Protestant, and assumed the Protestant creed. In 1715 he was sent by the states on an embassy to Spain. Having gained the favour of Philip V., he resigned the office of Dutch ambassador, became a penitent convert to the Catholic faith, and took up his permanent residence in Madrid. He made use of every influence to advance himself to the first position at court, and if possible to supplant Alberoni, who, provoked by his intrigues, deprived him of his pension and estate. After the fall of Alberoni he succeeded in ingratiating himself with the queen, Elizabeth of Parma. Returning from an embassy to Vienna in 1725, he pretended to the queen that he had effected her favourite scheme of betrothing her son Don Carlos to the eldest archduchess. His immediate elevation to a dukedom and to the office of prime minister compelled him to persist in this imposture. He was backed up by lie; the nation was impoverished to furnish him with hush-money; and he continued to try every bungling shift until, in May 1726, he was deprived of his offices, and sent a prisoner to Segovia. Making his escape after two years' imprisonment, he went to England. His hopes of influence there having been overthrown by the treaty of Seville in 1729, he finally collected his property and set sail for Holland, arriving at The Hague in November 1731. Thence he sailed to Morocco, where he was welcomed by the emperor Muley Abdallah, and, becoming a Mohammedan, was placed at the head of the administration of the country. But his royal patron was soon driven from the throne, and he himself was glad to escape with his head to Tetuan, where he could find no better employment for his restless spirit than that of asserting himself to be the last and greatest of the prophets. He died at Tetuan towards the end of 1737.

See Mañer, *Historia del Duque de Riperdá* (2d ed., Madrid, 1796); *Memoirs of the Duke de Ripperda* (2d ed., London, 1740); Moore, *Lives of Cardinal Alberoni, the Duke of Ripperda, and Marquis of Pombal* (2d ed., London, 1814).

RIPUARIAN LAW. See Salic Law.

RIST, Johann (1607–1667), German hymn-writer, was born at Ottensen in Holstein on March 8, 1607, and educated at Hamburg, Bremen, Leyden, Utrecht, and Leipsic. In 1635 he became a preacher at Wedel on the Elbe, and there he died on 31st August 1667 (see Hymns, vol. xii. pp. 586–7).

RITSCHL, Friedrich Wilhelm (1806–1876), an eminent German scholar, was born in 1806 in Thuringia. His family, in which culture and poverty were hereditary, were Protestants who had immigrated several generations earlier from Bohemia. Ritschl was fortunate in his school training, at a time when the great reform in the higher schools of Prussia had not yet been thoroughly carried out. His chief teacher, Spitzner, a pupil of Gottfried Hermann, divined the boy's genius and allowed it free growth, applying only so much either of stimulus or of restraint as was absolutely needful. After a wasted year at the university of Leipsic, where Hermann stood at the zenith of his fame, Ritschl passed in 1826 to Halle. Here he came under the powerful influence of Reisig, a young "Hermannianer" with exceptional talent, a fascinating personality, and a rare gift for instilling into his pupils his own ardour for classical study. The great controversy between the "Realists" and the "Verbalists" was then at its height, and Ritschl naturally sided with Hermann against Boeckh. The early death of Reisig in 1828 did not sever Ritschl from Halle, where he brilliantly attained the doctorate, and in 1829 became privat-docent, in 1832 an extraordinary professor. He began his professorial career with a great reputation and brilliant success, but soon hearers fell away, and the pinch of poverty compelled his removal to Breslau, where he reached the rank of "ordinary" professor in 1834, and held other offices. The great event of Ritschl's life was a sojourn of nearly a year in Italy (1836–37), spent in libraries and museums, and more particularly in the laborious examination of the Ambrosian palimpsest of Plautus at Milan. From this journey Ritschl's whole temperament and intellect received a new and richer colouring, and the remainder of his life was largely occupied in working out the material then gathered and the ideas then conceived. Bonn, whither he removed on his marriage in 1839, and where he remained for twenty-six years, was the great scene of his activity both as scholar and as teacher. The philological seminary which he controlled, although nominally only joint director with Welcker, became a veritable *officina litterarum*, a kind of Isocratean school of classical study; in it were trained many of the foremost scholars of the last forty years. The names of Georg Curtius, Ihne, Schleicher, Bernays, Ribbeck, Lorenz, Vahlen, Hübner, Bücheler, Helbig, Benndorf, Riese, Windisch, Brugmann, who were his pupils either at Bonn or at Leipsic, attest his fame and power as a teacher. In 1854 Otto Jahn took the place of the venerable Welcker at Bonn, and after a time succeeded in dividing with Ritschl the empire over the philological school there. The two had been friends, but after gradual estrangement a violent dispute arose between them in 1865, which for many months divided into two hostile forces the universities and the press of Germany. Both sides were steeped in fault, but Ritschl undoubtedly received harsh treatment from the Prussian Government, and pressed his resignation. He renounced not only Bonn but Prussia, though strongly attached to his country, which he had often refused to leave when plied with advantageous offers. He accepted a call to Leipsic, where he died in harness in 1876.

Ritschl's character was strongly marked. The spirited element in him was powerful, and to some at times he seemed overbearing, but his nature was noble at the core; and, though intolerant of inefficiency and stupidity, he never asserted his personal claims in any mean or petty way. He was warmly attached to family and friends, and yearned continually after sympathy, yet he established real intimacy with only a few. Both at Breslau and at Bonn he complained of isolation, which (though he was himself unconscious of the fact) was in part the natural fruit of his own superiority. The interests of his pupils were at all times dear, perhaps even too dear, in his eyes. He was far from being a dreamy scholar; his talent for practical affairs would have secured him eminence in almost any walk of life, and he was credited with diplomatic finesse. That Ritschl had a great faculty for organization is shown by his administration of the university library at Bonn, and by the eight years of labour which carried to success a work of infinite complexity, the famous *Priscæ Latinitatis Monumenta Epigraphica* (Bonn, 1862). This volume presents in admirable facsimile, with prefatory notices and indexes, the Latin inscriptions from the earliest times to the end of the republic. It forms an introductory volume to the Berlin *Corpus Inscriptionum Latinarum*, the excellence of which is largely due to the precept and example of Ritschl, though he had no hand in the later volumes.

In all that he did Ritschl exhibited rare genius combined with a precision unsurpassed. But to bring out to the full his great powers the zest of discovery was indispensable. When he was on the track of a new idea, he worked with a fiery energy which triumphed over his almost life-long physical weakness, and left him no peace till every difficulty was cleared away. But the toil of carrying his discoveries to their consequences he was only too apt to leave to feebler hands than his own. He was fertile in great projects, and struck out the main ideas which should guide them, but one only did he pursue to absolute completion, the *Priscæ Latinitatis Monumenta*,—precisely because, from the nature of this work, he was buoyed up from first to last by the occurrence or the expectation of novelty. The results of Ritschl's life are mainly gathered up in a long series of monographs, for the most part of the highest finish, and rich in ideas which have leavened the scholarship of the time.

As a scholar, Ritschl was of the lineage of Bentley, to whom he looked up, like Hermann, with fervent admiration. His best efforts were spent in studying the languages and literatures of Greece and Rome, rather than the life of the Greeks and Romans. He was sometimes, but most unjustly, charged with taking a narrow view of "Philologie." That he keenly appreciated the importance of ancient institutions and ancient art both his published papers and the records of his lectures amply testify. He had in reality no prejudice against any department of learning. He was ever anxious to discern precisely the work for which each pupil was fitted, and he despatched many explorers into fields where he could not labour himself. Ritschl for the most part devoted himself to the study of ancient poetry, and in particular of the early Latin drama. This formed the centre from which his investigations radiated. Starting from this he ranged over the whole remains of pre-Ciceronian Latin, and not only analysed but augmented the sources from which our knowledge of it must come. Before Ritschl the acquaintance of scholars with early Latin was so dim and restricted that it would perhaps be hardly an exaggeration to call him its real discoverer.

To the world in general Ritschl was best known as a student of Plautus. When he began his studies, the text of that author was like some ancient picture, defaced alike by time and by much repainting. He cleared away the accretions of ages, and by efforts of that real genius which goes hand in hand with labour, brought to light many of the true features of the original. It is infinitely to be regretted that Ritschl's results were never combined to form that monumental edition of Plautus of which he dreamed in his earlier life. For one such palace from the master builder's hand we could well have sacrificed some of the abundant material which he left for punier architects to handle. Ritschl's examination of the Plautine MSS. was both laborious and brilliant, and greatly extended the knowledge of Plautus and of the ancient Latin drama. Of this two striking examples may be cited. By the aid of the Ambrosian palimpsest he recovered the name T. Maccius Plautus, for the vulgate M. Accius, and proved it correct by strong extraneous arguments. On the margin of the Palatine MSS. the marks C and DV continually recur, and had been variously explained. Ritschl proved that they meant "Canticum" and "Diverbium," and hence showed that in the Roman comedy only the conversations in iambic senarii were not intended for the singing voice. Thus was brought into strong relief a fact without which there can be no true appreciation of Plautus, viz., that his plays were comic operas rather than comic dramas.

In conjectural criticism Ritschl was inferior not only to his great predecessors but to some of his contemporaries. His emendations do not often present that perfect wedding of art and fortune which we see in the best work of Madvig or Cobet. His imagination was in this field (but in this field only) hampered by erudition, and his judgment was unconsciously warped by the desire to find in his text illustrations of his discoveries. His remedies were often needlessly violent. But still a fair proportion of his textual labours has stood the test of time, and he forged the weapons which are destined to conquer for us the true text of Plautus, so far as an envious fate permits. Ritschl rendered immense service by his study of Plautine metres, a field in which little advance had been made since the time of Bentley. In this matter Ritschl was aided by an accomplishment rare (as he himself lamented) in Germany—the art of writing Latin verse.

In spite of the incompleteness, on many sides, of his work

Ritschl must be assigned a place in the history of learning among a very select few. His studies are presented principally in his *Opuscula* collected partly before and partly since his death. The *Trinummus* (twice edited) was the only specimen of his contemplated edition of Plautus which he completed. The edition has been continued by some of his pupils—Goetz, Loewe, and others—and is still (1885) in progress.

The facts of Ritschl's life may be best learned from the elaborate biography by Otto Ribbeck (Leipsic, 1879). An interesting and discriminating estimate of Ritschl's work is that by Lucian Mueller (Berlin, 1877). (J. S. R.)

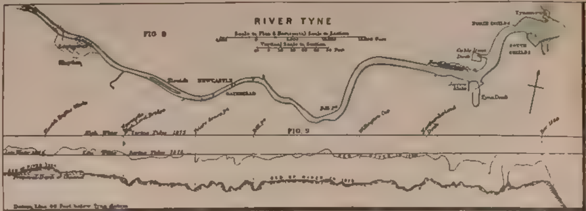
RITSON, Joseph (1752-1803), was the most militant and ill-tempered, and at the same time one of the most learned and accurate, of the antiquaries of the 18th century. Born at Stockton-on-Tees, of a Westmoreland yeoman family, in 1752, he was bred to the law, and settled in London as a conveyancer at the age of twenty-two. Already he had shown eccentricity of temper, had become a fierce apostle of vegetarianism, and a zealous student of antiquities. His first notable publication was in 1782, an attack on Warton's *History of English Poetry*. The fierce and insulting tone of his *Observations*, in which Warton was treated as a showy pretender, and charged with cheating and lying to cover his ignorance, made a great sensation in literary circles. In nearly all the small points with which he dealt Ritson was in the right, and his corrections have since been adopted, but the unjustly bitter language of his criticisms roused great anger at the time, much, it would appear, to Ritson's delight. In the following year Johnson and Steevens were assailed in the same unceremonious fashion for their text of Shakespeare. Bishop Percy was next subjected to a furious onslaught in the preface to a collection of *Ancient Songs* (printed 1787, dated 1790, published 1792). The only thing that can be said in extenuation of Ritson's unmatchable acrimony is that he spared no pains himself to ensure accuracy in the texts of old songs, ballads, and metrical romances that he edited. His collection of the Robin Hood ballads is perhaps his greatest single achievement. Scott, who admired his industry and accuracy in spite of his temper, was almost the only man who could get on with him. On one occasion, when he called in Scott's absence, he spoke so rudely to Mrs Scott that Leyden, who was present, threatened to "thraw his neck" and throw him out of the window. Spelling was one of his eccentricities, his own name being an example: Ritson is short pronunciation for Richardson. He died in 1803.

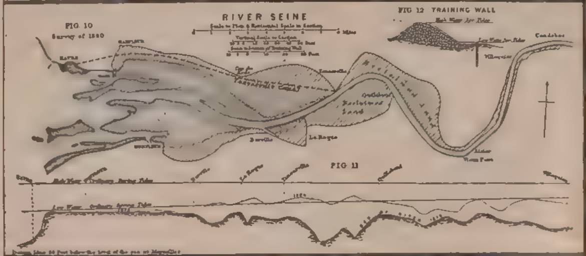
RITTENHOUSE, David (1732-1796), astronomer, was born at Germantown, Pennsylvania, on April 8, 1732. First a watchmaker, he afterwards became treasurer of Pennsylvania and (from 1792) master of the United States mint; he was largely occupied in settling the boundaries of several of the States. As an astronomer, Rittenhouse's principal merit is that he introduced the use of spider lines in the focus of a transit instrument. His priority with regard to this useful invention was acknowledged by Troughton, who brought spider lines into universal use in astronomical instruments (see Von Zach's *Monatliche Correspondenz*, vol. ii. p. 215), but Felice Fontana (1730-1805) had already anticipated the invention, though no doubt this fact was unknown to Rittenhouse. He died on 26th June 1796.

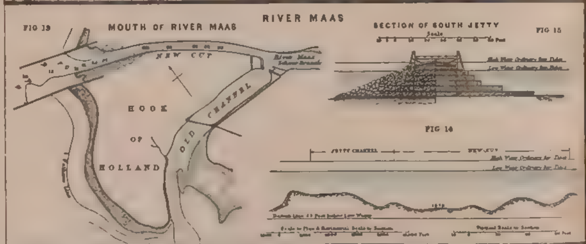
RITTER, Carl (1779-1859), the greatest geographer of modern times, was born at Quedlinburg on August 7th, 1779, and died in Berlin, September 29th, 1859. His father, a physician of some local eminence, having died, leaving his family in somewhat straitened circumstances, Carl, along with an elder brother and a young man, Johann Gutsmuths, who had been his private tutor, was received into the Schnepfenthal institution then just founded by Salzmann for the purpose of putting his educational theories to the test of experience. Gutsmuths, who had continued to teach his pupils without remuneration after their father's death, remained their special guardian and instructor at Schnepfenthal, and in his letters to their mother every little detail of their mental development is affectionately recorded. The Salzmann system was practically that of Rousseau: conformity to natural law and enlightenment were its watchwords; great attention was given to practical life; and the modern languages were carefully taught to the complete exclusion of Latin and Greek. In 1787 Gutsmuths reports about Carl that, "while not much of a hand at making money [trading with counters for coin was a regular branch of the Schnepfenthal education], he draws better maps than the biggest boys, and is making great strides towards becoming a professor of geography." When his school days were drawing to a close his future course was determined in a curious way by an introduction to Bethmann Hollweg, a banker in Frankfort. It was arranged that Ritter should become tutor to Hollweg's children, but that in the meantime he should attend the university at his patron's expense. In October 1796 he accordingly bade adieu to Schnepfenthal, and his next two winters were spent at Halle, where he resided in the house of Professor Niemayer, then at the height of his fame, and attended the lectures of Rüdiger on statistics and science, Sprengel on European history, Meinert on scientific agriculture, &c. His duties as tutor in the Hollweg family began at Frankfort in 1798 and continued for the next fifteen years. In one matter he went directly counter to the Salzmann theory: he gave a large place to the study of the ancient classics, of which he had grown passionately fond. The years 1814-1819, which he spent at Göttingen in order still to watch over the welfare of his pupils, were those in which he began to devote himself exclusively to geographical inquiries. In accordance with a promise exacted by Pestalozzi (with whom he had become acquainted at Yverdun on one of his many tutorial tours) he had several years previously drawn up a manual of physical geography in which many features of his later work are to be traced, but the book was not published. He now brought out his first masterpiece, *Die Erdkunde im Verhältniss zur Natur und zur Geschichte des Menschen* (Berlin, 2 vols., 1817-1818). In 1820 he was called to be professor extraordinarius of history at Berlin, where shortly afterwards he began also to lecture on statistics at the military college. He remained in this position till his death.

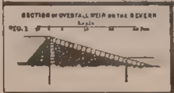
The service rendered to geography by Ritter was mainly threefold. His personal influence, due largely to the moral character of the man and partly to the skill of the teacher, was unusually potent on those who came within its range during the long years that he acted as a professor. Had he done nothing more than use this influence in disseminating the geographical ideas of his time he would have stood high with his own generation. But, secondly, his investigations and teaching were informed by a fresh conception of his subject which imparted life to what had been its dry bones and dust. Geography was, to use his own expression, a kind of physiology and comparative anatomy of the earth: rivers, mountains, glaciers, &c., were so many distinct kinds of organs, each with its own appropriate functions; and, as his physical frame is the basis of the man, determinative to a large extent of his life, so the structure of each country is a leading element in the historic progress of the nation. This naturally led him to attach great importance to the vertical as distinguished from the horizontal development of the earth's surface, and also to give perhaps quite as much attention to the history of civilization and of the individual animals and plants by which civilization has been affected as to questions of purely physical geography. And, thirdly, he was a scientific compiler of the first rank. Such portions of his universal geography as he completed remain each the standard thesaurus for its territory. This is especially the case with the sections devoted to Palestine and to Central Asia. Among Ritter's minor works may be mentioned *Vorhalle europaischer Völkergeschichten vor Herodot* (Berlin, 1820); *Die Stupas . . . . an der indobaktrischen Konigsstrasse u. d. Kolosse von Bamiyan* (1838); *Einleitung zur allgemeinen vergleichenden Geographie* (Berlin, 1852); "Bemerkungen über Veranschaulichungsmittel räumlicher Verhältnisse bei graphischen Darstellungen durch Form u. Zahl," in the *Trans.* of the Berlin Academy, 1828. After his death Daniel published selec-

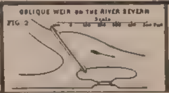
RIVER ENGINEERING

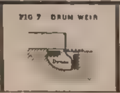


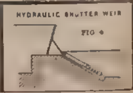


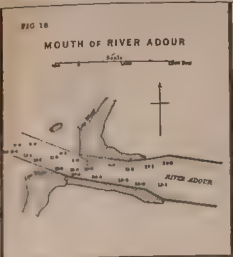


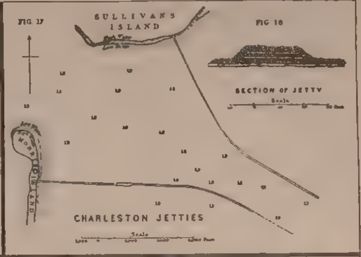


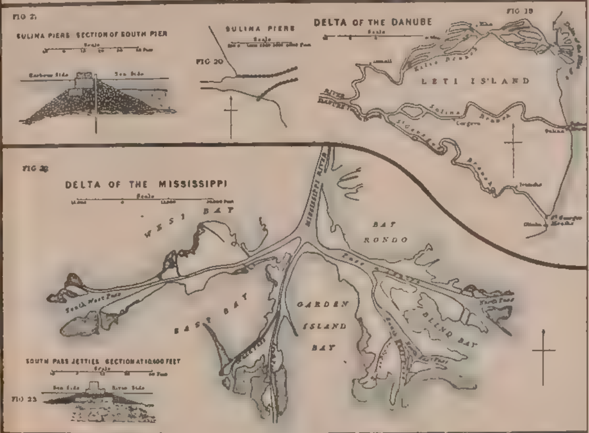


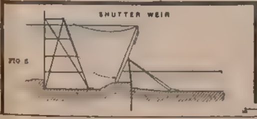


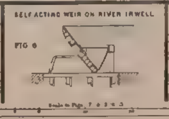


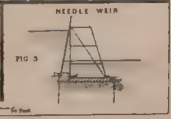












tions from his lectures under the titles *Geschichte der Erdkunde* (1851), *Allgemeine Erdkunde* (1862), and *Europa* (1863). Several of his works (*e.g.*, the "Palestine" volumes of his *Erdkunde*) have been translated into English.

See Kramer, *Carl Ritter, ein Lebensbild* (1864 and 1870, 2d ed. 1875); Gage, *The Life of Carl Ritter* (Edinburgh, 1867); Guyot, *Carl Ritter, an address to the American Geogr. and Stat. Soc.* (Princeton, 1860); F. Marthe, "Was bedeutet Carl Ritter für die Geographie," in *Zeitsch. der Ges. f. Erdk.*, Berlin, 1879

RIVAROL, ANTOINE DE (1753–1801), was born at Bagnols in Languedoc on the 26th June 1753, and died at Berlin on the 13th April 1801. It seems to be undisputed that his father was an innkeeper, but no researches have thrown any certain light on the question of his origin; later he assumed the title of Comte de Rivarol, and attributed himself to a noble family of Italian origin. His enemies declared that the family name was really Riverot, and that, whether Italian or not, it had nothing whatever to do with countship. It is certain that he bore several names, and that when he was among the foremost defenders of aristocracy his claim to share in it was by no means allowed by his associates. He was well educated, and is said to have been admitted by the bishop of Uzès to a theological seminary, then to have held a tutorship at Lyons under the name of Longchamps, then to have appeared in Paris under the further travesty of Chevalier de Parcieux with no better reason than that his mother was related to a man of science of that name. All this, however, is of very little consequence; it is sufficient that he appeared in Paris in 1780 (just when the operation of liberal ideas was throwing society most freely open to men of letters), with youth, good address, fair knowledge, and a very unusual stock of wit and literary ability. After competing for and sometimes winning several of the academic prizes then in greatest vogue, Rivarol distinguished himself in the year 1784 by a treatise *Sur l'universalité de la langue Française* (which shows, if not much learning, the utmost critical acumen and a very happy faculty of expression), and by a translation of the *Inferno*, very free but of no small merit. The year before the Revolution broke out he, with some assistance from a man of similar but lesser talent, Champcenetz, compiled a lampoon entitled *Petit Almanach de nos grands Hommes pour 1788*, in which some writers of actual or future talent and a great many nobodies were ridiculed in the most pitiless manner. It made him many enemies, but scarcely more than his speeches in society had made. When the Revolution developed the importance of the press, Rivarol at once took up arms on the royalist side. The *Journal Politique* of Sabatier de Castres and the *Actes des Apôtres* of Peltier were the chief papers in which he wrote. But he emigrated early in June 1792, and established himself at Brussels, whence he removed successively to London, Hamburg, and Berlin. For ten years he occupied himself not too strenuously with political pamphlets and literary projects, receiving pensions for his services to the royalist cause. He had married an Englishwoman, but had quarrelled with her, and during his later years had for his companion a pretty but totally uneducated girl named Manette, to whom he addressed certain often-quoted verses which are nearly poetry. Rivarol's genius, however, was essentially a genius of prose, though not a prosaic genius. No single work of his of any length has very great merit, and he is accordingly only known to posterity by volumes of "beauties" and selections, composed of epigrammatic remarks, short passages of criticism, and the like. Rivarol could not tell an anecdote with quite the point of his contemporary and rival Chamfort; but he has had no rival in France except Piron, and none in England except Sydney Smith, in sharp isolated conversational sayings. These were mostly ill-natured, and in some cases the full appreciation of them demands a more considerable acquaintance with the facts and men of the time than most readers possess. The brilliancy of Rivarol's phrase, however, can escape no one. Burke was hyperbolical, and not altogether happily hyperbolical, in calling him the Tacitus of the Revolution, because the description suggests a power of historical portrait painting which Rivarol did not possess. But the expression no doubt really referred to the detached phrases which are so striking in Tacitus, and which Rivarol did in truth sometimes equal.

The works of Rivarol were published in five volumes by his friend Chênedollé (who has reported much remarkable conversation of his in his last days) and Fayolle (Paris, 1805); but their perusal as a whole can only be recommended to the student of literature. Selections are frequent: that published by De la Hays (Paris, 1858), with introductory matter by Sainte-Beuve and others, and that edited in 1862 by M. de Lescure, may be specified. The last-named editor published, in 1883, a study on *Rivarol et la Société Française*, which is the fullest treatment of the subject.

RIVE DE GIER, a town of France, in the department of Loire, situated 13 miles to the east-north-east of St Étienne, on the Lyons Railway at the head of the canal of Givors on the Gier. The town, which is constantly enveloped in a dense cloud of smoke, and presents a dirty and unattractive appearance, is principally dependent on the coal industry, there being fifty pits in the basin of the Gier, with an annual output of over 19,000,000 bushels. There are twenty-two coke and lamp black furnaces, and five glass works, the products of which—coloured glass and so-called Nuremberg mirrors—are celebrated, on account of the fineness and purity of the sand found on the banks of the Rhone and the Saône. Mining machinery, railway plant, and coarse ironmongery are also manufactured, and there are iron and steel works. A large number of persons are also employed in winding and spinning silk and in tape-weaving. The population in 1881 was 15,760.

Rive de Gier is a place of some antiquity, as appears from remains of Gallo-Roman buildings, and mosaics and coins found at various times. In the 11th century the canons of Lyons were its superiors. At a later period the town was surrounded by a wall and protected by a fortress, of which, however, but few traces are visible. In the time of Henry IV. the working of the mines had already given to the locality a measure of importance which has steadily increased. At one time it was feared that the coal basin, which was considered distinct from that of St Étienne, would soon be exhausted, but it has now been proved that the two are in reality one, and that they have a long future before them.

RIVER. See GEOLOGY, vol. x. p. 272–278.

RIVER ENGINEERING. The improvement of rivers may be considered under two aspects, for rivers form the natural channels for conveying the surplus rainfall from the districts through which they pass to the sea, and they can also be utilized for the purposes of inland navigation. If a river, owing to the small section of its channel, or the slight inclination of its bed, is incapable of discharging the whole volume of water which drains into it in rainy seasons, the lands along its banks become flooded, frequently to the great detriment of the crops, and sometimes with disastrous results to life and property. If, on the other hand, a river is impeded by rapids, by shoals, or by a bar at its mouth, it is prevented from serving as a natural highway for the traffic of the district through which it flows. Accordingly the mitigation of floods and the regulation of rivers are the problems which have to be grappled with in the engineering of rivers. The first aims at remedying an existing evil, and the second deals with the development of the resources and trade of a country by the improvement of its water communications.

Floods.—Floods are of two kinds, according to the nature of the country traversed by the rivers producing them. Torrential rivers, flowing over impermeable strata and having a rapid fall, rise rapidly after a heavy rainfall, and produce a high flood which quickly subsides. Gently flowing rivers on the contrary rise slowly, and do not attain the same height as torrential rivers; but their floods subside slowly, and consequently, though less high, remain longer on the land than torrential floods. The valleys, moreover, of torrential rivers are steeper and less fertile than the alluvial plains of gently flowing rivers; and, consequently, the high short floods of the former are less injurious than the long continuing lower floods of the latter. The long duration of a flood is also the more prejudicial, as sometimes a flood remains long enough on the land for a second flood to come down before the first has subsided, thereby producing an increased rise.

Floods are generally largest in the winter months, for, owing to the absence of evaporation, a much larger proportion of rainfall finds its way into the rivers at that period; and the greatest floods occur when rain falls on melting snow. High floods, however, sometimes occur in the summer after an exceptionally heavy rainfall; and they are necessarily far more injurious at that time of the year, devastating the crops on the land which they inundate.

Floods are due to the inadequacy of the river channel to carry off the water poured into it within a given period. The bed of a river, being formed and maintained by its stream, is merely adequate to carry the ordinary discharge. Large floods occur at too distant intervals to scour a sufficient channel for their passage, and consequently they overflow the banks and inundate the adjacent districts. Other causes, moreover, tend to aggravate this evil.

A river carries down a large amount of solid matter which has been either ground from the mountain rocks by glaciers, washed from the land by the inflowing streams, or thrown into it as refuse from towns and manufactories. This material tends to settle in the channel wherever the current is checked, and consequently raises its bed and impedes the flow of the stream. Moreover, a river flowing through a plain gradually increases its serpentine course, thereby diminishing its fall and reducing its velocity. Accordingly the tendency of rivers is to deteriorate when left to themselves; and the discharging capacity of their channels becomes less, whilst the extension of subsoil drainage causes the rain to flow more rapidly and completely into the river upon whose basin it falls

The available fall of the river is frequently diminished by the erection of fixed weirs across the channel, at various places, for the purpose of forming a head of water for mills, or of providing still-water navigation. These weirs are generally constructed with high sills, and of inadequate width, and where flood openings closed by draw-doors are adopted the doors are frequently not fully raised till a flood has actually arrived. These weirs consequently not merely reduce the discharging capacity of the channel by diminishing the available fall of the water surface, but also actually restrict the section of the channel. The result is that floods occur more frequently, rise higher, and remain on the land for a longer period.

Prevention of Floods.—The entire prevention of floods would entail a larger expenditure than the results would justify. In most cases, the prevention of summer floods and the mitigation of winter floods would suffice; for, whilst summer floods are always very injurious, winter floods prove sometimes beneficial in depositing the mud which they bring down, provided they do not remain very long upon the land. Occasionally, however, where large tracts of low-lying country are exposed to inundation, and especially where portions of towns are below the flood level, it is necessary to extend the protection so as to ensure entire immunity from floods.

There are three methods by which floods may be prevented or mitigated, namely,—(1) improvement of channel; (2) embankment of channel; (3) pumping.

(1) *Improvement of Channel.*—The discharging capacity of a river may be increased by enlarging the section of its channel; by the formation of straight cuts, which reduce its length, and consequently increase its fall; by dredging away shoals, and thus rendering the fall of its bed more uniform; and by removing obstacles to its flow at weirs.

The channels of the English Fen rivers have been enlarged and straightened, and additional straight drains have been excavated for the more effectual drainage of the low-lying Fen country. Catchwater drains have also been formed to collect the rainfall of the higher lands and convey it into the river lower down, thus gaining a better fall than could be obtained if the upland waters were allowed to flow down to the low lands, besides relieving the low lands of this additional discharge.

Straight cuts are very useful when the fall is slight and the velocity of flow is consequently small; but they are not so suitable for more rapid streams, and, besides modifying the flow, and thus tending to produce shoals below, their straight course is liable to be altered by the irregularities of the current, especially if joining a sharp bend above. The banks in such cases need protection against erosion, which adds considerably to the cost of the works. The improvement of the upper Mississippi by cut-offs has not proved satisfactory; and it has been found preferable to train the river by brushwood mattresses and dykes.

Solid weirs across a river form serious impediments to its flow; and draw-door or movable weirs should be provided with adequate waterways, and sills level with the bed of the river. Old bridges, also, with wide piers and narrow arches retard the discharge of a river, and their rebuilding with wide openings would afford considerable relief. All obstacles in the river bed, such as weeds, fallen trees, and refuse, should be periodically removed; and fish-traps at weirs should be discarded, as they collect floating leaves and rubbish in their meshes and thus soon become entirely blocked up.

(2) *Embankment of Channel.*—When it is essential that the lands bordering a river should be absolutely protected from inundation, the enlargement of a river bed to an adequate extent for discharging the greatest floods would be too costly, especially when the fall is small, and it becomes necessary to resort to the expedient of increasing the channel, above the surface of the ground, by forming embankments along each side. By making the banks with material excavated from the channel, the earthwork serves the double purpose of enlarging the river bed and forming a bank. A flood channel of considerable dimensions can be readily obtained by placing the embankments some distance back from the margin of the river, thus greatly enlarging the section when the waters rise above the level of the land, whilst leaving the natural river bed unaltered for the ordinary flow. In some cases merely low embankments are constructed, which retain small floods but are submerged when large floods come down. Embankments, however, formed to secure the surrounding country from inundation must be high enough to exceed the highest flood level of the river, strong enough to resist the pressure of the water at that level, and perfectly watertight. If water can percolate through the bank, a breach is readily formed; and if a high bank is overtopped by the river, the rush of the stream over it soon destroys a portion of the embankment and produces a disastrous inundation from the large volume of water suddenly liberated. The Fens of Lincolnshire, a large portion of Holland, the valley of the Po, and large tracts of low-lying land bordering the Mississippi are protected by embankments.

The defects in the system of embanking rivers are,—that weak points in the banks are liable to be breached; that the banks are liable to be overtopped by unusually high floods; and that the muddy waters of the river in flood deposit their sediment in the bed of the river, instead of spreading it over the adjacent land, and thus gradually raise the river bed and consequently the height of the floods. The remedies for these defects are strong high banks made of the best materials, and a periodical cleansing of the river bed. Neglect of these precautions has led to serious disasters. Large tracts in the Fens have been occasionally flooded by the bursting or overtopping of badly constructed banks. Numerous breaches have occurred in the embankments of the Po, resulting in the devastation of its valley; and the flood level of the Po has been so much raised that it has been decided not to heighten the embankments for fear of occasioning still greater disasters. The gradual silting up of the river Theiss, near Szegedin, produced a rise in its flood level which led to the overtopping of the protecting embankment in 1879, and the formation of a breach; and the water thus set free destroyed a portion of Szegedin, and inundated a tract of 200 square miles. The rise of the bed of some rivers in Japan, from the deposit of silt, has been followed up by the gradual raising of the embankments; and this system has been carried out to such a degree, and the accumulated deposit is so great, that some of these embanked rivers have their beds as much as forty feet above the level of the plains over which they flow. These high embankments necessarily require constant attention; and any failure is attended with serious inundations. They serve as a warning against the extensive raising of embankments to counteract the silting up of a river.

(3) *Pumping.*—When lands are very flat and low, lying sometimes actually below the general drainage level of the district and the waterlevel of the streams, it is impossible for rivers to perform their ordinary function of draining the land by gravitation. It is necessary in such cases to create an artificial fall by pumping the drainage waters up so as to be discharged into the adjacent streams. This method has the advantage of ensuring the effectual drainage of the lands, provided adequate pumping power is supplied; but it forms an additional tax on the land, as steam has to be applied to do what is under ordinary conditions effected by nature, and the land has also to be surrounded by banks.

This system has been adopted for the drainage of the Haarlem Meer reclamation, and also for the lands reclaimed from Lake Y in the construction of the Amsterdam ship canal. The drainage of the Fens is, in several instances, supplemented by pumping; and a portion of the Witham basin has been secured against floods by this means.

Flood storage reservoirs.

The formation of large reservoirs in river valleys has been proposed for storing the surplus waters till a flood has subsided. A reservoir has indeed been formed, by constructing a high masonry dam across a narrow gorge of the Furens valley, which both supplies the town of St Étienne with water and preserves it from inundation. It is also proposed to prevent the floods of the river Chagres from interfering with the Panama Canal, by impounding its flood waters in an extensive reservoir to be formed by building a high dam across a suitable point of its valley. In these cases, however, the deep valleys with their narrow gorges are peculiarly well adapted for the formation of reservoirs having a considerable capacity, whereas most river valleys are unsuitable for reservoirs, and the construction of the long lengths of the banks that would be required would entail a very large expenditure, so that this system could only have a very restricted application.

Improvements of the Upper Portions of Rivers.—Most rivers are not suitable by nature for navigation in their non-tidal portion, or, in the case of tideless rivers, at a considerable distance from their mouths, as the fall of their bed increases towards their source, and they generally present irregularities in depth and flow, with occasional sharp bends. Even where the depth is adequate, an irregular or rapid flow offers a great obstacle to up-stream traffic. Moreover, the fall of the waterlevel in dry seasons would often make a river too shallow for navigation. Accordingly, whilst improving the worst bends and removing shoals, it is frequently necessary to retain the water, when the flow is small, so as to maintain a sufficient depth. This is accomplished by dividing the river into a series of sections or reaches, and pounding up the water at the end of each reach by means of a dam or weir.

Formerly rivers used to be penned in by a series of stanches near shoal places, which held up the water, and, when several boats were collected in the pool above a stanch, it was suddenly opened, and the sudden rush of water floated the boats over the shallows below. This primitive method of navigation, termed flashing, was formerly practised on the Thames and the Severn, and also on some of the rapidly flowing rivers in France, such as the Yonne. The stanches on the Severn were removed in 1842; but a few still exist across the Thames above Oxford, where the barge navigation follows a lateral canal. These stanches, consisting of beams swung across the river and supporting a series of spars and paddles, were easily removed in flood time or for the passage of boats. The stanches on the Yonne, which were more recently erected, were of a more elaborate description, known as needle weirs, and are still retained as weirs for holding up the water, though the process of flashing has been discontinued.

Introduction of locks and weirs.

As the demands of navigation increased, these primitive methods proved inadequate, and, moreover, they were quite unsuited for up-stream traffic. Accordingly weirs were substituted for stanches, to hold up the water in each reach; and locks were constructed, in suitable side channels, for enabling vessels to be passed from one reach to the next with little loss of water, and with equal facility either up or down. Rivers have been thus converted into still-water navigations, with level reaches forming a series of steps, having a fall at each lock, in place of the natural inclination of the river bed; so that the up-river traffic is in a great measure relieved from the serious hindrance of an opposing current. In order that the water held back by the weir may be retained within the channel, it is necessary to raise the banks on each side for some distance above the weir; and, as the gradual rise in the river bed towards the upper end of the reach reduces the depth, it is necessary to deepen the river along the upper portion of the reach to secure a uniform draught of water. A river is thus practically converted into a canal, with this sole difference that it has still to discharge the drainage waters of its basin. This primary object of rivers, to which indeed they owe their existence, was in many instances somewhat overlooked when rivers were utilized for navigation; and weirs appear to have been often regarded merely as dams for retaining the water, rather than as regulators of its flow.

Weirs.—Locks have been already considered in the article on CANALS (*q.v.*); so that it will suffice here to describe briefly the different forms of weirs, which are essentially river works.

Weirs have been divided into three classes, namely, overfall weirs, draw-door weirs, and movable weirs.[1]

Overfall Weirs.—An overfall weir is a solid barrier placed across a stream for the purpose of raising the waterlevel (Plate V. fig. 1[2]), and only affords an outlet for the discharge of the river when the water rises above its crest. The waterlevel of the river is thus permanently raised, not merely in dry seasons, but also in flood time, and its fall is correspondingly reduced. Accordingly, the discharging capacity of a river is materially diminished by the erection of overfall weirs; and this is only partially remedied by the deepening of the channel for navigation, especially as deposit more readily accumulates in the lower part of a reach, owing to the reduction in velocity of the current by the conversion of the river into level reaches. Endeavours have been made to alleviate this defect by placing the weir in a wide place on the river, and at an angle to the cross section of the channel, thereby increasing the length of its sill, and consequently the discharge over it for any definite height of the river (fig. 2). The gain in length of an oblique weir is somewhat neutralized by the weir not being at right angles to the direction of the current; and, even if the cross section of the channel above the sill of the weir is as large as the average section of the river bed, the change in shape, and the small hydraulic radius of the section over the weir, check the discharge of the stream.

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[1] L. F. Vernon-Harcourt, *Rivers and Canals*, p. 112.

[2] The fig. references in the present article all indicate Plate V

Draw-door Weirs.—In order to afford a freer flow than is attainable with the best-designed overfall weir, draw-door weirs are sometimes adopted, which serve equally well to retain the water above during dry weather, and provide a large opening for the discharge of the stream in floods. Draw-door weirs consist of a row of doors, or sluice gates, sliding vertically in grooves formed at the sides of frames, piles, or piers, which are shut down when the flow is small, but are raised to admit the passage of flood waters. These weirs generally serve to supplement an ordinary overfall weir; and, whilst the overfall weir regulates the flow in dry weather, the draw-door weir provides for its more rapid discharge in flood time. The relief, however, afforded by draw-door weirs depends entirely on the opening they furnish; they are rarely, if ever, made equal in section to the river channel, and their sills are usually raised some feet above the bed of the river; but, nevertheless, they are much superior to overfall weirs in respect of drainage, especially when the river has a small fall and low banks.

Teddington weir

A large oblique overfall and draw-door weir has been erected across the Thames, by Mr Leach, at the limit of its tidal flow at Teddington, having a total length of 480 feet. This weir is divided into four bays, the two side bays being overfalls, whilst the two central bays, 172½ feet and 69¾ feet wide respectively, are closed by large iron draw-doors sliding in grooves at the sides of strong iron frames supporting a foot bridge from which the doors are raised. The frames rest upon piles, and on the top of a rubble mound raised about a foot above low tide level.[1]

Free rollers to draw-doors.

The friction of large draw-doors against the grooves, in being lifted, is considerable when there is a head of water on one side; but this has been much reduced by Mr F. Stoney, in a large weir in Brazil, by making the doors, 20 feet in width, bear on each side against a row of free rollers suspended in the grooves.[2]

Movable weirs.

Movable Weirs.—Although draw door weirs afford a much freer discharge for a river than overfall weirs, the vertical frames or piers in which the doors slide offer more or less impediment to the flow. This defect is avoided by movable weirs, which, whilst equally efficient in retaining the water when raised, can be entirely lowered or removed so as to leave the channel quite open in flood-time.

There are three types of movable weirs which have been regularly adopted abroad, whilst other forms have been occasionally tried. The two types most extensively used are the frame or needle weir and the shutter weir, whereas the drum weir has been only erected on the Marne.

Frame weir

The *frame weir* consists of a series of movable iron frames, placed at intervals across the channel of a river end on to the current, carrying a foot bridge at the top, and supporting a wooden watertight barrier which forms the actual weir. Till recently the barrier was always composed of a series of long square wooden spars, or needles, placed close together and nearly vertical, resting against a sill at the bottom and against a horizontal bar connecting the frames near the top (fig. 3). This type of weir has, accordingly, been very commonly called a needle weir (*barrage à aiguilles*); but this term would not now include every form of the frame weir. The first needle weir was erected across the Yonne in 1834; and till 1881 all the weirs on the Seine below Paris were of this form. The needle weir is opened by lifting each needle successively from the foot bridge; one of the end frames is then disconnected from the rest by unfastening and withdrawing the connecting bars, the corresponding portion of the foot bridge is taken up, and the frame, which is hinged at the bottom, is lowered by chains on to the apron of the weir, and the whole of the frames are similarly lowered in succession, leaving the passage quite clear. The weir is closed again by a precisely reverse series of operations.

As the weight of the needle, which should be readily lifted by one man, imposes a limit to the height of the weir, the large frame weir recently erected at Port-Villez near Vernon, having a height of 18 feet, has been closed by a sort of wooden hinged shutter which spans the interval of 3½ feet between each frame, and can be rolled up from the bottom and removed when the weir is to be opened.

A series of similar hinged shutters are designed to close double intervals between the frames, about 7 feet wide, of the frame weir in progress at Poses, the next weir above Martot weir which is at the boundary of the tidal Seine above Rouen. Poses weir has a form quite distinct from all frame weirs hitherto constructed, for its vertical frames are suspended from an overhead girder, and rest against a sill at the bottom when down, but can be raised entirely out of water into a horizontal position when the weir is open. The girders carry a foot bridge, from which the frames and hinged shutters are raised and lowered, and rest on masonry piers dividing the river into seven bays, the two navigable passes being 106½ feet and the five shallower passes 99 feet wide. The girders spanning the two navigable passes leave a clear headway of 17¾ feet above the navigable high water, whilst the rest of the girders are merely placed above flood level. The fall at the weir is 13 feet. The system is costly, with its girders and piers, but it secures all the movable parts of the weir from injury in flood, and enables the weir to be worked with perfect ease and safety.

Sliding panels have been adopted for closing the frame weir across the Rhone at Mulatière, near Lyons, erected in 1882; and a comparison is being made of the relative durability of sliding panels and hinged shutters by placing the two systems side by side at Suresnes weir just below Paris.

The earliest form of *shutter weir* consisted of a gate, or shutter, turning on a horizontal axis at the bottom, supported by a prop when raised against the stream, and falling flat on the apron of the weir when the prop was withdrawn. As considerable force would be required to raise such a shutter against a strong stream, a second up-stream gate is usually provided, which, rising with the stream and being retained by chains, relieves the pressure on the down-stream gate, and enables it to be readily raised and propped up. The waterlevel is then equalized on both sides of the upper gate, which is then lowered; and the lower gate forms the actual weir, which can be opened by merely releasing the prop. In India, where this form of shutter weir has been adopted on a large scale, the strain on the retaining chains was so great, when the upper shutter was raised in a strong current to shut off the river from the irrigation canals, that hydraulic brakes have been substituted, by Mr Fouracres, for controlling the motion of the up-stream shutters. A closed cylinder full of water is fixed on the apron of the weir above the upper shutter, in which a piston, attached to the upper side of the shutter, is fitted. Directly the current tends to lift the shutter, the piston is drawn against the cushion of water in the cylinder, which controls its motion. The pressure of the piston forces the water gradually out of some small orifices along the side of the cylinder, so that the piston is enabled to travel slowly along the cylinder. In its progress, however, it passes by some of the orifices, whereby the rate of efflux of the remaining water is reduced, and a greater resistance offered to the motion of the piston. Whilst therefore the shutter in rising presents a greater surface to the stream, and consequently exerts a greater pull upon the piston, the retarding force is similarly increased, and the shutter is thus gradually raised without any jar.

At Brulée Island weir, on the Yonne, the up-stream shutter has been dispensed with; and the shutter forming the weir is raised against the stream by a piston working in a hydraulic press (fig. 4), the water pressure being supplied from an accumulator which is charged by means of a turbine worked by the fall of water at the weir. The weir is closed by seven shutters, 11½ feet long and 6 feet high, which can be raised in five minutes; and the power for damming up the stream is actually obtained from the stream itself.

The form of shutter weir most commonly adopted in France is shown in fig. 5, representing a section of the largest and most recent weir of this type, erected at Port-à-l'Anglais weir on the Seine, two or three miles above Paris; and weirs on the same system have been erected across the Great Kanawha river in the United States. The shutter revolves upon a horizontal axis placed just above the centre of pressure on the down-stream side of the shutter. The axis is fastened on an iron tressel hinged to the apron of the weir; and the shutter and tressel are supported in position by a wrought-iron prop resting against a cast-iron shoe fixed on the apron. When the weir is closed, the shutter butts against a sill at the bottom, as is shown on fig. 5. The weir can be more or less opened, from the foot bridge, by means of chains fastened to the top and bottom of the shutter; and it can be completely lowered in flood time by releasing the prop from its shoe, when the prop, tressel, and shutter fall flat upon the apron, their fall being regulated by aid of the chains, the frames also supporting the foot bridge, being hinged to the apron, can be lowered as in the ordinary frame weir. The weir is raised by first reinstating the foot bridge, and then raising the shutters, with the connected tressels and props, by means of the chains. Each shutter of the navigable pass at Port-à-l'Anglais is 3¼ feet wide, and rises 12½ feet above the sill of the weir. Smaller shutter weirs, of a similar form, are placed on the top of overfalls to regulate the discharge, being so adjusted that the shutters dip when the water attains a certain height above them. Sometimes the regulation of the flow is effected through the large shutters by means of small shutters fixed in their upper panels, called butterfly valves, which open spontaneously when the water rises above the required height. The smaller shutters on the overfalls are entirely lowered in flood-time, like the large shutters, but, being unprovided with a foot-bridge, they are raised by aid of boats on the approach of the dry season. The earlier shutters erected across the navigable passes were similarly raised; but, though a foot bridge adds considerably to the cost of a shutter weir, it greatly facilitates its working.

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[1] L. F. Vernon-Harcourt, *op. cit.*, plate iv figs. 9 and 10.

[2] *Minutes of Proceedings Inst. C. E.*, vol. lx. p. 88.

The navigable passes in French rivers, which are always closed either by frame or shutter weirs, serve for the passage of vessels during floods when the locks are submerged.

With the exception of the primitive movable stanches, there is only one example of a movable weir in England. This self-acting shutter weir has been erected across the Irwell at Thostleuest near Manchester; and a section of it is given in fig. 6. The weir consists of a series of shutters turning on a central horizontal axis. When the weir is closed, each shutter is inclined at an angle of 35° to the vertical, as shown in fig. 6, and revolves to a horizontal position for opening the weir. It resembles in fact the French shutter weirs, except that the shutters and their supports are not removed from the channel, so that the waterway at Thostlenest is not so unimpeded as in the French system. The shutters are so adjusted that they open when the river rises 2¾ feet above its ordinary level; but, lest the rush of water, which would result from their sudden opening, should injure the river bed, an arrangement has been made for opening any of the shutters by means of a set of chains worked by crabs from each bank, so as to release the pent-up waters more gradually.[1] This weir, designed by Mr Wiswall, consists of fourteen shutters, each 10 feet wide above the axis and 9 feet below, and 12 feet long. The actual height of the weir above the floor is only 10 feet, owing to the inclination of the shutters, so that it presents a surface of 1400 square feet to the stream when closed, which is reduced to 293 feet when open.

The *drum weir*, which has been adopted in several instances on the river Marne, consists of an upper and an under iron paddle capable of making a quarter of a revolution round a horizontal central axis. The upper paddle forms the weir, and the under one revolves in a closed recess, shaped like the quadrant of a cylinder, laid below the sill of the weir, from which the term *drum* is derived (fig. 7). The under paddle and the drum are so formed that a space is left between the upper face of the paddle and the top of the drum when the paddles are horizontal; and a similar space exists between the down-stream face of the paddle and the vertical wall of the drum when the paddles are vertical, as represented in fig. 7. These spaces serve as sluiceways by which water can be admitted into the series of drums on the upper or under side of the under paddles. The weir is closed by placing the upper sluiceway in communication with the upper pool, when the pressure of water on the upper faces of the under paddles overcomes the pressure of the stream upon the upper paddles, causing them to rise, and closing the weir against the stream. The weir is readily opened by shutting off communication between the upper pool and the upper sluiceway, and opening communication with the lower pool; the stream then depresses the upper paddles, or the action can be quickened by opening communication between the upper pool and lower sluiceway. The pressure on either side of the under paddles can be easily adjusted with the utmost precision, enabling the paddles to be placed at any angle, so that the most absolute control is obtained over the discharge at the weir. The largest example of this type of weir is at Joinville, on the Marne, only a few miles above Paris. The weir is formed by forty-two paddles, 3½ feet high and 4¾ feet wide, which are worked with great ease by means of sluice gates on the left bank, being opened or closed in three or four minutes by one man. This type of weir has the defect of not being suited for navigable passes, owing to the depth of the foundations for the drum below the floor of the weir having to exceed the height of the actual weir.

Movable weirs possess the great merit over other forms of weirs of offering little or no impediment to the passage of floods; and this advantage is still further enhanced by the system of warnings, organized for the Seine, the Loire, and other French rivers, whereby timely information of the approach of a flood is telegraphed to the various weir keepers, so that they may fully open the weirs before its arrival, and thus aid in facilitating its descent. By telegraphic intimation of the rise in the upper tributaries, and of the rainfall in the basin, it is possible to predict with remarkable accuracy the probable rise of the river at places lower down, and to afford valuable warning of a coming flood to the riparian proprietors.

Tidal and Tideless Rivers.

Rivers may be broadly divided into two classes in respect of the lower portion of their course, for the tide is propagated up some rivers to a considerable distance from their mouth, commingling with the fresh water and producing an ebb and flow far into the interior; whilst rivers flowing into tideless seas descend with an unimpeded current to their outlet. Tidal and tideless rivers, possessing very distinct physical characteristics, necessarily present different features and require different methods of improvement, and will be therefore separately considered. Tidal rivers are the more numerous, owing to the greater extent of tidal seas. The great differences also in the tidal rise introduce numerous variations in the tidal influence on rivers, and the rise of the river bed determines the distance to which the tidal flow extends. Accordingly, tidal rivers exhibit a greater diversity in their natural condition than tideless rivers, which are only affected by the volume of their fresh-water discharge, the amount of sediment carried in suspension, and the inclination of their bed. These latter conditions affect also the state of tidal rivers, but their influence is greatly modified by the ebb and flow of a large volume of tidal waters. The effect of the tidal ebb and flow is most readily perceived in contrasting the mouths of tidal and tideless rivers. The mouths of the Mississippi, the Nile, the Danube, and the Rhone present very marked differences to the outlets of the St Lawrence, the Seine, the Thames, and the Severn. Tideless rivers divide into a number of mouths, whereas tidal rivers are confined to a single outlet; and the effect of tidal influence on this difference is still further confirmed by the instance of the Maas, which, with a very slight tidal range, exhibits a tendency to deteriorate into the dispersion of mouths of a tideless river. The value of tidal flow in maintaining a river is fully manifested by comparing the navigable condition of the Thames or of the muddy Humber with the delta of the Nile or the Rhone, though the latter rivers possess a much larger fresh-water discharge. The tidal rise also frequently allows of the access of vessels to a river whose entrance is barred at low water.

The general improvements of the upper portions of both tidal and tideless rivers may be carried out on similar principles, though on approaching their mouths they need a totally different treatment. To give a river a uniform depth, its channel and flow require regulation. Hard shoals may be permanently removed by dredging; but silty shoals, even when dredged away, will re-form unless the channel is contracted. Formerly rivers were regulated by building out jetties at intervals at right angles to the banks, especially in wide shoal places, in order to contract the channel and concentrate the stream, so as to scour a deeper central channel. These cross jetties, however, whilst effecting a deepening in front of their extremities, caused irregularities in the flow of the current in the intervals between them, thus producing differences in depth. Continuous longitudinal jetties, or training banks, though more costly, are much more efficient in regulating a river, and are now generally adopted for procuring a uniform width, and, consequently, a regular depth. Where the fall alters, a corresponding variation must be made in the section of the channel; and, in the case of tidal rivers, the section should gradually increase as it approaches the sea, so as to admit the increasing volume of sea water which enters but does not pass far up the estuary whose upper portion has been filled by the earlier flow.

Most rivers, whether tidal or tideless, are more or less impeded for navigation by a bar at their mouth. A bar is a ridge or shoal extending across the navigable channel, over which there is a less depth than either above or below it. The lowering of such a bar forms one of the main objects of river improvement, as upon the depth that can be obtained over the bar depend the class of vessels that can enter the river, and, in tidal rivers, the period of time during which the entrance can be navigated. A bar may result from the action of the sea, which tends to form a continuous beach across any inlet, and would obliterate the mouths of rivers if the channels were not maintained by the ebb and flow of the tide and the fresh-water discharge; or it may be formed by the conflict of the sea and river water, which checks the current at the mouth and causes the river to deposit the sediment which it held in suspension. The bars at the mouths of the Mersey, the Liffey, and the Adour are due to the first cause; whilst the bars at the mouths of tideless rivers, such as the Mississippi, the Danube, and the Rhone, are mainly due to the second.

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[1] *The Engineer*, Sept. 1, 1882

Improvement of Tidal Rivers.

Tidal conditions of rivers.

Tidal rivers differ greatly in their natural characteristics, owing to the variety in the different conditions which affect them. Thus the Mersey, with an extreme tidal rise of 30 feet at its mouth, is only tidal for 46 miles, whilst the Seine, with a rise of 22 feet, is tidal for 91 miles, and the Scheldt, with a rise of only 13½ feet, is tidal up to Ghent, a distance of 105 miles. These differences are mainly due to the different falls of the river-beds, but they are also affected by the facility of entry afforded to the flood tide, and the form of the channel up which it flows. The tidal capacity of a river depends on the rise of the tide and the configuration of the banks. The tidal flow into the Mersey amounts to 710,000,000 cubic yards at a high spring tide, whilst the flow into the Scheldt at Flushing, with less than half the tidal rise, reaches 475,000,000 cubic yards. The tidal capacity of the Seine, together with its estuary, formerly exceeded that of the Mersey, but it has been greatly reduced by the training works which have been carried out on it since 1848.

Influence of tides.

The tidal ebb and flow passing and returning through the entrance channels of a river twice a day exercise a very important influence on its maintenance. The effect of tidal scour is manifested in the history of the harbours of Calais and Ostend,[1] which in old times possessed deep outlet channels, but were injured by reclamation, and in the deterioration of the outfalls of the Fen rivers as soon as the tidal flow was curtailed by the erection of sluices. The power of the tidal scour necessarily varies with the volume of water producing it, and therefore one of the first principles of tidal river improvement is that the tide should be admitted as far up a river as possible, and all obstructions to its flow removed. If, however, the maintenance of an estuary depended solely upon the tidal ebb and flow, the estuary would gradually silt up, for the flood tide brings in matter in suspension which it washes from the adjacent shores and sandbanks, especially during rough weather, when the waves stir up the sand and silt. The impetus of the tide running up the rising bed of an estuary is gradually checked, till at last slack water occurs, and the silt begins to deposit, which the ebb tide, enfeebled by the friction of the tidal water in its passage up and down the estuary, would of itself be unable completely to remove. The erection of any obstructions to the tidal flow, such as sluices and weirs, increases the period of slack tide, and consequently not only reduces the volume of ebb and flow but also promotes the deposit of silt, to the further detriment of the estuary. The maintenance of estuaries is secured by the aid of their fresh-water discharge, which, being penned up during the flood tide, reinforces the ebb and preserves an equilibrium.

The fresh-water discharge of a river, depending upon the area of the basin and the available rainfall, naturally varies greatly in different rivers—being, for instance, greater in the Tyne and the Clyde than in the Mersey, though these rivers have little more than one-thirteenth of the tidal capacity of the Mersey. The Seine, with a drainage area of 30,500 square miles, nearly six times the size of the Thames basin, has a discharge of 28,000,000 cubic yards, on the average, each tide (about twenty-eight times that of the Mersey), though this volume sinks into insignificance when compared with the flow of the Danube with a basin of ten times the size, or still more of the Mississippi with a basin forty times as large. A large fresh-water discharge is of great value to the maintenance of an estuary, especially when, as in the case of the Seine, it carries little silt in suspension; whilst a small discharge in proportion to the size of an estuary, of which the Mersey is a notable instance, renders the state of the estuary very delicate, and necessitates great vigilance in maintaining its tidal capacity, to which its existence is almost wholly due.

The silt brought down by tidal rivers, instead of being carried to their mouths and there deposited, is met by the incoming tide at points varying daily with the states of the tides; and, moreover, except during slack tide, it is maintained in constant motion up and down the estuary, till at length it gets to the sea. Accordingly, though the sediment of tidal rivers is more or less deposited wherever the velocity of the current is checked, it does not tend to accumulate in one particular part, as in the case of tideless rivers, and therefore the formation of a bar at the mouth is mainly due to the drift by waves along the beach. A flood also, though more largely charged with silt, by giving additional power to the ebb, scours the channel and lowers the bar. The Humber, whose waters are densely burdened with mud which is readily deposited in still water, is nevertheless free from a bar.

Forms of estuaries.

The best form of estuary for a tidal river is when it enlarges gradually as it approaches the sea, thus affording an increasing capacity for the admission of the tide, and promoting a regular flow. The estuaries approximating to such a form are generally free from bars—as, for instance, the Thames, the Severn, and the Scheldt. When, however, a river expands abruptly into a wide estuary on a sandy coast, it winds through the enlarged estuary in an unstable shallow channel, owing to the reduced velocity of the ebb in expanding out, and the checking of the flood tide on reaching the head of the wide estuary. Thus the Seine, with a deep stable channel from Rouen to La Mailleraye, had formerly a shallow shifting dangerous channel from thence to the sea; the Ribble, with a good depth at Preston, has a shoal irregular channel towards its mouth; and the Dee, with a moderate channel at Chester, is almost barred to vessels, except at high tide, below Connah's Quay. These estuaries do not possess a well-defined bar, but their long shallow winding channels offer a still more serious impediment to navigation. The worst form is a very irregular estuary with abrupt expansions and contractions, of which the Mersey is a prominent example, for, in spite of its large rise of tide, it possesses a shallow, irregular, and shifting channel above Liverpool, and is encumbered by a wide bar below.

There are three obstructions to which tidal rivers are subject, namely, a bar, a shifting channel, and inadequacy of depth; and there are three general methods which may be resorted to for their improvement, namely, jetties, training walls, and dredging, in addition to the regulation of their upper portion by longitudinal jetties, or banks, as previously mentioned.

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[1] L. F. Vernon-Harcourt, *Harbours and Docks*, pp. 149 and 155.

Jetties.—A bar being caused by the littoral drift, and by the impotence of the expanded current to scour the channel over it to the same depth as elsewhere, it is necessary either to arrest the drift or to concentrate the current across the bar. The drift, which comes from the direction of the prevalent winds, might be temporarily arrested by projecting a groyne, or jetty, from the shore on the windward side of the outlet. The material, however, carried along the coast would accumulate against the jetty, and eventually form a bar beyond, or, sweeping round the end of the jetty, deposit in the channel under its shelter. Accordingly a second jetty is added, on the opposite side of the outlet, to direct and concentrate the current over the bar, and thus increase the depth of the channel, and also to drive into deep water any material that may be carried round the windward jetty, or convey it within the influence of any littoral current farther out. The jetties are either made parallel, or slightly diverging, so as to form a sort of continuation of the banks of the river across the beach, or they are commenced far apart and made to converge towards their extremities, so as to admit a larger volume of tidal water and concentrate the flow into a narrow channel over the bar. The parallel jetty system has been adopted for the new outlet of the Maas (fig. 13), the mouth of the Adour near Bayonne (fig. 16), and the mouths of the Wear at Sunderland, the Yare at Yarmouth, and the Ouse at Newhaven; whilst the converging jetty system has been carried out at Charleston (figs. 17 and 18) and Aberdeen, and at the mouths of the Liffey, the Tyne (fig. 8), and the Tees.

The ordinary form of jetty is a timber pier resting upon base of rubble stone, like the jetties of the North Sea jetty harbours of Calais, Dunkirk, and Ostend, so that the solid lower portion may concentrate the ebb, whilst the open upper portion permits the passage of the littoral currents in order that a rapid advance of the foreshore may be prevented. Such structures, however, simply delay, and do not stop, the advance of the foreshore, as manifested at Newhaven and Dunkirk, where the accumulation of shingle in the one case and of sand in the other brought low-water mark out to the extremities of their western jetties. The solid northern jetties of the Wear and the Yare have naturally produced a similar advance of their northern beaches, both being exposed to a north-easterly drift.

A special form of jetty has been constructed at the mouth of the Adour to combine the advantages of open and closed jetties. These jetties consist of a row of cylindrical columns placed at intervals and carrying iron girders on the top. Grooves are formed at the sides of the columns, down which panels can be lowered from the roadway above to confine the issuing current, whilst when the panels are open the spaces between the columns admit the flood tide and the passage of the currents. Nevertheless there are indications of an advance of the foreshore; the sand passing through the spaces in the northern jetty has encroached upon the channel, and the depths are reduced beyond the end of the jetties (fig. 16).

The most important examples of training jetties, including converging jetties, have been made solid, though sometimes they have not been raised to high-water level at their outer ends, in order to provide for the freer admission of the flood tide. The converging jetties, or walls, at the mouth of the Liffey consist of mounds of rubble stone, and the outer portion of the northern jetty is only raised to half-tide level. The jetties at the mouth of the Maas (figs. 13 and 15) are formed of fascine mattresses; and the Charleston jetties (figs. 17 and 18) are similar in construction; in both these cases the outer portions have not been raised above half-tide level. The converging jetties or piers at Aberdeen, the Tyne (fig. 8), and the Tees are in reality breakwaters,[1] though they serve the same purpose of protecting the entrance channels from the littoral drift, and promoting scour over the bar, as the less solid structures at Dublin and Charleston. The Tees breakwaters are random mounds of slag; the Aberdeen breakwaters at the mouth of the Dee are upright walls of concrete; and the Tynemouth piers are masonry and concrete-block walls upon a rubble foundation. The breakwaters afford a much better shelter for vessels and for dredging operations, but the lower fascine-work jetties at the mouth of the Maas are equally effective in directing the current.

Training Walls.—The wandering shallow channel of a river through a wide sandy estuary may be improved by training the channel, in a suitable direction, by means of longitudinal mounds of rubble stone, commonly termed training walls. These walls fix the channel and prevent the current eroding the sandbanks and thus changing its course. Moreover, by guiding the channel into a more direct line, making the ebb and flow follow the same course, and concentrating the current, the scouring capacity of the stream is increased and the channel is deepened. The flood tide ascends the trained channel more readily, and therefore is able to extend its influence farther up; whilst the ebb tide flows out of the improved and deepened channel earlier, and thus lowers the low-water line and increases the tidal capacity in the channel.

Form of training walls.

The trained channel must be gradually widened out and carried into deep water, otherwise the abrupt expansion which occurs beyond the ends of the training walls would so enfeeble the ebbing current that a shallow shifting channel would be formed only a short distance below. Training walls which stop in the middle of a wide sandy estuary, like the walls carried out on the Seine (fig. 10) and the Ribble, can be only regarded as incomplete works, which sooner or later will have to be extended if the full benefit of a trained channel is to be realized. When the channel is to follow close along one shore of the estuary, a single training wall on the outer side is sufficient; and a single wall is sometimes adequate for maintaining a channel in the middle of an estuary, when placed along the concave side of a bend.

The proper width between the training walls depends upon the fall, the tidal range, and the fresh-water discharge, and should gradually increase down stream so as to admit as much tidal water as possible with a steady flow. As the scour of the fresh-water discharge is greater with a contracted channel, the tendency is to place the training walls too close together, which, though improving the depth in the channel between the walls, reduces the volume of tidal water that can get up the channel and thus compromises the maintenance of the outlet beyond the walls. The training walls on the Seine and on the Ribble, whilst improving the trained channels, have been prejudicial to the channels beyond; and an extension of the works has been authorized on the Ribble. The widths also adopted between these walls are not compatible with an adequate widening out towards their outlet for the free admission of the flood tide, so that these estuaries will eventually be deficient in tidal capacity.

The training of a wandering channel is always beneficial to the maintenance and depth of the channel. The wanderings, however, of the channel, which are thus arrested, though very prejudicial to navigation, are advantageous in preventing the silting up of an estuary by the constant erosion and stirring up of the sandbanks which they effect in shifting their position, and which they carry by gradual stages throughout the whole of the estuary. The scouring current predominates at one time in one part and at another time elsewhere, so that slack water is never permanent in any part of the estuary, and accretion cannot progress for a long period without disturbance. When, however, a channel is permanently fixed by training walls, the condition of the estuary is completely transformed. The flood tide, indeed, comes in with its burden of silt as before, rising sooner up the improved channel, and therefore dispersing with a somewhat gentler flow over the rest of the estuary. The ebb tide, however, is mainly concentrated along the trained channel, especially when it attains its maximum scouring efficiency towards low water. Accordingly, whilst the flow in the trained channel is increased, stagnation occurs more or less over the rest of the estuary, and silting-up inevitably occurs, resulting eventually in a large reduction of tidal capacity. The accretion, moreover, is not confined to the portion of the estuary behind the training walls, but gradually creeps down, on each side of the estuary, for a considerable distance beyond the ends of the walls. Low training walls hardly rising above the adjacent sandbanks have been tried with the object of preventing this accretion, but the improved flow in the trained channel and the reduced velocity elsewhere still promote accretion behind the low walls, and the deposit, rising first along the shores of the estuary, gradually attains high-water level over a great portion of the area at the back of the training walls, and from thence slopes down to the top of the walls on each side of the channel. Though the process of accretion is less rapid with low training walls, the ultimate result is only delayed and not prevented, as clearly manifested by observations on the Seine and other rivers, so that the view formerly entertained by some engineers, that if training walls were kept down to the level of the existing sandbanks no accretion would take place, has been proved to be erroneous by the results of experience; and it may be accepted as a general law that training walls, whether high or low, inevitably lead to accretion if the flood tide is charged with silt.

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[1] L. F. Vernon Harcourt, *Harbours and Docks*, pp. 200, 317, 341.

Remarks on training walls.

The most careful consideration should be given to all the conditions of an estuary before training works are commenced, for when once begun they must be eventually carried out to deep water; and, if ports exist along the shores of the estuary, they are liable to be injured by the accretion resulting from the works unless the trained channel can be led close along them. The training works of the Seine estuary, though very advantageous to the inland port of Rouen, are compromising the approach channels to Honfleur and Havre, and have silted up the port of Harfleur, so that the extension of the training walls to Honfleur has been urged in the interests of that port, whilst large works have been executed to preserve its entrance, and a new direct channel into the sea is being proposed for Havre. Though the training works on the Dee have not been carried out hitherto in a judicious direction, having been formed mainly with a view to land reclamation, it would be advantageous for the ports of Chester and Connah's Quay to extend these works towards the sea, as there are no ports below the present limits of the training walls to be injured by the effects of their prolongation; and the navigable channel would be much improved, provided the works were carried out to deep water. The training walls in the Ribble estuary must eventually be extended, even beyond the limits at present authorized, if a good navigable channel is to be secured to Preston, but these works will produce an entire transformation in the estuary, of which large portions have been already reclaimed as a consequence of the works already accomplished. The Mersey estuary would need a very comprehensive scheme for its improvement, owing to the very defective natural condition of the estuary, and the situation of the ports along its banks. The mere training of the channel in the upper estuary, for the benefit of the up-river ports, would result in the reclamation of the wide estuary between Runcorn and Liverpool, and thus deprive the channels between Liverpool and the sea of their natural scouring reservoir of tidal water; whilst the training of a channel below Liverpool out to the bar would necessitate very extensive works in deep water and in an exposed situation.

Dredging.—The improvements effected within recent years in the ordinary dredging machinery, and the introduction of the sand-pump dredger, have facilitated and cheapened dredging operations to such an extent that some of the most remarkable river improvements have been effected by dredging. The great increase in depth realized on the Tyne and the Clyde has been effected by means of steam bucket-dredgers aided by hopper barges, whilst the maintenance of the entrance channel to St Nazaire on the Loire, and the deepening of the approaches to Dunkirk and Calais, have been accomplished by sand pumps, which have the advantage of being able to work when exposed to moderate waves. Dredging merely consists in removing material from the river bed and thus enlarging and deepening it; and the extent to which this method of improvement may be carried simply depends upon the economical consideration as to how far the improvement of the traffic on the river by an increase of depth will afford an adequate return for the outlay. Dredging, however, furnishes a cheap method of excavation owing to the small cost of carriage by water. Dredging, being a purely artificial means of improvement, generally necessitates regular maintenance; whereas the improvement from scour effected by jetties and training walls is permanent, being realized by natural means. Frequently, however, training walls and jetties are supplemented by dredging, for the walls and jetties render the deepening by dredging easier and more permanent; whilst, on the other hand, dredging enables a greater depth to be attained, and even maintained, than could have been effected by scour alone.

The improvements on the Tyne and on the Clyde have mainly resulted from very extensive dredging operations, but they have been aided by training walls on the Clyde, and by the Tynemouth piers on the Tyne, which protect the entrance channel from drift and the dredgers from waves, and concentrate the scour over the bar. The three methods of improvement described above have been resorted to on the Tees: for training walls have been formed through the wide estuary below Middlesborough for fixing the channel; converging jetties are being constructed for sheltering the channel from wave-borne sand, and for directing the scour over the bar; and dredging is being employed for deepening the trained and sheltered channel. On the Maas also, and at Charleston, dredging is being used for attaining a depth for navigation which the jetties alone were unable to produce.

River Tyne Improvement Works.

The Tyne has a drainage area of 1053 square miles; its tidal flow extends 18 miles from its mouth, and the range of spring tides at its outlet is 14¾ feet. Being by nature a small winding irregular river, with little tidal capacity and no estuary, its depth was small and variable, and a bar existed at its mouth, which opens directly on to the sea-coast. The first improvement works, commenced in 1843, consisted in training the river by cross jetties, subsequently connected by low training walls, so as to regulate the width and consequently the depth of the river. As, however, the volume of water in the river was small, the scour was not adequate to effect a great improvement in the depth; the bed of the river between Newcastle and the sea, in 1860, was in many places above low-water level; and the depth on the bar at low tide was only 6 feet (fig. 9). The piers at the mouth were commenced in 1856.

for the purpose of facilitating the removal of the bar and for sheltering vessels entering the river, and were originally designed to terminate in a depth of 13 feet at low water; but eventually a larger scheme was adopted for forming a refuge harbour in combination with the improvement of the river, and the piers, which are still in progress, are to extend into a depth of 30 feet. In 1861 extensive dredging operations were commenced for improving the depth of the river, and a maximum of 3,515,000 cubic yards was removed in 1866; the work has been regularly continued, and the total amount dredged since the commencement, in 1838, reached 49,668,000 cubic yards in 1884, being an average of nearly 2,000,000 cubic yards annually since 1861, when systematic dredging operations were begun. The improvement in depth that was effected between 1860 and 1884 is shown on the longitudinal section of the river (fig. 9); and the deepening of the river between Newcastle and Hedwin Streams, a distance of 8½ miles, is in progress, being carried on by six dredgers. The river has also been regulated by making a straight cut across Lemington Point, and widening the channel from 150 feet to 400 feet opposite Blaydon; the obstruction offered to the Tyne by the old Newcastle Bridge has been removed by rebuilding the bridge with larger openings; and a sharp bend in the river has been eased by removing the high projecting rock at Bill Point (fig. 8). The tidal capacity of the river has been increased by 14,000,000 cubic yards; the bar has been lowered 14 feet since 1860; and the least depth at low water up to Newcastle is 20 feet, and 18 feet for 3 miles above. The deepening of the channel has produced a very beneficial lowering of the flood line in the river, thereby preserving the adjacent lands from inundation.[1] The improvement of the river has led to a great increase in the tonnage of the vessels frequenting it, and a large development of its trade. The average tonnage of the vessels, which was 163 tons in 1863, had risen to 396 tons in 1883; and the total tonnage of the vessels entering and clearing the Tyne ports rose from 4,382,000 tons in 1863 to 13,043,000 tons in 1883.

River Clyde Improvement Works.

The Clyde is a small river, with a drainage area of only 945 square miles, and a tidal flow of about 20 miles; it opens, however, into a deep well-sheltered estuary, or arm of the sea, called the Firth of Clyde, and is free from a bar. The rise of spring tides at its mouth is about 10 feet. The Clyde was by nature an insignificant stream, with numerous hard gravel shoals, and a ford 12 miles below Glasgow which could be crossed on foot. The regulation of the river by cross jetties, and the removal of hard shoals, was commenced in 1773. Early in the present century the jetties were made more uniform, others were added, and their ends were eventually connected by low training walls which were gradually raised as deposits formed behind. The river had to be subsequently widened to accommodate the increasing trade and a larger size of vessels. As scour alone could only produce a very moderate depth, systematic dredging operations were commenced in 1844, and reached a total of 28,648,000 cubic yards by the middle of 1884, the maximum accomplished in a single year (1878–79) reaching 1,502,000 cubic yards. Dredging is still being continued with six dredgers in order to maintain as well as deepen the river; for the channel up to Glasgow has been deepened so far beyond its natural limit that any matter in suspension which enters the river is readily deposited. Of the 1,041,000 cubic yards dredged in 1883–84, as much as 703,000 cubic yards consisted of deposit, or more than two-thirds of the whole quantity removed. The river has a depth of 24 feet at high water from Glasgow to Port Glasgow, and from 13 to 15 feet at low water. The tide falls 8 feet lower at Glasgow than it did before any works were begun, which not merely adds to the tidal capacity of the river, but also prevents the fresh-water floods which formerly inundated the low-lying portions of Glasgow. The improved depth has caused the average tonnage of the vessels frequenting the port of Glasgow to rise from 199 tons in 1863 to 315 tons in 1883; whilst the total tonnage entered and cleared has increased from 1,757,000 tons in 1863 to 5,544,000 tons in 1883.

River Tees Improvement Works.

The Tees was formerly a very irregular winding river between Stockton and Middlesborough, and after passing that town it opens out into a wide sandy estuary about 6 miles long and 3 miles across at its widest part. It is tidal for about 17 miles, and the rise of spring tides at its mouth is 15 feet. The improvement of the river between Stockton and the estuary was commenced in 1810 by making a straight cut near Stockton; another cut was made in 1830, and the river was also regulated by cross jetties. These works provided a more direct channel, and increased the depth by about from 2 to 5 feet. The channel, however, between the jetties was irregular in depth; and the navigable channel through the estuary was shallow and variable, with a rocky shoal across it, and a bar at the mouth of the river. Accordingly, in 1853 training walls were commenced, both for connecting the ends of the cross jetties, and also for guiding the channel through the estuary. Dredging was commenced in 1854 for removing shoals and deepening the channel, and the ridge of rock across the estuary channel has been removed by blasting. The total amount dredged up to Oct. 31, 1884, reached 13,145,000 cubic yards, and a maximum of 1,220,000 cubic yards was dredged in 1883–84. Vessels of 3000 tons, drawing 21 feet of water, can leave Middlesborough fully laden the average tonnage of vessels frequenting the Tees has risen from 169 tons in 1873 to 303 tons in 1883; and the total tonnage entered and cleared has increased from 1,212,000 tons in 1873 to 2,528,000 tons in 1883. It is proposed at present to deepen the channel by dredging, so as to obtain a depth at low water of 15 feet up to Middlesborough, and 10 feet from thence up to Stockton; and it is hoped that eventually 2 feet additional depth may be attained by the same means. Two breakwaters have been designed, starting from opposite sides of the estuary and converging over the bar, in order to protect the entrance, to facilitate dredging, and to keep out drifting sand. The southern breakwater has been completed, and the northern breakwater is in progress. The breakwaters and the training walls are constructed of slag obtained free of charge from the neighbouring iron-works.

Training Walls on the Tidal Seine.

Plate V figs. 10, 11, 12

The Seine has a very winding course between Rouen and the sea, as well as in its upper portion, but it possesses a good natural depth between Rouen and La Mailleraye, a distance of about 37 miles. Below this point, however, the natural condition of the river was very unsatisfactory, for the channel through the estuary was constantly shifting, and high shoals existed at Aizier and Villequier with a depth over them of only 10 feet at spring tides, so that vessels of from 100 to 200 tons found the passage difficult, and even dangerous at times. Training walls, formed of mounds of chalk obtained from the neighbouring cliffs, were commenced in 1848, and were gradually extended along both sides of the channel, as shown in fig. 10, and were terminated at Berville in 1869, a further extension of the northern wall for 1¼ miles having been refused in 1870 for fear of endangering Havre. These works have effected a remarkable increase in depth in the channel between the walls, as shown by a comparison of the longitudinal sections of the river in 1824 and 1875 (fig. 11); for dredging has only been used for deepening the worst shoals. The improvement, however, ceases beyond the termination of the works; and the channel between Berville and the sea is still changeable and shallow. High walls were for the most part adopted down to Tancarville on the right bank and to La Roque on the left bank. These walls, however, produced such rapid accretion behind them that low walls, raised only from 3 to 5 feet above low water of spring tides, were adopted below these points. This precaution, however, has not arrested the accretion in the estuary, which is still proceeding, though sixteen years have elapsed since the works were stopped. The accretion resulting from the training works had reduced the tidal capacity of the estuary by 274,000,000 cubic yards in 1875; and a survey in 1880 showed that a still further loss of over 40,000,000 cubic yards had occurred between 1875 and 1880. More than 28,000 acres of land have been reclaimed in the upper part of the estuary, as shown by cross lines on the plan; whilst large tracts have been raised to high-water level, as indicated by dotted lines, extending as much as 8½ miles below the ends of the training walls. The walls were originally merely rubble chalk mounds; but the bore and the currents injured the mounds, so that the walls are being strengthened by pitching or concrete on the river slope, with an apron of concrete, and piling at the toe (fig. 12). The regulation of the river, by bringing deep water about 25 miles nearer the sea, enables vessels of about 2000 tons, and drawing about 20 feet, to pass the shallow estuary between the sea and Berville at high tide and thus reach Rouen. The prolongation of the training walls has been frequently urged; but the fear of injuring Havre, and the difficulty of devising a suitable channel which would effectually serve both Honfleur and Havre on opposite sides of the estuary, have hitherto prevented the continuation of the work. The Tancarville Canal is in progress for connecting Havre with the Seine at Tancarville (fig. 10), so as to enable river craft to avoid the dangers of the lower estuary; and the canal is being made so as to be capable of being readily converted into a ship-canal if the growing accretions should impede access between Berville and the sea.

Works at the Mouth of the Maas.

The Scheur branch of the Maas, which forms the most direct channel to Rotterdam, gradually silted up at its outlet, so that vessels had to seek more southern and circuitous channels. The length of the deepest channel was shortened in 1829 by the construction of the Voorne Canal, but even this course became inadequate for the increasing draught of vessels. Accordingly, in 1862 works were commenced for providing a new direct outlet for the Scheur branch of the river by a straight cut across the Hook of Holland, with fascine-work jetties for training and maintaining the channel across the sandy beach into deep water (fig. 13). The cut, three miles long, was only partially excavated, its completion being effected by damming up the old channel and directing the fresh-water discharge and tidal current through the new cut. The scour soon deepened the narrow cut; but some of the sand washed from the cut settled in the wider channel formed by the jetties. The cut also, being scoured deeper than the adjacent channel above and below, was not adequately widened, and consequently impedes the entry of the flood tide up the river (figs. 13 and 14). The desired depth of 23 feet at high water not having been attained as anticipated from the works, dredging has been resorted to for deepening the outlet; and the widening out of the cut to the proper full width would improve the tidal influx. The jetties consist of fascine mattresses secured by piles and stakes and weighted with stone (fig. 15); and their outer portions have been kept down to half-tide level to promote the freer admission of the flood tide, whilst serving equally to concentrate the latter part of the ebb.

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[1] P. J. Messent, C.E., *River Tyne Improvement*, 1882.

Charleston Jetties.

The largest jetty works in the world for lowering a bar in front of a tidal estuary are being constructed at the entrance to Charleston harbour (fig. 17). The jetties are being formed after the type of the Maas jetties, with log and fascine mattresses weighted with rubble stone (fig. 18). They start from the shore about 2¼ miles apart and converge to a width of about 2000 feet over the bar, which stretches across the entrance to the harbour at 1¾ miles from the shore. The object of the works is to concentrate the tidal and fresh-water current from the land-locked estuary, having an area of 15 square miles, into which the Ashley and Cooper rivers flow, and whose mouth forms the entrance to Charleston harbour. The northern jetty, which was commenced in 1878, attained the present length of 14,860 feet in 1881; and the southern jetty had been carried out 14,130 feet towards the end of 1883. The outer portions, lying in the direction of the flood current, are to be raised; but the inner portions are to be kept low, in order to interfere as little as possible with the littoral drift and thus avoid an advance of the foreshore, and also in order to admit freely the flood tide. Though scour has already commenced, it will be necessary to aid it by dredging in order to attain a depth of 21 feet in place of the former depth of 11½ feet.

Improvement of Tideless Rivers.

Deltas. Tideless rivers on entering the sea have their velocity checked, and consequently deposit the silt which they previously carried in suspension. In process of time this accumulated deposit forms a tract of low-lying land protruding into the sea, through which the river flows in several shallow channels to the sea owing to the impediments offered to its flow by the sediment which it deposits. The form which these diverging channels assume has led to the term delta being applied to the mouths of tideless rivers and the tract of land which they create (figs. 19 and 22). These deltas are always advancing, and consequently reducing the very small fall of the channels through them by prolonging their course. The rate of advance varies with the amount of sediment brought down, the depth of the sea in front, and the extent to which the delta spreads out. The Rhone delta has at present a yearly average progression of 140 feet; the Kilia mouths of the Danube delta have been estimated to advance 200 feet annually; whilst the Mississippi delta, extending 220 miles into the Gulf of Mexico, is supposed to have taken four thousand four hundred years in forming, which would be equivalent to an average annual advance of 264 feet, the present advance being about 207 feet in a year.

The only method of improving the outlet of a tideless river is to concentrate the current flowing through one of the channels, and to prolong the banks of the regulated channel into deep water by means of parallel jetties.

The only other way of remedying the impediments to navigation at the mouths of tideless rivers is by avoiding the delta channels altogether, and constructing a canal connecting the deep river above the delta with the sea at some suitable place beyond the influence of the river alluvium. This expedient has been resorted to for the trade of the Rhone; for, though the discharge of the river was concentrated into a single outlet by forming embankments on each side, between 1852 and 1857, which shut off the other three outlets and extended into the sea at its mouth, the increased discharge brought down the whole sediment of the river, and a bar formed again farther out. Accordingly the St Louis Canal was formed, between 1863 and 1873, going from the head of the delta into the Bay of Foz beyond the limits of the delta. A similar plan was proposed for the Mississippi, but was abandoned in favour of the jetty system. The canal constructed by the emperor Claudius for connecting the Tiber with the harbour of Ostia proved a failure, as its outlet at Ostia was not sufficiently removed from the delta, so that it gradually silted up and is now 2 miles from the coast.

The success of the jetty system depends upon the existence of a littoral current to carry away the sediment in the stream conveyed by aid of the jetties into deep water, or upon the gradual prolongation of the jetties to keep pace with the progression of the delta. The outlets of the Danube and the Mississippi have both been improved by training one of their minor delta channels into deep water; and hitherto the depth over the bars has been maintained. In the case of the Danube, the southerly current sweeping across the outlet carries away a portion of the issuing sediment. The Mississippi jetties direct the discharge into such deep water, and with so much velocity, that it may be premature to decide to what extent the maintenance of the depth may be due to a westerly current in the gulf; but hitherto from one cause or the other, or probably from both combined, the bar has not formed again in front of the jetties.

Sulina Piers of the Danube Delta.

The delta of the Danube commences about 45 miles from the Black Sea, and has an area of 1000 square miles. The river divides into three main branches; the northern or Kilia branch conveys more than three-fifths of the discharge, but it forms an independent delta near its outlet and is consequently unsuitable for improvement (fig. 19). The southern or St George branch is the next largest, and possesses the best channel, but it divides near its outlet into two channels, which are both barred. The central or Sulina branch, though narrower and less good than the St George branch, and conveying less than one-thirteenth of the total discharge, possessed the only navigable outlet in 1858, and was therefore selected for the provisional improvement works begun in that year. The works designed by Sir Charles Hartley consist of piers, starting on each side of the Sulina outlet, which converge till the width between them is 600 feet, and are then carried parallel across the bar (fig. 20). The piers were at first constructed of rubble mounds with piles carrying a platform strengthened at intervals by timber cribs; but subsequently they were consolidated with concrete blocks (fig. 21). These piers serve to concentrate the discharge across the bar, and increased the least depth at the outlet from 9 feet in 1857 to 20 feet in 1872, a year after the final completion of the works; and this depth has been since maintained. The sediment-bearing current, moreover, is carried within the influence of the southern littoral current, which, diverting a portion of the deposit, has reduced the rate of advance of the Sulina delta from 94 feet to 44 feet in a year. This progression, however, will eventually necessitate the extension of the piers.

Plate
figs 1
20, 21

The Mississippi Jetties.

Though the Gulf of Mexico is in communication with the Atlantic Ocean, it is almost tideless, for the average rise of tide in front of the Mississippi delta is only 14 inches, and there is only one tide in a day. The Mississippi, accordingly, is a tideless river, and forms a delta which has an area of 12,300 square miles, and has three main channels, or passes, leading the discharge of the river into the gulf (fig. 22). The general features of the delta have been already described, and the various schemes for improving the outlet referred to (see MISSISSIPPI). In flood time the river brings down in suspension 2800 cubic feet of solid matter per second; and before the jetties were commenced the annual advance of the bars at the mouths of the passes was 300 feet at the South-West Pass, 260 feet at Pass à l'Outre, and 110 feet at the South Pass.

In 1874 Mr Eads offered to make and maintain a channel 28 feet deep across the bar of the South-West Pass, which had only 13 feet of water over it. The South Pass is narrower, having a width of from 600 to 800 feet; it conveys only about a tenth of the total discharge of the river; it was impeded by a shoal at the head of the pass with a depth of only 15 feet over it; and the depth on the bar at its mouth, where it expanded to 2 miles in width, was only 8 feet. The South Pass, however, was selected by Congress for improvement, partly on account of the smaller cost of the works required, and partly because it was the pass which had been preferred by a previous commission. The depth of the South Pass through the delta, a distance of about 13 miles, was 30 feet; so that the obstructions to be removed were restricted to the head and mouth of the pass. Dredging had been tried for deepening the outlet of the South-West Pass, and had necessarily failed in producing any permanent improvement, for sediment soon filled up again the portion of the channel which had been enlarged beyond its natural limits of maintenance. The object aimed at in the South Pass was to contract the width of the channel at the head and outlet, so that the current might be forced to regain its required section of channel by scouring out in depth what it lost in width. At the mouth of the South Pass this result could be effected by concentrating the current over the bar with parallel jetties, thus prolonging the banks of the pass artificially into deep water, and contracting the current sufficiently to ensure the requisite depth. At the head, however, of the South Pass, the conditions were more complicated; for, as soon as the entrance channel there was contracted, a portion of the discharge tended to desert the impeded pass for the other more open passes, and the head works by themselves would therefore have deprived the South Pass of a portion of its natural flow, which would have necessarily led to a reduction of the channel below the head. Accordingly the entrances to the other passes had to be correspondingly reduced, so as not to absorb more than their former proportion of the discharge and thus leave the discharge through the South Pass undiminished.

The works consist mainly of willow mattresses, which are specially suitable where osiers are abundant, and where settlement on the soft alluvial bottom is inevitable. The funnel-shaped entrance at the head of the South Pass was contracted across the shoal into a uniform channel, 800 feet wide, by means of mattress dykes; and mattress sills, 30 to 40 feet wide, 60 to 70 feet long, and 2 feet thick, were laid right across the entrances to the other two passes to restrict the volume of their discharge to its normal amount.

The parallel jetties on each side of the mouth of the South Pass consist of tiers of willow mattresses, 100 feet long, from 20 to 50 feet wide, and about 2 feet thick, consolidated with rubble stone, and capped at the outer ends with concrete blocks to secure them against waves (fig. 23). They have been raised to flood-tide level to within 1000 feet of their extremities. The east jetty is 2¼ miles long, and the west jetty 1½ miles; they terminate at the same distance out, in a depth of thirty feet. They are placed about 1000 feet apart, and are curved slightly towards their extremities, so as to bring the channel at right angles to the westerly littoral current in the gulf. The jetty channel has been contracted to a width of 700 feet by mattress spurs, in order to promote the scour in the central channel, which was lessened at first by leakage through the mattresses owing to their want of consolidation from difficulties in the supply of stone.

The works were commenced in 1875, and completed in 1879. The channel was to be made, according to the terms of the contract, 26 feet deep and 200 feet wide, with a central depth of 30 feet. According to a survey made in May 1884, the least central depth through the jetty channel is 33 feet, and the width of the 26-foot channel is 290 feet; and beyond the jetties the least central depth is 31·8 feet, and the least width of the 30-foot channel is 70 feet. At the head of the South Pass there now exists a straight channel with a minimum central depth of 35 feet; and the 30-foot channel has a minimum width of 275 feet. There is now a depth of 30 feet right through the South Pass.

The latest surveys indicate only a slight shoaling beyond the outlet, showing that hitherto the accelerated current, being protruded into deep water and aided by the littoral current, has not created a fresh bar by the deposit of its sediment. As the littoral current cannot be expected to convey away more than a portion of the sediment brought down, the material must be accumulating beyond the outlet, and after having filled up the deep places in front, will gradually rise beyond the ends of the jetties, where the dispersed river current will be unable to carry it away. This shoaling, however, may be delayed for a considerable time by the distance to which the velocity of the trained current carries the sediment, and the depth in which the sediment is deposited; and when it becomes prejudicial to navigation, it can be readily removed by an extension of the jetties.

The method of lowering a bar at the mouths of rivers by means of jetties has been applied, as indicated above, to both tidal and tideless rivers; but the systems employed for each type of river are based on different principles which must not be confounded together. A tideless river is maintained solely by its discharge, and therefore the more its channel is contracted the greater is the depth attained. As, however, a tidal river depends largely for its maintenance on its tidal flow, a contraction at its mouth checks the entrance of the flood tide and reduces the tidal flow. The contracted width between the Adour jetties (fig. 16) has reduced the tidal rise at Bayonne in spite of the openings formed in them for the admission of the tide; and the narrow width of the cut at the Maas outlet (figs. 13 and 14), whilst affording an improved depth in the cut, is prejudicial to the depth elsewhere. A parallel channel with high jetties is suitable for tideless river mouths; but a slightly diverging channel, with the outer ends of the jetties below high-water level, is expedient for tidal rivers. Converging jetties, like those of Dublin and Charleston (fig. 17), would be perfectly useless at tideless outlets; but these jetties, by not being unduly contracted at their extremities, and by being kept low towards their ends, freely admit the tidal flow, whilst the increased capacity obtained by their enlarged form increases the tidal scour at the outlet. The comparatively small improvement in depth over Charleston bar, as compared with the magnitude of the works, may be due to the want of concentration of tidal scour, owing to the small elevation of the inner portions of the jetties, which allows of the dispersion of part of the ebb.

The greatest difficulty in training tidal rivers is so to adjust the width of channel that the free admission of the flood tide may be secured whilst affording adequate scouring power for the current. If the influx of the tide is checked by a sufficient reduction of width to ensure improvement in depth by scour, the capacity of the estuary is eventually reduced, and a portion of the scouring power is lost, as in the case of the Seine. It is better, therefore, to regulate the width so as to ensure a free admission of the tide, and to provide for any deficiency in scour and depth by dredging. Deepening by dredging can be easily and economically effected to any desired extent, as shown by the Tyne and Clyde improvements; whereas tidal capacity in an estuary, when once lost, can never be regained.

For further information about the works described, reference may be made to *Rivers and Canals*, by L. F. Vernon-Harcourt; *River Tyne Improvements*, by P. J. Messent; "The River Clyde," by James Deas, *Proc. Inst. C. E.*, vol. xxxvi.; "The Delta of the Danube," by Sir Charles Hartley, *Proc. Inst. C. E.*, vols. xxi. and xxxvi.; *A History of the Jetties at the Mouth of the Mississippi River*, by E. L. Corthell. (L. F. V.-H.)

RIVIERA OF GENOA. See ITALY, vol. xiii. p. 437. It is customary to speak of the Eastern and Western Riviera (Riviera di Levante and Riviera di Ponente), which meet at Genoa.

RIXDORF, a large village to the south-east of Berlin, and practically an outlying suburb of that city, with which it is connected by tramway, is chiefly interesting as a foundation of Moravian Brethren from Bohemia, who settled here in 1737, under the protection of King Frederick William I. German Rixdorf, which is now united with Bohemian Rixdorf, was a much more ancient place, and appears as Richardsdorf in 1630 and as Riegenstorp in 1435. The inhabitants of the united community (who numbered 18,729 in 1880, though only 3421 in 1852) are engaged chiefly in weaving, in the manufacture of india-rubber goods, and in the various industries of the neighbouring capital.

RIZZIO, DAVID, a servant of Mary, queen of Scots, was, according to Buchanan, a native of Turin, and came to Scotland in 1561 in the train of the Piedmontese ambassador. He entered the queen's service as a musician in 1564, and was also employed by her as private foreign secretary. He was murdered in 1566, as has been related in the article MARY (vol. xv. p. 596).

RJEV. See RZHEFF.

ROACH (*Leuciscus rutilus*), a fish of the family of Carps (*Cyprinidæ*) and of the genus *Leuciscus*, which comprises also the Rudd, Chub, and Dace. It is one of the most common freshwater fishes of Europe north of the Alps, and extends northwards as far as Lapland. Its pharyngeal teeth are in a single series, five or six on each side. The body is generally rather deep, its greatest depth being about one-third of the total length, the caudal fin not included. The scales are large, from forty-two to forty-four along the lateral line, seven or eight series being above it, and three between the lateral line and ventral fin. The first dorsal rays are inserted vertically above, but not in advance of the root of the ventral fin. The anal fin is supported by from twelve to fourteen rays. The general colour is silvery, in adult fishes with a red tinge about the lower fins. Roach spawn from April to May, and frequently produce hybrids with other allied fishes, such as the rudd and the bream. They never attain to a large size, a roach of 1½ ℔ being considered an unusually large fish. As a food-fish this species is not held in esteem; but by the pleasure it affords to a large class of humble anglers it rivals any of the freshwater fishes which give more pretentious sport, and has properly been made the subject of a special work, *The Book of the Roach*, by Greville Fennell (London, 1870).

ROADS AND STREETS. The earliest roads about which anything definite is known are those of ancient Rome, one of the oldest of which and the most celebrated for the grandeur of its works—the Appian Way—was commenced in 312 B.C. Roman roads are remarkable for preserving a straight course from point to point regardless of obstacles which might have been easily avoided. They appear to have been often laid out in a line with some prominent landmark, and their general straightness is perhaps due to convenience in setting them out. In solidity of construction they have never been excelled, and many of them still remain, often forming the foundation of a more modern road, and in some instances constituting the road surface now used. It is consequently possible, with the help of allusions of ancient writers, to follow the mode of construction. Two parallel trenches were first cut to mark the breadth of the road; loose earth was removed until a solid foundation was reached; and it was replaced by proper material consolidated by ramming, or other means were taken to form a solid foundation for the body of the road. This appears as a rule to have been composed of four layers, generally of local materials, though sometimes they were brought from considerable distances. The lowest layer consisted of two or three courses of flat stones, or, when these were not obtainable, of other stones, generally laid in mortar; the second layer was composed of rubble masonry of smaller stones, or a coarse concrete; the third of a finer concrete, on which was laid a pavement of polygonal blocks of hard stone jointed with the greatest nicety. The four layers are found to be often 3 feet or more in thickness, but the two lowest were dispensed with on rock. The paved part of a great road appears to have been about 16 feet wide, and on either side, and separated from it by raised stone causeways, were unpaved side-ways, each of half the width of the paved road. Where, as on many roads, the surface was not paved, it was made of hard concrete, or pebbles or flints set in mortar. Sometimes clay and marl were used instead of mortar, and it would seem that where inferior materials were used the road was made higher above the ground and rounder in cross section. Streets were paved with large polygonal blocks laid as above described and footways with rectangular slabs. Specimens are still to be seen in Rome and Pompeii. There are no traces of Roman influence in the later roads in England, but in France the Roman method appears to have been followed to some extent when new roads were constructed about the beginning of the 18th century. A foundation of stones on the flat was laid, and over that two layers of considerable thickness, of larger and smaller stones, bordered by large stones on edge, which appeared on the surface of the road. In 1764 Tresaguet set the foundation-stones on edge and reduced the thickness of the upper layers, and his method was generally followed until the influence of Macadam began to be felt. A French chaussée with accotements still retains some resemblance to the old Roman roads.

The almost incredibly bad state of the roads in England towards the latter part of the 17th century appears from the accounts cited by Macaulay (*Hist.*, c. iii.). It was due chiefly to the state of the law, which compelled each parish to maintain its own roads by statute labour, but the establishment of turnpike trusts and the maintenance of roads by tolls do not appear to have effected any great improvement. At the time of Arthur Young's six months' tour in 1770 the roads would seem to have been almost as bad as ever, and it is doubtful if there was much improvement up to the beginning of the present century. The turnpike roads were generally managed by ignorant and incompetent men until Telford and Macadam brought scientific principles and regular system to their construction and repair. The name of Telford is associated with a pitched foundation, which he did not always use, but which closely resembled that which had been long in use in France, and the name of Macadam often characterizes roads on which all his precepts are disregarded. Both insisted on thorough drainage and on the use of carefully prepared materials, and adopted a uniform cross section of moderate curvature instead of the exaggerated roundness given before; but, while Telford paid particular attention to a foundation for the broken stone, Macadam disregarded it, contending that the subsoil, however bad, would carry any weight if made dry by drainage and kept dry by an impervious covering. Macadam was engaged more with the repair of old roads than with the construction of new ones, and, though it is not possible to agree with all his doctrines, the improvement which he effected in road management and maintenance was great and lasting.

CONSTRUCTION OF ROADS.
Gradient.

Construction of Roads.—A road should be as short as possible between two points to be connected, but straightness must often be sacrificed to avoid difficulties and expense and to secure good gradients. The latter should be as easy as practicable, having regard to the country to be traversed, and it is desirable that there should be a ruling gradient than which none should be steeper. On a level macadamized road in ordinary repair the force which the horse has to put forth to draw a load may be taken as one-thirtieth of the load. But in going uphill the horse has also to lift the load, and the additional force to be put forth on this account is very nearly equal to the load drawn divided by the rate of gradient. Thus on a gradient of 1 in 30 the force spent in lifting is one-thirtieth of the load, and in ascending a horse has to exert twice the force required to draw the load on a level. In descending, on the other hand, on such a gradient, the vehicle, when once started, would just move of itself without pressing on the horse. A horse can without difficulty exert twice his usual force for a time, and can therefore ascend gradients of 1 in 30 on a macadamized surface without sensible diminution of speed, and can trot freely down them. These considerations have led to 1 in 30 being generally considered as the ruling gradient to be aimed at on first-class roads, though 1 in 40 has been advocated. Telford adopted 1 in 30 as the ruling gradient on the Holyhead road through North Wales, and there are only two gradients steeper, in places where they were unavoidable. All unnecessary rises and falls should be avoided, but a dead level is unfavourable for drainage, and on this account 1 in 100 to 1 in 150 is the flattest gradient that is desirable. Such slight rises and falls are probably rather favourable than otherwise to ease of draught by horses.

In transverse section, roads in the United Kingdom generally comprise the carriage-way, a space on each side, on one or both of which there may be a footpath, then the fences, and outside all the ditches. The width of the carriage-way may be from 15 feet, which allows of the easy passage of two vehicles, to 30 or 50 feet for roads of importance near towns. The side spaces may be from 4 or 5 to 8 or 10 feet wide; wide sides give the sun and air access to the road, and tend to keep it dry, and also afford space for the deposit of road materials and scrapings. In cuttings or on embankments the transverse section has of course to be modified. The road surface should have just enough convexity to throw the wet off freely, and a very moderate amount is sufficient when a good surface is maintained. On a too convex road the traffic keeps to the middle, and wears ruts which retain the water, so that the surface is not so dry as with a flatter section which allows the traffic to distribute itself over the whole width. Telford used a cross section differing slightly from an arc of a circle in being more convex in the middle than at the sides. Walker recommended two straight lines joined in the middle of the road by a curve, and inclined about 1 in 24 towards the sides, the objection to which is that the flat sides are liable to wear hollow. An arc of a circle is often used, and is a good form, but on the whole a curve more convex at the centre than towards the sides is the best. The rise in the curve from the sides to the centre need not exceed one-fortieth of the width, and one-sixtieth is generally enough on well-kept roads, and if seven-eighths of the total rise are given at one-fourth the distance from the centre to the sides and five-eighths at half that distance a curve of suitable form will be obtained. It is generally best to obtain the requisite convexity by rounding the formation surface or seat of the road and giving a uniform thickness to the coating of stone. When there is not a kerb there should be a "shouldering" of sods and earth on each side to keep the road materials in place, and to form with the finished surface the water tables or side channels in which the surface drainage is collected, to be conveyed by outlets at frequent intervals to the side ditches. The outlets are open cuts through the sides or drains beneath the footpaths. The side ditches should be deep enough to thoroughly drain the foundation of the road, and cross or mitre drains under the road communicating with the side ditches may be required in wet soil. A thorough drainage of the subsoil is of the greatest importance, and it is economical in the end to go to considerable expense to secure it. In a cutting, or where there are no side ditches, the surface water may be taken off by gratings and under drains beneath the side channels.

The thickness to be given to a road made altogether of broken stone will depend on the traffic it is intended for. On a good well-drained soil a thickness of 6 inches will make an excellent road for ordinary traffic, and Macadam's opinion that 10 inches of well-consolidated material was sufficient to carry the heaviest traffic on any substratum if properly drained has proved to be generally correct. In a new road the loss of thickness during consolidation must be allowed for, and the materials should be laid about one-half thicker than the coating is intended to be. When the materials are not rolled, a thickness of 3 to 6 inches should be laid first, and when that has partly consolidated under the traffic other coats may be added to make up the full thickness. There is great wear and waste of the materials in consolidating if they are laid too thickly at once. Inferior material is sometimes used in the lower part of the road coating, especially when the surface is to be of granite or other hard expensive stone. Thus flints or gravel may be used for the lower 5 or 6 inches of a road to be coated with 3 or 4 inches of granite. Telford covered the broken stone of new roads with 1½ inches of gravel to act as a binding material. Macadam absolutely interdicted the use of any binding material, leaving the broken stone to work in and unite by its own angles under the traffic. An unsound road may be made by the improper use of a binding material, but there is no doubt that broken stone consolidates more quickly, and without losing its angular form, when binding is moderately used. About one half the volume of broken stone is void space, and, as the results of examinations into the composition of the coatings of roads when thoroughly consolidated prove that a very large proportion must necessarily be small stones and detritus, it is much better to give some portion of this at first rather than to obtain it by the crushing and grinding of the materials by the traffic. The binding material—fine gravel, sand, or road scrapings—should be spread over the surface after the broken stone is laid and not be mixed with it. Uniform consolidation is much aided by raking.

Whenever it is possible a new road should be finished with a roller. The materials are consolidated with less waste, and wear and tear of vehicles and horses is saved. Horse-rollers, if heavy enough to be efficient, require a number of horses to draw them and are cumbersome to use. A ton or a ton and a half weight per foot of width is desirable, and to obtain it a roller 4 feet wide must be loaded to 5 or 6 tons, and will require as many horses to draw it. In Great Britain horse-rollers have to a great extent been superseded by steam road rollers in consequence of the superiority and economy in the work done. A 15-ton roller, 7 feet wide, giving upwards of 2 tons weight per foot, can thoroughly consolidate 1000 to 2000 square yards of newly-laid materials per day. The materials should be formed to the proper section, and not more than 4 or 5 inches in thickness; if a greater thickness is required it is better to roll two coats separately. After several passages of the roller any hollows must be filled up with small materials, and the rolling must be continued until it causes no motion among the stones. When this result has been attained the binding material may be added. It should be spread dry and uniformly in moderate quantities and should be rolled into the interstices with the aid of watering and sweeping. Provided that all the interstices in the upper stratum of stones are filled after the stones are thoroughly consolidated, the less binding that is used the better. By using binding in larger quantity, and before the stone is thoroughly consolidated, the amount of rolling required is lessened, but at the expense of durability in the road. Watering is necessary from the commencement of the rolling unless the weather is wet, but excessive watering, especially in the earlier stages, tends to soften the foundation.

A pitched foundation like that used by Telford is always desirable for a road that is subject to heavy traffic. It consists of flat stones carefully set on edge in courses across the road with the broadest edges downwards. The upper edges should not exceed 4 inches in breadth, to hold the broken stone well. All inequalities must be knocked off, and small stones and chips must be firmly pinned into the interstices with a hammer, so as to form a regular convex surface, with every stone firmly fixed in place. The thickness of the pitching is generally 6 or 7 inches; it should not be less than 4, and it may generally be thicker without any sensible increase of cost. At least 4 inches of broken stone are required over the pitched foundation, and, when consolidated, 6 are always sufficient. A foundation of cement concrete 6 inches thick was used by Sir J. Macneill on the Highgate Archway (London) road on a bad clay bottom, and common lime concrete was subsequently used elsewhere. A bed of lias lime concrete 12 inches thick was laid as a foundation in Southwark Street and on the Thames Embankment, but it is too expensive for a macadamized road under ordinary circumstances. Burned clay, gravel, or even sand may be usefully employed as a foundation on a clay bottom, to cut off the road material from the clay.

The qualities required in a good road stone are hardness, toughness, and ability to resist the action of the weather, and these are not always found together in the same stone. Limestones possess another quality, that of furnishing a mortar-like detritus which binds the stone together, and enables it to wear better than a harder material that does not bind. For heavy traffic the best materials are traps, basalts, greenstones, and syenite; quartzose grits and cherty sandstones are also excellent materials. For moderate traffic the harder limestones are sufficiently durable and make the smoothest and pleasantest roads. Coefficients of quality for various road materials have been obtained by the engineers of the French "Administration des Ponts et Chaussées." The quality was assumed to be in inverse proportion to the quantity consumed on a length of road with the same traffic, and measurements of traffic and wear were systematically made to arrive at correct results. These processes requiring great care and considerable time, direct experiments on resistance to crushing and to rubbing and collision have also been made on 673 samples of road materials of all kinds. The coefficients obtained by these experiments, which were found to agree fairly well with those arrived at by actual wear in the roads, are summarized in the following table. The coefficient 20 is equivalent to "excellent," 10 to "sufficiently good," and 5 to "bad."

Materials.	Coefficient of Wear.	Coefficient of Crushing.
Basalt	12·5 to 24·2	12·1 to 16
Porphyry	14·1 „ 22·9	8·3 „ 16·3
Gneiss	10·3 „ 19	13·4 „ 14·8
Granite	7·3 „ 18	7·7 „ 15·8
Syenite	11·6 „ 12·7	12·4 „ 13
Slag	14·5 „ 15·3	7·2 „ 11·1
Quartzite	13·8 „ 30	12·3 „ 21·6
Quartzose sandstone	14·3 „ 26·2	9·0 „ 16·6
Quartz	12·9 „ 17·8	12·3 „ 13·2
Silex	9·8 „ 21·3	14·2 „ 17·6
Chalk flints	3·5 „ 16·3	17·3 „ 25·5
Limestone	6·6 „ 15·7	6·5 „ 13·5

Stone for a new road should be evenly broken to a size that will pass every way through a ring 2½ inches in diameter. For repairs, especially when the material is tough, a gauge of 2¼ or 2 inches may be used with advantage, as the stone covers a larger surface, consolidates sooner, and makes a smoother surface. Stone is best broken by hand, but stone-breaking machines have been introduced which supersede hand-breaking to some extent, especially where large quantities of hard stone are to be broken. There is always a certain amount of crushing in breaking by a machine, from which softer stones suffer more, and machine-broken stone is never nearly so cubical, uniform in size, or durable as stone well broken by hand. Broken road material contains about 55 per cent. of solid stone to 45 of void space. In a well-consolidated road the void is filled up by small fragments, detritus, and mud, the result of wear, and specimens of good road surfaces weigh from 93 to 95 per cent. of the weight of the solid stone of which they are made. In the coating of a well-maintained road the proportion of stones of various sizes varies, but generally from one-third to one-half is found to consist of detritus under three-eighths of an inch in diameter, and there is a very constant proportion of about one-fifth of mud and detritus under one-thirtieth of an inch in diameter. This appears to be the amount necessary to fill the voids between the fragments of stone when compacted together. In an ill-kept road, from which the mud is not removed, the proportion of detritus is much higher, and mud may constitute nearly one-half of the coating. In proportion as the detritus and mud are kept down to the minimum by constant removal from the surface, so will the road be able to resist the action of wet and frost and the wear of the traffic.

The wear of materials, resulting in their gradual reduction to detritus, is due to the joint action of the traffic and the weather, which cause surface wear, wear arising from cross breaking, and from rubbing of the stones together. When there is no movement in the body of the road, and the wear is confined to the crushing and grinding at the surface, it is the least possible; but, when a road is weak from insufficient thickness or solidity on a yielding foundation, bending and cross breaking of the coating take place under passing loads in addition to the surface wear, and the effects are aggravated by the softening action of water finding its way into the road through cracks formed in the surface and by the disintegrating action of frost. The wear and waste are thus far larger than on roads of sufficient strength, properly maintained. The destructive effect of wheels is greater as the diameter is less, and to a much greater degree as the tire is narrower. On hard and strong roads no greater width of wheel than 4½ inches is useful, as a wider tire does not bear evenly, but on yielding roads a greater width is of some advantage, though it does not prevent damage from bending and cross breaking of the whole coating under excessive loads. A good deal of attention has been given by French engineers to the measurement of traffic, wear, and the consumption of road materials. Without a knowledge of the amount of traffic accurate comparisons of wear are impossible, and an account of the traffic on the roads of France is taken periodically in "collars" or horses drawing loads, and in the weight drawn. Traffic as measured by weight drawn has of late been observed in some of the streets of London and Liverpool, and has been reduced for comparison to the weight per foot or yard of width of the carriage-way. Wear may be measured by loss of thickness in the coating; but the loss of stone in proportion to detritus must also be ascertained before all the effects of wear can be determined. The accurate measurement of wear as practised by the French engineers is a complicated process, and it must suffice here to state that measured by thickness the wear is seldom found to exceed half an inch, or on the most frequented roads of France one inch, of consolidated surface per year, and that about 100 cubic yards of good materials per mile per year are considered as the average consumption under 100 collars of traffic per day. Observations in the United Kingdom on roads well and systematically maintained have confirmed these results.

Maintenance. The new materials may be added to the road either in thin coats and small patches year by year or in a thick coat consolidated by rolling. The first method, by which the wear is replaced annually and the traffic is depended on to work the materials into the road, can be followed with excellent results, and at no great inconvenience to the public under proper management when the traffic is not excessive. Considerable care in the use of materials is required that none may be unnecessarily applied. The annual employment of one-fifth or one-sixth the quantity which it would take to cover the whole surface one stone in thickness is often sufficient to replace wear, and it will then take five or six years to coat every part of the road if it is covered regularly. It is therefore important to apply the new materials only where they are needed, and not to use them where the road is already sufficiently thick. The irregularity of wear and of thickness enables a good roadman to judge where new materials must be applied, and he will apply them in small quantities wherever weak places appear. To facilitate this the materials should be placed in heaps by the roadside in the summer, and they should be carefully spread in the autumn and attended to afterwards to ensure consolidation without waste. By good management a large quantity of materials may be incorporated in a road before the middle of the winter without harassing the traffic, and the strength may not only be maintained but increased. On a hard strong road consolidation may be aided by loosening the surface with a pick; generally only the margin of a patch need be picked up. But if the road is soft or weak it is better not to disturb the surface at all. Binding may sometimes be used to aid consolidation, but it is seldom necessary if the materials are properly laid and attended to, as the coating already contains detritus enough. In the second method a coating of materials is laid on at once sufficient to endure the wear of several years with such slight repairs as may be necessary to keep a good surface, and, when the wear has gone as far as it can be safely allowed to go, the process is repeated. Unless the wear is very considerable there is no economy in this method, though the convenience to the public, especially in towns, is undeniable. Consolidation by rolling (after the manner already described) is essential, and it is generally desirable to loosen the old surface to ensure the incorporation of the new coating with it. Scraping and attention are required between one coating and another and also slight repairs to the surface, as, however well the materials may be laid and rolled, the wear of the ordinary traffic will search out places which have escaped the full pressure of the roller and produce inequalities.

Besides a regular application of new materials to replace wear, there must be in road maintenance on proper principles a systematic removal of the detritus by scraping or sweeping, which must be regarded as keeping the whole coating in proper condition, and not as mere surface cleansing. The wear should also be reduced as far as possible by providing sufficient thickness to carry the traffic, by keeping an even surface on which water can never stand and soak, and by good drainage both of surface and subsoil. An adequate amount of skilled manual labour is necessary for economy of maintenance, and this and the constant attention which is required to keep a road in good order are best secured by putting a man in permanent charge of a defined length. In the autumn and winter, when more labour is wanted, extra men should work under the directions of the permanent road labourer, whose knowledge of his length of road will enable him to employ them to the best advantage.

Concrete and tar macadam. Concrete macadam, formed by grouting with lime or cement mortar a coat of broken stone laid over a bed of stone previously well rolled, has been tried as an improvement on an ordinary macadamized surface, but not hitherto with much success. When cleanliness is of importance, and great durability is not required, tar macadam or bituminous concrete may be usefully employed. It is sometimes made by first spreading a coating of broken stone and consolidating it by a roller, and then pouring over it a mixture of coal-tar, pitch, and creasote oil, upon which a layer of smaller stone is spread and rolled in, and the surface finished with stone chippings rolled in. More usually the broken stone and bituminous mixture are well incorporated together before they are spread, the stone sometimes being previously heated. The lower layer, about 4 inches thick, may be of stone broken to 2½ inches gauge, and the next layer, about 2 inches thick, may be of smaller stone. Each layer must be well rolled, and when perfectly solid a thin coating of fine stone or granite chippings is spread over the surface and rolled in. Hard limestone is found to be more suitable than silicious or igneous rocks for this material. A road surface well made in this manner will last several years under light traffic without any repairs, and it can easily be patched when necessary.

Stone pavement. *Stone Pavements.*—Early pitched roadways consisted of pebbles or rounded boulders, bedded in the natural surface or in sand or gravel. The next step in advance was to employ roughly-squared blocks; but the wide and irregular joints admitted the water to the subsoil, and the mud worked up and the stones sank irregularly under the traffic. Telford, who was called upon to report on the street pavements of the parish of Hanover Square in 1824, saw the necessity of cutting off all connexion between the subsoil and the paving stones. He recommended a bed of about 6 inches of clean river ballast, rendered compact by being travelled upon for some time before the paving was laid, but he subsequently considered that nothing short of 12 inches of broken stone, put on in layers 4 inches thick and completely consolidated by carriages passing over them, would answer the purpose. He recommended paving stones of considerable depth and of from 4½ to 6 or 7½ inches in breadth for the greatest thoroughfares, and he pointed out the importance of working the stones flat on the face and square on all sides, so as to joint close and preserve the bed or base as nearly as possible of the same size as the face, and of carefully placing together in the same course stones of equal breadth. Many pavements thus laid with stones of considerable breadth still remain, but experience proved that it was a mistake to suppose that broad stones having a larger base would support better the weight and shocks of heavy traffic; on the contrary, a wide stone has a tendency to rock on its bed, and also to wear round on the top and become slippery. To obtain an evener surface and a better foothold for the horses the stones were reduced in width, and in 1840 a granite pavement was laid by Walker on Blackfriars Bridge, which may be considered the first of modern set pavements. The stones were 3 inches broad and 9 deep; they were laid on a bed of concrete 1 foot thick and were jointed with mortar. The reduction of breadth to about 3 inches was generally followed, but it is only of late years that a concrete foundation has been employed to any great extent, the frequent breaking up to which streets are subject having prevented it. In London a foundation of broken stone has been continued in the chief thoroughfares, the sets being evenly bedded in gravel upon it and rammed with a heavy wooden rammer. Hard core—a mixture of broken stone, clinker, brick rubbish, and old building materials—has also been largely used to form a foundation. In the northern towns of England cinders have been employed, and where the traffic is exceptionally heavy a pitched foundation of stones on edge has been laid when the sets were not paved upon an old macadamized surface. The concrete for a foundation to a paved street should be made with the best Portland cement, thoroughly mixed in proper proportions with the sand and gravel or other materials used, water being added as sparingly as possible. A thickness of 6 inches of well-made cement concrete is sufficient for the heaviest traffic, and it can be cut out in slabs for pipe-laying or repairs and can be relaid and cemented in its place. To obtain the best result a new foundation should not be paved upon for a week. A foundation of bituminous concrete is sometimes used where only a thin bed can be laid, in consequence of there being an old foundation which it is undesirable to disturb. It is made by pouring a composition of coal-tar, pitch, and creasote oil while hot over broken stone levelled and rolled to the proper form, and then spreading a thin layer of smaller broken stone over the surface and rolling it in. It has the advantage that it can be paved upon a few hours after it has been laid.

The best materials for pavement sets are the hard igneous and metamorphic rocks, though millstone grit and other hard sedimentary rocks of the same nature are used when the traffic is comparatively light. Excessively hard stone which wears smooth and slippery is objectionable in spite of its durability. Penmaen-Mawr stone, which is much used in many of the large Lancashire towns, is of this character, and its use was discontinued in London in consequence of its slipperiness and noise. Guernsey granite (syenite) and Mount Sorrel granite (syenite) have the same nature in a less degree, and in London Aberdeen blue granite is preferred, as, though it wears faster, it keeps a rough surface. Walker's observations on the wear of tram stones showed that Aberdeen granite wore three and a quarter times as fast as Guernsey granite, and in the set pavement of Blackfriars Bridge it was found that after thirteen and a half years' wear the Aberdeen stone had worn 1½ inches, while the Guernsey granite had only worn one-fourth of an inch (equal to ·11 and ·019 inch per year respectively), or that the former had worn six times as fast as the latter. Observations made by Mr Haywood showed the general rate of wear of Aberdeen granite under heavy traffic in the City of London pavements to have been from ·14 to ·23 inch per year. The rate of wear of Penmaen-Mawr and Carnarvonshire sets in Liverpool under the greatest traffic is stated to be seldom more than ·02 inch per year. A certain proportion between the depth and the length and breadth of sets is required for stability. A shallow stone is more easily tilted up by a heavy weight coming on one edge, and a narrow stone has a tendency to turn over sideways. The length, measured across the street, must be sufficient to break joint properly, as two or more joints nearly in a line lead to the formation of grooves. For the softer stones a breadth of 4 or 5 inches may be adopted, but for sets of granite or other hard material, with which the joints must be depended on for foothold, the breadth should not much exceed 3 inches. The depth should not be less than twice the breadth, and, as deeper sets weigh more and cost more than shallower ones and the loss by wear is but slight, there is some reason for not exceeding the minimum depth. Where, however, the speedy relaying of a street pavement is of more importance than a saving in first cost, deeper sets are used, and when they have become so worn as to be uneven the street is relaid with new sets and the old ones are removed to be redressed for use in other streets, the sets being used again and again in less important streets as their depth is reduced. In London sets 3 inches wide, 10 to 15 long, and originally 9 deep are used in this manner. In Liverpool sets 4 to 14 inches wide, to average with the joints, 5 to 7 inches long, and 6 to 7½ deep according to the traffic are used. In Manchester the sets are 3 to 3½ inches wide, 5 to 7 long, and 5 to 6 deep, or 7 in exceptional situations. Sets should be well squared and not taper from the face downwards; both joints and face should be free from irregular projections. On a concrete foundation sets are generally bedded on a thin layer of sand or fine gravel; sometimes they are laid in a bed of fine cement concrete, enough of which is spread over the concrete foundation to be covered while fresh by the sets, which are put in place and smartly tapped, and the joints are grouted at once with cement grout. To allow the cement to become thoroughly set it is desirable that traffic over the pavement should not be allowed for a fortnight, if that can be arranged. The courses of sets are laid square across the street, no advantage arising from a slanting direction, which makes the wear more irregular. At junctions of streets the courses are laid meeting at an angle at the centre line of the narrower street, so that the courses may not run in the direction of the traffic. On steep inclines the sets are sometimes slightly tilted on their beds, forming a serrated surface to give foothold, and slate has been inserted in the joints for the same purpose. The water channels are formed by two or three courses of sets laid parallel to the kerb.

Joints simply filled in with gravel are of course pervious to water, and a grout of lime or cement does not make a permanently water-tight joint, as it becomes disintegrated under the vibration of the traffic. Grouted joints, however, make a good pavement when there is a foundation of concrete or broken stone or hard core. Where there is not a regular foundation imperviousness in the joints is of great importance. In some of the Lancashire towns the joints have for many years past been made by first filling them with clean gravel, well shaken in by ramming, and then pouring in a composition of coal-tar, pitch, and creasote oil. The Manchester pavements are good examples of this system of trusting to impervious jointing to prevent unequal settlement. The foundation, where there is not already an old road surface, is a bed of cinders about 1 foot thick, over which are laid 3 inches of gravel, which are thoroughly consolidated by allowing the traffic to pass over them. The sets are evenly bedded and well rammed after the joints have been filled with clean gravel, ramming and gravelling being repeated till the joints are full of gravel. The mixture of coal-tar, pitch, and creasote oil, well boiled, is then poured over the surface and allowed to percolate and fill up all interstices in the joints, and the pavement is finished by covering it with small gravel. Joints so formed are impervious to wet and have a certain amount of elasticity; the foundation is kept dry; and the pavement keeps its form well for many years. The objection is made that in hot weather the composition runs from the joints and makes the streets unpleasant for foot-passengers. This sort of jointing is used in Liverpool and some other large towns, where the sets are laid on a concrete foundation. The elasticity diminishes vibration and noise, and pavements so jointed are said to wear better than others.

Cross section.

A curve like that before described, flattening gradually towards the sides, and having a rise equal to one-sixtieth of the width of the carriage-way, is a common cross section for a paved street. Sometimes the rise is even less.

Granite tramway

A pavement consisting of broad, smooth, well-jointed blocks of granite for the wheel tracks, and pitching between for the horse track, was laid by Walker in Commercial Road (London) for the heavy traffic to the West India Docks in 1825, and similar pavements have been successfully used elsewhere, principally for heavy traffic, in streets only wide enough for one vehicle. In Milan, Turin, and other towns of northern Italy tramways of the same sort are extensively used for the ordinary street traffic. The tractive force required is small, while the foothold on the horse track is good; but the tram-stones are slippery for horses to pass over. The rigidity of the roadway renders it more suitable for slow heavy traffic than for light quick vehicles, and the improvement in other pavements has limited the application of this one in ordinary streets.

WOOD PAVING.

Wood Paving.—Wood pavements were introduced in England in 1839. Hexagonal blocks of fir, 6 to 8 inches across and 4 to 6 deep, were bedded in gravel laid on a foundation previously levelled and beaten. The blocks were either bevelled off at the edges or grooved across the face to afford foothold. Other wood pavements were tried in London about the same time, but they soon got out of order from unequal settlement of the blocks, and most of them lasted but a few years. The best of these was Carey's, which consisted of blocks 6½ to 7½ inches wide, 13 to 15 long, and 8 or 9 deep, the sides and ends having projecting and re-entering angles locking the blocks together with the view of preventing unequal settlement. Pavements on this system were laid in Mincing Lane in 1841 and in Gracechurch Street in 1842. In the latter street the blocks appear to have been relaid every three or four years and to have been entirely removed about every eleven years, until the pavement was removed in 1871, to be superseded by asphalt. Experience led to a reduction in the width of the blocks to 4 inches and in the depth to 5 or 6, and the salient and re-entering angles disappeared from the sides. With these modifications Carey's pavement remained in use from 1841 until after the introduction of more modern systems in recent years. The "improved wood pavement" was first used in London in 1871. After the foundation was formed to the proper cross section a bed of sand 4 inches deep was laid, upon which came two layers of inch deal boards saturated with boiling tar, one layer across the other. The wooden blocks were 3 inches wide, 5 deep, and 9 long; they were dipped in tar and laid on the boards with the ends close together, but transversely the courses were spaced by fillets of wood three-fourths of an inch wide nailed to the floor and to the blocks. The joints were filled up with clean pebbles rammed in and were run with a composition of pitch and tar, the surface being dressed with boiling tar and strewed with small sharp gravel and sand. In this pavement a somewhat elastic foundation was provided in the boards, which were also intended to prevent unequal settlement of the blocks; but the solidity of the pavement depended upon its water-tightness, for, when the surface water reached the sand, as it did sooner or later, settlement and dislocation of the blocks under the traffic arose. Pavements on this system were laid between 1872 and 1876, and were kept in repair and relaid from time to time, but about 1877 the plank foundation was abandoned for a foundation of cement concrete.

A concrete foundation for a wood pavement appears to have been first employed in a pavement laid in 1872 in Gracechurch Street by the Ligno-Mineral Company. The concrete was of blue lias lime 4 inches thick formed to the curve of the road. The blocks were of beech, mineralized by a special process, 3½ inches wide, 4½ deep, and 7½ long, with the ends cut to an angle of 60°, so that each block might derive support from the next one. They were laid with the ends inclining in opposite directions in alternate courses. The upper edges of the blocks were chamfered, and there was a chamfered groove near the bottom. In a few years this form of block was abandoned for rectangular blocks, and mineralized fir was substituted for beech. The blocks were bedded in Portland cement and laid with joints one-fourth of an inch wide, partly filled with asphalt and then grouted with mortar. The adoption of a bed of concrete as the weight-bearing foundation of the road marks a new departure, and in all the more recent systems of wood pavement a substantial foundation of concrete is an essential feature. In Norwich, however, a large quantity of wood pavement has been laid on the old street foundation, the blocks being bedded in gravel and sand and rammed, and the joints grouted with lime and sand. The experience of from four to seven years has proved the pavements to be successful, but the foundation is exceptionally dry and hard and the traffic not very heavy. With a concrete foundation there is no reason for complicated shapes and contrivances for locking the blocks together; and wood pavements in their modern form consist of rectangular blocks (obtained by cutting off the end of a deal plank), bedded on the concrete with the fibres of the wood vertical, thus constituting a slightly elastic wearing surface on a rigid foundation, by which the weight of the traffic is borne. There is, however, considerable variation in the method of bedding and jointing the blocks. The Asphaltic Wood Pavement Company laid half an inch of asphalt upon the concrete, and formed the lower part of the joint of asphalt and the upper part of a grout of Portland cement and gravel, the advantage claimed being a slightly elastic bed for the blocks and water-tight joints. The blocks have been laid in unset cement over the concrete and rammed to an even surface; but the ramming is liable to split the blocks, and the indentations formed in the cement surface of the foundation have to be removed when the time comes for renewing the blocks. It is now more usual to bed the blocks directly on the concrete, a smooth surface being formed either with the concrete itself or by a floating of cement, and to fill the joints with a grout of cement and gravel. A cement joint adheres to the blocks, resists wet, and does not wear down too much below the surface of the wood, and so form a receptacle for mud. In Henson's system, which has been largely used, the blocks are bedded and jointed with ordinary roofing felt, a strip of which, cut to a width equal to the depth of the blocks, is placed between every two courses. The joint is made as close as possible by driving up the blocks as every eight or ten courses are laid with heavy mallets,—a plank being laid along the face of the work. A perfectly close and slightly elastic joint is thus formed. A continuous layer of felt is likewise laid over the concrete foundation to give a slightly elastic bed to the blocks. A V-shaped groove along the centre of every fourth block was at first considered necessary for foothold, but its use has been discontinued except on gradients steeper than 1 in 30. The surface of the pavement is dressed over with a hot bituminous compound, and covered with fine clean grit. This method of laying a wood pavement, although somewhat more expensive, is probably the best that has hitherto been devised for smoothness and durability. The blocks are laid in courses across the streets, any change in the direction of the latter being accommodated by shorter courses ending with wedge-shaped blocks. At street junctions the courses are laid diagonally, or meeting at right angles. Two or three courses are laid parallel with the kerb to form a water channel. The blocks may be laid close end to end across the street if some allowance be made for expansion by wet, without which the kerbstones and footways will be displaced, or the courses will be bent in reversed curves. To afford relief the joints of the courses parallel to the kerb may be left open, or the course next the kerb may be left out until expansion has ceased, the space being temporarily filled in with sand. In the direction of the traffic joints more or less wide are generally thought necessary for foothold. A wide joint allows the fibres of the wood to spread and give way at the upper corner of the blocks for want of lateral support, and it also forms a receptacle for mud and wet. Experience has shown that the space of three-fourths of an inch or one inch, once thought necessary for foothold, may safely be reduced to one-fourth or three-eighths of an inch. For spacing the courses to form the joints strips of wood of the proper thickness may be laid in and removed before the joints are filled, or they may be nailed to the lower part of the blocks. Two fillets have been nailed on, or three cast-iron studs fixed in the sides of each block to keep them steady in place until the joints are filled and thoroughly set. The latter method secures more uniformity in the width of the joints.

There is some difference of opinion as to the best material for a wood pavement. Pitch pine and the harder red and yellow deals are the most durable, but they are less elastic than the softer woods, and are apt to wear slippery. Soft white woods have been recommended for the sake of a more elastic surface; but on the whole either Memel or Swedish yellow deal is generally considered the best material. Whatever wood is used, it should be sound, close-grained, even in quality, free from knots and sap, and from the blue tinge which is a sign of incipient decay. After the blocks are cut, all those that are unsound, knotty, or badly shaped should be carefully rejected, as defective blocks soon cause holes in the surface and must be replaced, or the adjoining blocks will suffer undue wear and the surface become irregular. The breadth of the blocks never now exceeds 4 inches, and it is generally 3, the length being determined by the breadth of the deal or batten from which they are cut. The depth is usually 5 or 6 inches; 5 inches are considered by many to be enough to give sufficient depth for as long as the pavement will retain a sufficiently good surface without renewing the wood, and blocks of that depth have been laid in many London streets. It is doubtful if any advantage is derived from creasoting or from dipping the blocks in creasote oil or coal tar. Dipping affords a cover for the use of defective or inferior wood, and thorough creasoting, though it preserves the wood from decay, has little or no influence on the wear, which in almost all cases determines the life of the blocks.

Foundation

With a curved cross section like that already described a rise from the mean level of the channels to the crown of the road equal to one-sixtieth or one-seventieth of the width of the carriage-way is enough. The necessary profile must be accurately given to the concrete foundation when wet. Wooden moulds or templates are fixed across the street 10 or 12 feet apart, over which a straight batten is worked to give the concrete the required form and a smooth surface. The moulds are removed when the concrete is partially set and the spaces are made good with cement mortar. In a level street provision should be made in the foundation for a fall in the side channels towards the gullies of not less than 1 in 150, and the necessary modifications of cross section at the intersection of streets must also be provided for. Every care should be taken to ensure a good homogeneous concrete for the foundation, as upon that the strength of the road depends. With a well-made Portland cement concrete a thickness of 6 inches is sufficient. It should be allowed to set thoroughly before the blocks are laid, and traffic should not be allowed to pass over it for a week. The finished pavement should be covered with a thin layer of sharp grit, which is forced into the wood by the traffic and forms a hard face. Several applications of grit are desirable at first, and from time to time afterwards, both as a protection to the wood and to prevent slipperiness. Systematic cleansing is required to prevent slipperiness and foul smells, and to preserve the pavement. Cleansing may be aided by washing, and when it is thoroughly carried out but little watering is required to keep down the dust. A wood pavement is the quietest for the residents, pleasant to travel over, and favourable to the wear of vehicles. Traction on it is easy and foothold good, so that it may be laid on gradients as steep as 1 in 20.

The wear of wood pavements in London is stated by Mr Stayton to be from ·065 inch per year in Sloane Street, with a traffic of 279 tons per yard of width per day, to ·456 inch per year in Fleet Street, with a traffic of 1360 tons per yard of width per day. Reduced to a standard of traffic of 750 tons per yard per day, the comparative annual wear becomes ·175 in the former and ·251 in the latter street. In Parliament Street, Westminster, blocks removed after four years in places where patching was required had lost 1¼ to 1½ inches in thickness, equal to one-third of an inch per year under traffic stated to be 1106 tons per yard of width per day. From information afforded by Mr Haywood it appears that in the City of London under traffic of from 300 to 660 vehicles per yard of width per day of 12 hours the wear is from ·2 to ·3 inch per year, and that in King William Street, London Bridge, under a traffic of about 1200 vehicles per yard of width in 12 hours the wear was found to be 2⅝ inches in 3¼ years in the middle of the road, or ·81 inch per year. This is the heaviest traffic to which wood pavement has been subjected. The wear is generally considered to be as much due to the horses' feet as to the wheels, and the action of the former is more destructive on steep gradients. Towards the end of the life of the blocks the wear is more rapid than at first. Few wood pavements retain a sufficiently good surface after about six years' wear without extensive repairs, and it is probably not advantageous to lay blocks of a greater depth than will provide for a duration of seven years; 5 inches are almost always sufficient for this.

Wood pavements of plain blocks on a cement concrete bed are now (1885) laid at from 10s. 6d. to 12s. 6d. per square yard, a considerable reduction on the prices paid for patented systems a few years ago. Of the above prices 2s. 3d. to 3s. 9d. is the cost of the foundation, which does not require renewal like the blocks. Assuming the average life of the latter to be seven years, Mr Stayton estimates the annual cost of wood paving in Chelsea with a traffic of 500 to 750 tons per yard of width per day to be 1s. 9d. per square yard, which includes the cost of original construction, repairs and renewals, and interest, spread over fifteen years. Cleansing and sanding are estimated to cost 5d. per square yard in addition.

Asphalt Paving.—Asphalt was first used for street paving in Paris in 1854. It was introduced in London in 1869, when Threadneedle Street was paved by the Val de Travers Asphalt Company, and since then it has been extensively used for paving both streets and footways. The material is a hard limestone impregnated with bitumen in the proportion of from 6 to 8 per cent. in the Seyssel rock, and from 10 to 12 in that from Val de Travers. Asphalts containing less than the former proportion have not sufficient coherence for street pavements, and those containing more than the latter proportion soften from heat in the summer. Asphalt is employed either as a mastic or compressed. The mastic is previously prepared in cakes and is melted for use in caldrons with a small quantity of bitumen, and for a street pavement is thoroughly mixed with sand or grit. It is spread in one thickness on a concrete foundation, covered with sand, and beaten to an even surface. This material has not proved so successful for street surfaces as compressed asphalt. To produce this the rock asphalt, previously reduced to a fine powder by mechanical means, is heated in revolving ovens to from 220° to 250°, spread while still hot, and compressed into a solid mass by hot disk-shaped rammers, and afterwards smoothed with irons heated to a dull redness. The original rock is thus as it were reconstructed by taking advantage of the power of coherence of the molecules under pressure when hot. In heating the powder the moisture combined in the limestone must be driven off without reducing the proportion of the bitumen more than is unavoidable. The powder cools very slowly and may be conveyed long distances from the ovens; it may even be kept till the next day before use. When laid it should still retain a temperature of from 150° to 200°. It is spread evenly with a rake by skilled workmen for the whole width of the street to a thickness about two-fifths greater than the finished coating is intended to be. Ramming is commenced with light blows to ensure equality of compression throughout and is continued with increased force until the whole is solidified. The ramming follows up the spreading, so that a joint is required only when the work is interrupted at the end of a day, or from some other cause. In a few hours after it has been laid an asphalt pavement may be used for traffic. When finished, its thickness may be from 1½ to 2½ inches, according to the traffic; a greater thickness than the latter cannot be evenly compressed with certainty. The asphalt loses thickness by compression under the traffic for a long time and to the extent, it is said, of one-fifth or one-fourth, but the wear appears to be very small. A pavement in Paris which had lost more than one-fourth of its thickness was found to have lost only 5 per cent. of its weight after sixteen years' wear. The pavement in Cheapside, after fourteen years under exceptionally heavy traffic, has been reduced, where not repaired, from its original thickness of 2½ to about 1⅞ inches. The wear-resisting power of the asphalt is due to its elasticity; tracks are made by the wheels at first, but when thoroughly compressed by the traffic the surface retains little or no trace of the heaviest loads. Repairs are easily and quickly made by cutting out defective places and ramming in fresh heated powder, which can be done in the early morning without stopping the traffic. An unyielding foundation is indispensable; it should be of the best Portland cement concrete, 6 inches in thickness, which must be well set and perfectly dry throughout before the asphalt is laid, or the steam generated on the application of the hot powder will prevent coherence and lead to cracks and holes in the asphalt, which quickly enlarge under the traffic. For the same reason the asphalt should be laid in dry weather. The concrete foundation must be carefully formed to the proper profile, with an inclination towards the sides of not more than 1 in 50, which is sufficient with so smooth a surface. About 1 in 50 is the steepest gradient at which an asphalt pavement can be safely laid. When either dry or wet it affords good foothold for horses, but when beginning to get wet, or drying, it is often extremely slippery. This is said to be due to dirt on the surface, and not to the nature of the material. Sand is strewed over the surface to remedy the slipperiness; it tends, however, to wear out the asphalt, and great cleanliness is the best preventive. An asphalt pavement can be kept cleaner than any other, is impervious to moisture, and dries quickly. It is noiseless, except from the clatter of horses' feet on it; it is the pleasantest pavement to travel upon, but it has the drawback of imperfect foothold and slipperiness at times. The cost of a compressed asphalt pavement 2 to 2½ inches thick on a Portland cement concrete foundation 6 inches thick is from 13s. to 16s. a square yard, and the maintenance is usually undertaken for a period of seventeen years by the company laying the pavement, the first two years free and at 3d. to 1s. 6d. per square yard, according to the traffic, in succeeding years.

Comparison of Street Surfaces.—The comparative cost of various street surfaces in Liverpool, including interest on first cost, sinking fund, maintenance, and scavenging, when reduced to a uniform standard traffic of 100,000 tons per annum for each yard in width of the carriage-way, is given by Mr Deacon as follows:—

	Per square yard per year.
Set pavement of hard granites	11½d.
,, ,, softer granites	1s. 2¾d.
Bituminous concrete	1s. 10¼d.
Wood pavement	2s. 2¼d.
Macadam, on hand-pitched foundation	2s. 11½d.

Taking the standard of traffic at 40,000 tons per annum for each yard in width, the cost for the last three pavements is:—

	Per square yard per year.
Bituminous concrete	1s. 1½d.
Wood pavement	1s. 8½d.
Macadam	1s. 11½d.

Asphalt paving may be placed between wood and bituminous concrete in the above order. These comparisons show the high cost of a macadamized surface in a street where the traffic is great. However well it may be maintained, a macadamized street must be dirtier and dustier than any pavement, though it is superior to them all in safety and to set pavements in the matter of noise. Bituminous concrete or asphalt macadam is cheaper, cleaner, and quieter than ordinary macadam and is sufficiently durable when the traffic is not heavy. For heavy traffic no pavement is so economical as granite sets; but for the sake of quiet and cleanliness a wood or asphalt pavement is often preferable. Asphalt can be kept cleaner than any other pavement and is the pleasantest to travel over; wood, on the other hand, is quieter for the residents, less slippery, and can be laid on steeper gradients.

The comparative ease of draught on various surfaces is largely influenced by the amount of foothold afforded, and it may be doubted if dynamometer experiments, however carefully made, are altogether conclusive. The tractive force is influenced by the gradient, the diameter of the wheels, the friction of the wheel axles, and the speed, as well as by the resistance of the road surface, and these must be all taken into account to obtain accurate results. Some recent experiments made, under the direction of Sir J. W. Bazalgette, with Easton and Anderson's horse dynamometer on London street surfaces gave the following mean results:—

	Tractive force on the level.
Macadamized surface	40·7 to 44·29 lb per ton.
Asphalt	39·0 ,, 39·32 ,,
Wood	33·62 ,, 36·63 ,,
Granite sets	26·2 ,, 27·0 ,,

The gross load was 4 tons, drawn at a speed of from 2 to 6 miles an hour. It is remarkable that the tractive force on asphalt is so high; but the other results are consistent with former experiments by Morin, Macneill and others.

The comparative safety of granite, wood, and asphalt pavements in the City of London was the subject of careful observations, which were fully reported on by Mr W. Haywood in 1873. The pavements selected were granite sets 3 inches wide, ligno-mineral pavement of beech blocks 3½ inches wide, improved wood pavement of fir blocks 3 inches wide, and Val de Travers compressed asphalt pavement. On known lengths of these the traffic, the accidents to horses, the weather, and other circumstances were observed for fifty days, and when the distance traversed was taken into account it was found that as a mean result a horse might be expected to travel 132 miles on granite without falling, 191 on asphalt, and 446 on the improved wood pavement. The condition of the weather had considerable effect: on the granite when dry a horse might be expected to travel 78 miles without falling, when damp 168, and when wet 537; on wood when damp 193 miles, when wet 432, and when dry 646; on asphalt when damp 125 miles, when wet 192, and when dry 223. It thus appeared that wood pavement was less slippery than either granite or asphalt in a marked degree, it being only more slippery than granite when both pavements were wet. About 85 per cent. of the falls on the wood pavement were falls on the knees, which are less likely to injure the horses and are less inconvenient to the traffic than other falls. On the granite the falls were falls on the knees or complete falls in about equal proportions, with about 7 per cent. of falls on the haunches. On the asphalt 43 per cent. were complete falls and 24 per cent. falls on the haunches.

Watering.—On macadamized roads in Great Britain watering is only good for the road itself when the materials are of a very siliceous nature and in dry weather. With other materials the effect is to soften the road and increase wear. In and near towns watering is required for the comfort of the inhabitants, but it should not be more than enough to lay the dust without softening the road, and the amount required for this may be greatly reduced by keeping the surface free from mud, and by sweeping off the dust when slightly wetted. Pavements are watered to cleanse them as well as to lay the dust, but it must be remembered that both wood and asphalt are more slippery when wet, and that therefore watering should be obviated as far as possible by thorough cleansing. Hydrostatic vans, by improvements in the distributing pipes and regulating valves, water a wide track uniformly with an amount of water which can be regulated at pleasure. Where hydrants exist in connexion with a water supply at high pressure, street watering can be effected by a movable hose and jet, a method much more effective in cleansing the surface, but using a much larger quantity of water. Another method which has been tried, but not much used, is to lay perforated pipes at the back of the kerb on each side of the road, from which jets are thrown upon the surface. The first cost is considerable, and the openings for the jets are liable to choke and get out of order. Deliquescent salts have been used for street watering, by which the surface is kept moist, but at the expense of the moisture in the air. Sea water has the same effect in a less degree.

Cleansing.—The principal streets of a town are generally cleansed daily, either by hand-sweeping and hand-scraping or by machines. Whitworth's machine consists of a series of revolving brooms on an endless chain, whereby the mud or dust is swept up an incline into the cart. A less costly and cumbersome machine consists of a revolving brush mounted obliquely, which sweeps a track 6 feet wide and leaves the dust or mud on one side to be gathered up by hand. A horse scraping-machine which delivers the mud at the side is also used, the blades of the scrapers being mounted obliquely and covering a width of 6 feet. For general use, more especially in the country, scraping machines worked by a man from side to side of the road, and scraping a width of about 4 feet, are more convenient.

All street surfaces suffer from the constant breaking up and disturbance to which they are subjected for the purpose of laying and repairing gas and water pipes. Subways, either under the middle of the road or near the kerbs, in which the pipes may be laid and be always accessible, have often been advocated, and in a few instances have been constructed; but they have not hitherto found general favour.

Footways.—Gravel is the most suitable material for country or suburban footways; it should be bottomed with a coarser material, well drained, and should be laid with a roller. An inclination towards the kerb of about half an inch in a foot may be given, or the surface may be rounded, to throw off the wet. Where greater cleanliness is desirable and the traffic is not too great a coal-tar concrete similar to that already described, but of smaller materials, makes a good and economical footway. The coating should be 2½ or 3 inches thick, composed of two or three layers each well rolled, the lower layer of materials of about 1¼ inches gauge, and the upper of a half or a quarter of an inch gauge, with Derbyshire spar, or fine granite chippings over all. Concrete footways require to be carefully made and must be allowed to set thoroughly before they are used. Concrete has a tendency to crack from contraction, especially when in a thin layer, and it is better to lay a footway in sections, with joints at intervals of about 2 yards. Concrete slabs, especially when silicated and constituting artificial stone, make an excellent footway. The material is composed of crushed granite, gravel, or other suitable material, mixed with Portland cement and cast in moulds, and when set saturated with silicate of soda. This paving has proved more durable than York stone flagging, but it is more slippery, especially when made with granite. York stone makes a good and pleasant foot pavement, but is somewhat expensive considering its durability; it is apt to wear unevenly and to scale off when the stone is not of the best quality. It should not be laid of a less thickness than 2 inches; 2½ or 3 inches are more usual. The flags should be square jointed, not under-cut at the edges, and should be well bedded and jointed with mortar. Caithness flag is much more durable than York stone and wears more evenly; it is impervious to wet and dries quickly by evaporation. The edges are sawn, and the hardness of the stone renders it difficult to cut it to irregular shapes or to fit openings. Staffordshire blue bricks and bricks made of scoria from iron furnaces are both very durable, though somewhat brittle. Asphalt either laid as mastic or compressed is extensively used for footways; the former is considered inferior in durability to York stone and the latter superior to it. Asphalt should not be laid less than three-fourths of an inch thick on 4 inches of cement concrete, and 1 inch of asphalt is desirable where there is great traffic.

Footways in a street must be retained by a kerbing of granite, York stone, Purbeck, or other stone sufficiently strong to stand the blows from wheels to which it is subjected. It should be at least 4 inches wide and 9 deep and in lengths of not less than 3 feet. A granite kerb is usually about 12 by 6 inches, either placed on edge or laid on the flat. When set on edge a kerb is generally bedded on gravel with a mall; when laid on the flat a concrete bed is desirable.

In a macadamized street pitched or paved water channels are required, to prevent the wash of the surface water from undermining the kerb. The pitching consists of cubical blocks of hard stone about 4 inches deep, bedded on sand or mortar, or preferably on a bed of concrete. A paved channel consists of flat stones about 1 foot wide inclining slightly towards the kerb. Moulded bricks and artificial stone are also used both for side channelling and for kerbing. Such an inclination must be given to the channel as will bring the surface water to gullies placed at proper intervals, and the level of the kerbing and consequently of the footway will depend to some extent on the surface drainage as well as on the levels of adjacent houses. To lay out a street satisfactorily the longitudinal and transverse sections must be considered in relation to these matters as well as to the levels of intersecting streets.

For fuller information on the subject see Sir Henry Parnell, *A Treatise on Roads*; Thomas Codrington, *The Maintenance of Macadamized Roads*; Debauve, *Manuel de l'Inégnieur des Ponts et Chaussées*; *Annales des Ponts et Chaussées*; *Minutes of Proc. Inst. Civ. Eng.*, "Street Pavements," vol. lviii. p. 1, and "Wood Pavements," vol. lxxviii. p. 240; *Reports* by W. Haywood, engineer to the commissioners of sewers of the City of London. (T. C.)

ROANNE, a town of France, at the head of an arrondissement in the department of the Loire, lies on the left bank of the Loire in 46° 2′ 26″ N. lat. at a height of 912 feet above the sea. It is now the point of junction for the railway from Paris (262 miles north-north-west) to Lyons (50 miles south-east), *via* Tarare, with the line from Paris to St Étienne (50 miles south-south-east), and a branch connecting Roanne with Paray le Monial; and as the terminus of the Roanne-Digoin Canal (1832-38) the town is the real starting-point of the Loire navigation. Besides the modern town-house (1868-73), it is enough to mention the ruins of a castle with a tower dating from the 11th century, and a fine bridge of seven arches connecting Roanne with the industrial suburb of Le Côteau on the right bank of the river. Cotton is the staple manufacture, employing 1200 hands. Hosiery, hats, woollen yarn, weaving looms, chemicals, and paper are also produced; and, as the town stands in the centre of the Loire and Rhone coal-field (output 4224 tons in 1884) and in the neighbourhood of the St Étienne coal-field, it has a considerable trade in coal and coke. In 1881 Roanne had a population of 24,992.

Roanne (*Rodomna*, Ptolemy; *Roidomna*, Tab. Peut.) was an ancient city of the Segusiani and a station on the great Roman road from Lyons to the ocean. The absence of coins later than the time of Constantius II. among the numerous local relics of the Roman period seems to show that the town was sacked by the barbarians in the 4th century. In 1447 the lordship of Roanne became the property of the celebrated banker Jacques Cœur. A favourite scheme of his was to make the town a great industrial centre by regulating the course of the Renaison, an affluent from the Monts de la Madeleine which joins the river a little higher up; his death prevented its execution, but the subject has since been frequently revived.

ROBBERY. See THEFT.

ROBBIA, DELLA, the name of a family of great distinction in the annals of Florentine art. Its members are enumerated in chronological order below.[1]

I. LUCA DELLA ROBBIA (1399 or 1400[2]-1482) was the son of a Florentine named Simone di Marco della Robbia. According to Vasari, whose account of Luca's early life is little to be trusted, he was apprenticed to the silversmith Leonardo di Ser Giovanni, who from 1355 to 1371 was working on the grand silver altar frontal for the cathedral at PISTOIA (*q.v.*); this, however, appears doubtful from the great age which it would give to Leonardo, and it is more probable that Luca was a pupil of Ghiberti. During the early part of his life Luca executed many important and exceedingly beautiful pieces of sculpture in marble and bronze. In technical skill he was quite the equal of Ghiberti, and, while possessing all Donatello's vigour, dramatic power, and originality, he very frequently excelled him in grace of attitude and soft beauty of expression. No sculptured work of the great 15th century ever surpassed the singing gallery which Luca made for the cathedral at Florence between 1431 and 1440, with its ten magnificent panels of singing angels and dancing boys, far exceeding in beauty those which Donatello in 1433 sculptured for the opposite gallery in the same choir. This magnificent work now lies scattered in various parts of the

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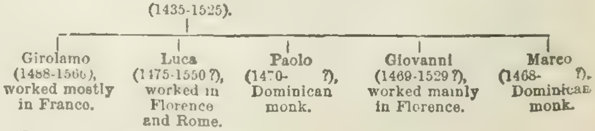
[1] Genealogical tree of Della Robbia sculptors:—


Simone di Marco.
Marco.
Luca (1400-1482).
Andrea (1435-1525).
Girolamo (1488-1566), worked mostly in Franco.
Luca (1475-1550 ?), worked in Florence and Rome.
Paolo (1470- ?), Dominican monk.
Giovanni (1469-1529 ?), worked mainly in Florence.
Marco (1468- ?). Dominican monk.

[2] Not 1388, as Vasari says. See a document printed
teggio Inedito, i. pp. 182-186.

Bargello. The general effect of the whole can best be seen at the South Kensington Museum, where a complete cast is fixed to the wall. The same museum possesses a study in *gesso duro* for one of the panels, which appears to be the original sketch by Luca's own hand.

In May 1437 Luca received a commission from the signoria of Florence to execute five reliefs for the north side of the campanile, to complete the series begun by Giotto and Andrea Pisano. These panels are so much in the earlier style of Giotto that we must conclude that he had left drawings from which Luca worked. They have representative figures chosen to typify grammar, logic, philosophy, music, and geometry,—the last represented by Euclid and Ptolemy.[1] In 1438 Luca received an order for two marble altars for chapels in the cathedral, a third being ordered from Donatello. The reliefs from one of Luca's—St Peter's Deliverance from Prison and his Crucifixion—are now in the Bargello. It is probable that these altars were never finished. A tabernacle for the host, made by Luca in 1442, is now at Peretola in the church of S. Maria. A document in the archives of S. Maria Nuova at Florence shows that he received for this 700 florins 1 lira 16 soldi (about £1400 of modern money). In 1437 Donatello received a commission to cast a bronze door for one of the sacristies of the cathedral; but, as he delayed to execute this order, the work was handed over to Luca on 28th February 1446, with Michelozzo and Maso di Bartolomeo as his assistants. Part of this wonderful door was cast in 1448, and the last two panels were finished by Luca in 1467, with bronze which was supplied to him by Verrocchio.[2] The door is divided into ten square panels, with small heads in the style of Ghiberti projecting from the framing. The two top subjects are the Madonna and Child and the Baptist, next come the four Evangelists, and below are the four Latin Doctors, each subject with attendant angels. The whole is modelled with the most perfect grace and dignified simplicity; the heads throughout are full of life, and the treatment of the drapery in broad simple folds is worthy of a Greek sculptor of the best period of Hellenic art. These exquisite reliefs are perfect models of plastic art, and are quite free from the over-elaboration and too pictorial style of Ghiberti. Fig. 1 shows one of the panels. A terra-cotta relief at Berlin and another in the South Kensington Museum are probably original studies by Luca for two of the panels of the doctors.

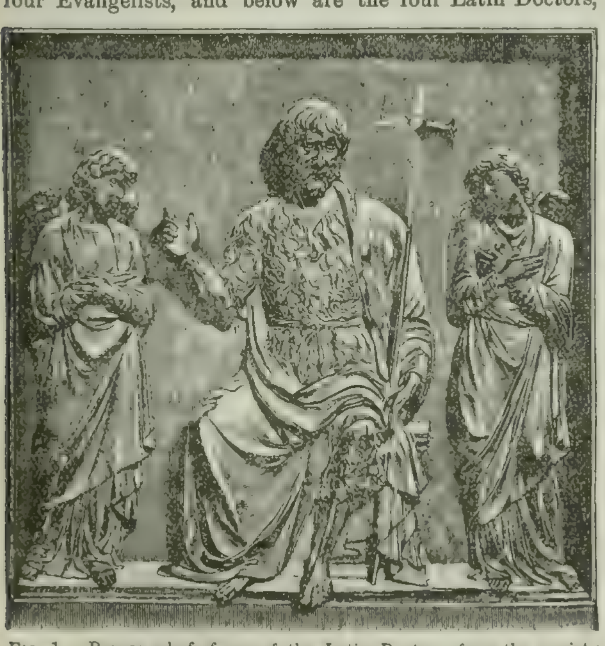


Fig. 1.—Bronze relief of one of the Latin Doctors, from the sacristy door in the cathedral of Florence, by Luca.

The most important existing work in marble by Luca (executed in 1457-58)[3] is the tomb of Benozzo Federighi, bishop of Fiesole, originally placed in the church of S. Pancrazio at Florence, but now in S. Francesco di Paola on the Bello Sguardo road outside the city. A very beautiful effigy of the bishop in a restful pose lies on a sarcophagus sculptured with graceful reliefs of angels holding a wreath, which contains the inscription. Above are three-quarter-length figures of Christ between St John and the Virgin, delicately carved in low relief. The whole is surrounded by a rectangular frame formed of painted majolica tiles of the most exquisite beauty, far surpassing any other existing work of the same sort. On each tile is painted, with enamel pigments, a bunch of flowers and fruit in brilliant realistic colours, the loveliness of which is very hard to describe The perfect mean between truth to nature and decorative treatment has never been more thoroughly obtained than in these wonderful tile pictures, each of which is worthy of the most careful study; and they are also of special interest as being among the earliest examples of Italian majolica. Though the bunch of flowers on each is painted on one slab, the ground of each tile is formed of separate pieces, fitted together like a kind of mosaic, probably because the pigment of the ground required a different degree of heat in firing from that needed for the enamel painting of the centre. The few other works of this class which exist do not approach the beauty of this early essay in majolica painting, on which Luca evidently put forth his utmost skill and patience.

In the latter part of his life Luca was mainly occupied with the production of terra-cotta reliefs covered with enamel,—a process which he improved upon, but did not invent, as Vasari asserts. The secret of this process was to cover the clay relief with an enamel formed of the ordinary ingredients of glass (*marzacotto*) made an opaque white by oxide of tin,—a method practised with great success in the 13th century in Persia[4] (see POTTERY, vol. xix. pp. 620, 628). Though Luca was not the inventor of the process, yet his genius so improved and extended its application that it is not unnaturally known now as Della Robbia ware; it must, however, be remembered that by far the majority of these reliefs which in Italy and elsewhere are ascribed to Luca are really the work of some of the younger members of the family. Comparatively few exist which can with certainty be ascribed to Luca himself. Among the earliest of these are medallions of the four Evangelists in the vault of Brunelleschi's Pazzi chapel in S. Croce. These fine reliefs are coloured with various metallic oxides in different shades of blue, green, purple, yellow, and black. It has often been asserted that the very polychromatic reliefs belong to Andrea or his sons, and that Luca's were all in pure white; this, however, is not the case: colours were used more freely by Luca than by his successors. A relief in the South Kensington Museum furnishes a striking example and is of especial value from its great size, and also because its date is known. This is an enormous medallion containing the arms of René of Anjou and other heraldic devices; it is surrounded by a splendidly modelled wreath of fruit and flowers, especially apples, lemons, oranges, and fir cones, all of which are brilliantly coloured. This medallion was set up on the façade of the Pazzi Palace to commemorate René's visit to Florence in 1442. Another early relief by Luca, also highly polychromatic, is that of the Ascension in the tympanum of one of the sacristy doors in the cathedral, executed between 1446 and 1450, as is recorded in a document published by Rumohr (*Italien. Forsch.*, ii. pp. 364-365). Other existing works of Luca in Florence are the tympanum reliefs of the Madonna between two Angels in the Via dell' Agnolo, a work of exquisite beauty, and another over the door of S. Pierino del Mercato Vecchio. The only existing statues by Luca are two lovely enamelled figures of Kneeling Angels holding candlesticks, now in the canons' sacristy.[1] A very fine work by Luca, executed between 1449 and 1452, is the tympanum relief of the Madonna and four Monastic Saints over the door of S. Domenico at Urbino.[2] Luca also made the four coloured medallions of the Virtues set in the vault over the tomb of the young cardinal-prince of Portugal in a side chapel of S. Miniato in Florence (see ROSSELLINO). By Luca also are reliefs of the Madonna and various medallions outside Or San Michele. One of his chief decorative works which no longer exists was a small library or study for Piero de' Medici, wholly lined with painted majolica plaques and reliefs.[3] The South Kensington Museum possesses twelve circular plaques of majolica ware painted in blue and white with the Occupations of the Months; these have been attributed to Luca, but have no resemblance to any known works of his. Their *provenance* is unknown.

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[1] Vasari is not quite right in his account of these reliefs: he speaks of Euclid and Ptolemy as being in different panels.

[2] See Cavallucci, *S. Maria del Fiore*, pt. ii. p. 137.

[3] Gaye, *Carteggio Inedito*, i. p. 183.

[4] It is described by Theophilus, *Diversarum Artium Schedula* (11th century), and by Pietro del Bono in his *Margarita preciosa* (1330). An example earlier than any of Luca's exists at Florence over the door of S. Egidio (in S. Maria Nuova). It is a relief of the Coronation of the Virgin executed by Lorenzo de' Bicci in 1424; see Milanesi, *Archivio Storico Italiano*, 1860, pp. 182-183. Contemporary writers call this enamelled clay "terra invetriata."

In 1471 Luca was elected president of the Florentine artists' guild, but he refused this great honour on account of his age and infirmity. It shows, however, the very high estimation in which he was held by his contemporaries. He died on 20th February 1482, leaving his property to his nephews Andrea and Simone.[4] His chief pupil was his nephew Andrea, and probably also Agostino di Duccio, who executed many pieces of sculpture at Rimini, and the graceful but mannered marble reliefs of angels on the façade of S. Bernardino at Perugia.[5] Vasari calls this Agostino Luca's brother, but he was not related to him at all.

II. ANDREA DELLA ROBBIA (1435-1525), the nephew and pupil of Luca, carried on the production of the enamelled reliefs on a much larger scale than his uncle had ever done; he also extended its application to various architectural uses, such as friezes and to the making of lavabos (lavatories), fountains, and large retables. The result of this was that, though the finest reliefs from the workshop of Andrea were but little if at all inferior to those from the hand of Luca, yet some of them, turned out by pupils and assistants, reached only a lower standard of merit. Only one work in marble by Andrea is known, namely, an altar in S. Maria delle Grazie near Arezzo, mentioned by Vasari (ed. Milanesi, ii. p. 179), and still well preserved.

One variety of method was introduced by Andrea in his enamelled work; sometimes he omitted the enamel on the face and hands (nude parts) of his figures, especially in those cases where he had treated the heads in a realistic manner; as, for example, in the noble tympanum relief of the meeting of St Domenic and St Francis in the loggia of the Florentine hospital of S. Paolo,—a design suggested by a fresco of Fra Angelico's in the cloister of St Mark's. One of the most remarkable works by Andrea is the series of medallions with reliefs of Infants in white on a blue ground set on the front of the foundling hospital at Florence. These lovely child-figures are modelled with wonderful skill and variety, no two being alike. Andrea produced, for guilds and private persons, a large number of reliefs of the Madonna and Child varied with much invention, and all of extreme beauty of pose and sweetness of expression. These are frequently framed with realistic and yet very decorative garlands of fruit and flowers, all painted with enamel colours, while the main relief is left white. Fig. 2 shows a good example of these smaller works. The hospital of S. Paolo, near S. Maria Novella, has also a number of fine medallions with reliefs of saints, two of Christ Healing the Sick, and two fine portraits, under which are white plaques inscribed—"dall' año 1451 all' año 1495"; the first of these dates is the year when the hospital was rebuilt owing to a papal brief sent to the archbishop of Florence. Arezzo possesses a number of fine enamelled works by Andrea and his sons—a retable in the cathedral with God holding the Crucified Christ, surrounded by angels, and below, kneeling figures of S. Donato and S. Bernardino; also in the cathedral is a fine relief of the Madonna and Child with four saints at the sides. In S. Maria in Grado is a very noble retable with angels holding a crown over a standing figure of the Madonna; a number of small figures of worshippers take refuge in the folds of the Virgin's mantle, a favourite motive for sculpture dedicated by guilds or other corporate

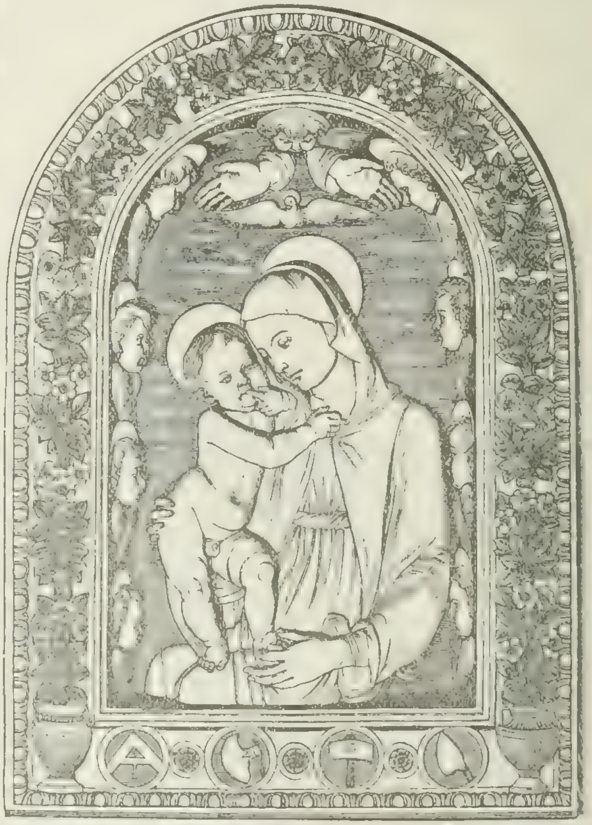

FIG. 2.—Enamelled clay relief of Virgin and Child, by Andrea.

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[1] The South Kensington Museum possesses what seem to be fine replicas of these statues.

[2] The document in which the order for this and the price paid for t are recorded is published by Yriarte, *Gaz. d. Beaux Arts*, xxiv. p. 143.

[3] It is fully described by Filarete in his *Trattato dell' Architectura*, written in 1464, and therefore was finished before that date; see also Vasari, ed. Milanesi, Florence, 1880, ii. p. 174.

[4] His will, dated 19th February 1471, is published by Gaye, *Cart. Ined.*, i. p. 185.

[5] In the works of Perkins and others on Italian sculpture these Perugian reliefs are wrongly stated to be of enamelled clay.

bodies. Perhaps the finest collection of works of this class is at La Verna, not far from Arezzo (see Vasari, ed. Milanesi, ii. p. 179). The best of these, three large retables with representations of the Annunciation, the Crucifixion, and the Madonna giving her Girdle to St Thomas, are probably the work of Andrea himself, the others being by his sons. In 1489 Andrea made a beautiful relief of the Virgin and two Angels, now over the archive room door in the Florentine Opera del Duomo; for this he was paid twenty gold florins (see Cavallucci, *S. Maria del Fiore*). In the same year he modelled the fine tympanum relief over a door of Prato cathedral, with a half-length figure of the Madonna between St Stephen and St Lawrence, surrounded by a frame of angels' heads.

In 1491 Andrea was still working at Prato, where many of his best reliefs still exist. One of his finest works is a large retable at Volterra in the church of S. Girolamo, dated 1501; it represents the Last Judgment, and is remarkable for the fine modelling of the figures, especially that of the archangel Michael, and a nude kneeling figure of a youth who has just risen from his tomb. Other late works of known date are a Resurrection of Christ, made in 1501 for S. Frediano at Florence (the lower half of this only exists, in the court of the Casa Mozzi), and a medallion of the Virgin in Glory, surrounded by angels, made in 1505 for Pistoia cathedral.[1] Andrea's last known relief is a Nativity, made in 1515 for S. Maria in Pian di Mugnone at Florence.[2]

III., IV. Five of Andrea's seven sons worked with their father, and after his death carried on the Robbia fabrique; the dates of their birth are shown in the table on p. 588 above. Early in life two of them came under the influence of Savonarola, and took monastic order at his Dominican convent; these were MARCO, who adopted the name of Fra Luca, and PAOLO, called Fra Ambrogio. One relief by the latter, a Nativity with four life-sized figures of rather poor work, is in the Cappella degli Spagnuoli in the Sienese convent of S. Spirito; a MS. in the convent archives records that it was made in 1504.

V. The chief existing work known to be by the second son LUCA is the very rich and beautiful tile pavement in the uppermost story of Raphael's loggie at the Vatican, finely designed and painted in harmonious majolica colours. This was made by Luca at Raphael's request and under his supervision in 1518.[3] It is still in very fine preservation.

VI. GIOVANNI DELLA ROBBIA (1469-1529?) during a great part of his life worked as assistant to his father, Andrea, and in many cases the enamelled sculpture of the two cannot be distinguished. Some of Giovanni's independent works are of great merit, especially the earlier ones; during the latter part of his life his reliefs deteriorated in style, owing mainly to the universal decadence of the time. A very large number of pieces of Robbia ware which are attributed to Andrea, and even to the elder Luca, were really by the hand of Giovanni. One of his finest works, quite equal in beauty to anything of his father's, from whom the design of the figures was probably taken, is the washing-fountain in the sacristy of S. Maria Novella at Florence, made in 1497.[4] It is a large arched recess with a view of the seashore, not very decorative in style, painted on majolica tiles at the back. There are also two very beautiful painted majolica panels of fruit-trees let into the lower part. In the tympanum of the arch is a very lovely white relief of the Madonna between two Adoring Angels (see fig. 3). Long coloured garlands of fruit and flowers are held by nude boys reclining on the top of the arch. All this part is of enamelled clay, but the basin of the fountain is of white marble. Neither Luca nor Andrea was in the habit of signing his work, but Giovanni often did so, usually adding the date, probably because other potters had begun to imitate the Robbia ware.[5]

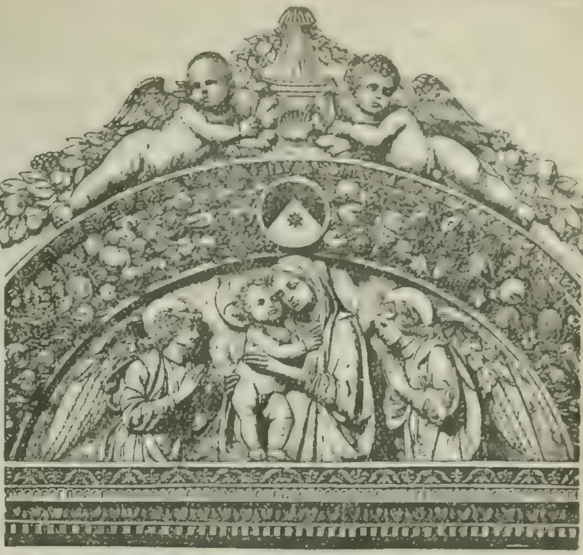

FIG. 3.—Relief of Madonna and Angels in the tympanum of the lavabo (S. Maria Novella, Florence), by Giovanni.

Giovanni lacked the original talent of Luca and Andrea, and so he not only copied their work but even reproduced in clay the marble sculpture of Pollaiuolo, Da Settignano, Verrocchio, and others. A relief by him, evidently taken from Mino da Fiesole, exists in the Palazzo Castracane Staccoli. Among the very numerous other works of Giovanni are the large retable in the Castellani chapel of S. Croce, a relief in the wall of a convent in the Via Nazionale at Florence, and two reliefs in the Bargello dated 1521 and 1522. The latter is a many-coloured relief of the Nativity, and was taken from the church of S. Girolamo in Florence; it is a too pictorial work, marred by the use of many different planes. Its predella has a small relief of the Adoration of the Magi, and is inscribed "Hoc opus fecit Joanes Andree de Robia, ac posuit hoc in tempore die ultima Iulii año. Dñi. MDXXII." At Pisa in the church of S. Silvestro is a relief in Giovanni's later and poorer manner dated 1520; it is a Madonna surrounded by angels, with saints below—the whole overcrowded with figures and ornaments. Giovanni's largest and perhaps finest work is the polychromatic frieze on the outside of the Del Ceppo Hospital at Pistoia, for which he received various sums of money between 1525 and 1529, as is recorded in documents which still exist among the archives of the hospital.[6] The subjects of this frieze are the Seven Works of Mercy, forming a continuous band of sculpture in high relief, well modelled and designed in a very broad sculpturesque way, but a little injured perhaps by the crudeness of some of its colouring. Six of these reliefs are by Giovanni, namely, Clothing the Naked, Washing the Feet of Pilgrims, Visiting the Sick, Visiting Prisoners, Burying the Dead, and Feeding the Hungry. The seventh,

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[1] See Gualandi, *Memorie risguardanti le Belle Arti*, Bologna, 1845, vi. pp. 33-35, where original documents are printed recording the dates and prices paid for these and other works of Andrea.

[2] See a document printed by Milanesi in his Vasari, ii. p. 180.

[3] It is illustrated by Gruner, *Fresco Decorations of Italy*, London, 1854, pl. iv.; see also Müntz, *Raphaël, sa Vie*, &c., Paris, 1881, p. 452, note i., and Vasari, ed. Milanesi, ii. p. 182.

[4] See a document printed by Milanesi in his Vasari, ii. p. 193.

[5] Examples of these imitations are a retable in S. Lucchese near Poggibonsi dated 1514, another of the Madonna and Saints at Monte San Savino of 1525, and a third in the Capuchin church of Arceria near Sinigaglia; they are all inferior to the best works of the Robbia family.

[6] The hospital itself was begun in 1514.

Giving Drink to the Thirsty, was made by Filippo Paladini of Pistoia in 1585; this last is of terra-cotta, not enamelled, but simply painted with oil colours. Giovanni also executed the medallions in the spandrels of the arches under this frieze, with reliefs of the Annunciation, the Visitation, and the Coronation of the Virgin.

A large octagonal font of enamelled clay, with pilasters at the angles and panels between them with scenes from the life of the Baptist, in the church of S. Leonardo at Cerreto Guidi, is a work of the school of Giovanni; the reliefs are pictorial in style and coarse in execution. Giovanni's chief pupil was a man named Santi, who was at first apprenticed to Buglioni,[1] and when the latter died in 1521 he went into Giovanni's bottega. His work is very inferior to that of his master.

VII. Girolamo della Robbia (1488-1566), another of Andrea's sons, was an architect and a sculptor in marble and bronze as well as in enamelled clay. During the first part of his life he, like his brothers, worked with his father, but in 1528 he went to France and spent nearly forty years in the service of the French royal family. Francis I. employed him to build a palace in the Bois de Boulogne called the Château de Madrid. This was a large well-designed building, four stories high, two of them having open loggie in the Italian fashion. Girolamo decorated it richly with terra-cotta medallions, friezes, and other architectural features.[2] For this purpose he set up kilns at Suresnes. Though the palace itself has been destroyed, drawings of it exist.[3]

The best collections of Robbia ware are in the Florentine Bargello and Accademia, the South Kensington Museum (the finest out of Italy), the Louvre, the Cluny, and the Berlin Museums. Many fine specimens exist in Paris in the private collections of M. Alphonse de Rothschild, M. Gavel, and M. Dreyfus. The greater part of the Robbia work still remains in the churches and other buildings of Italy, especially in Florence, Fiesole, Arezzo, La Verna, Volterra, Barga, Montepulciano, Lucca, Pistoia, Prato, and Siena. The best accounts of the Della Robbia family are those given by De Jouy, *Les Della Robbia*, Paris, 1855; Bode, *Die Künstlerfamilie Della Robbia*, Leipsic, 1878; and Cavallucci and Molinier, *Les Della Robbia*, Paris, 1884, an ably-written and well-illustrated work. See also Vasari, ed. Milanesi, Florence, 1880, ii. p. 167 *sq.*, and various works on Italian sculpture. (J. H. M.)

ROBERT I., king of France, son and successor of Hugh Capet, was born at Orleans in 971 and died at Melun in 1031. See France, vol. ix. p. 536. He is sometimes cited as Robert II., Robert I. being then taken to mean Robert, duke of France (*ob.* 923), the second son of Robert "the Strong" (*ob.* 866); comp. France, vol. ix. p. 535.

ROBERT, called The Bruce[4] (1274-1329), king of Scotland, was the son of the seventh Robert de Bruce, lord of Annandale in his own right and earl of Carrick in right of his wife Marjory, daughter of Neil, second earl, and thus was of mingled Norman[5] and Celtic blood. His grandfather, the sixth Robert de Bruce, claimed the crown of Scotland as son of Isabella, second daughter of David, earl of Huntingdon; but Baliol, grandson of Margaret, the eldest daughter, was preferred by the commissioners of Edward I. The birthplace of the Bruce—perhaps Turnberry, his mother's castle, on the coast of Ayr—is not certainly known. His youth is said by an English chronicle to have been passed at the court of Edward I. At an age when the mind is quick to receive the impressions which give the bent to life he must have watched the progress of the great suit for the crown of Scotland. Its issue in favour of Baliol led to the resignation of Annandale by Bruce the competitor to his son, the Bruce's father, who, either then or after the death of the aged competitor in 1295, assumed the title of lord of Annandale. Two years before he had resigned, on the death of his wife, the earldom of Carrick to Robert the Bruce, who presented the deed of resignation to Baliol at Stirling on 3d August 1293, and offered the homage which his father, like his grandfather, was unwilling to render. Feudal law required that the king should take sasine of the earldom before regranting it and receiving the homage, and the sheriff of Ayr was directed to take it on Baliol's behalf. As the disputes between Edward and Baliol, which ended in Baliol losing the kingdom, commenced in this year it is doubtful whether Bruce ever rendered homage; but he is henceforth known as earl of Carrick, though in a few instances this title is still given to his father. Both father and son sided with Edward against Baliol. Towards the end of 1292 the elder Robert had a safe-conduct from Edward to visit Norway with a daughter, Isabella, who married Erik, king of Norway, the widower of Margaret of Scotland,—a fact marking the high standing of the family of Bruce. On 20th April 1294 the younger Robert, earl of Carrick, had a similar safe-conduct or permission to visit Ireland till Michaelmas and a year following, and a further mark of Edward's favour by a respite for the same period of all debts due by him to the exchequer. His father, having done homage to Edward, was entrusted in October 1295 with the custody of the castle of Carlisle by a patent in which he is styled lord of Annandale; and Baliol retaliated by seizing Annandale, which he conferred on John Comyn, earl of Buchan. On 28th August 1296 Robert de Bruce "le vieil" and Robert de Bruce "le jeune," earl of Carrick, swore fealty to Edward at Berwick; but (according to Hemingford), in breach of this oath, renewed at Carlisle on the Gospels and the sword of Thomas a Becket, the young earl joined Wallace, who had raised the standard of Scottish independence in the name of Baliol after that weak king had himself surrendered his kingdom to Edward. Urgent letters were sent ordering Bruce to support Warenne, Edward's general, in the summer of 1297; but, instead of complying, he, along with the bishop of Glasgow and the steward of Scotland, laid waste the lands of those who adhered to Edward. On 7th July Percy forced Bruce and his friends to make terms by the treaty called the Capitulation of Irvine. The Scottish lords were not to serve beyond the sea against their will and were pardoned for their recent violence, while in return they owned allegiance to Edward. The bishop of Glasgow, the steward, and Sir Alexander Lindesay became sureties for Bruce until he delivered his daughter Marjory as a hostage. Wallace almost alone maintained the struggle for freedom which the nobles as well as Baliol had given up, and Bruce had no part in the honour of Stirling Bridge or the reverse of Falkirk, where in the following year Edward in person recovered what his generals had lost and drove Wallace into exile. Shortly afterwards Bruce appears again to have sided with his countrymen; Annandale was wasted and Lochmaben taken by Clifford, while Bruce (according to Hemingford), "when he heard of the king's coming, fled from his face and burnt the castle of Ayr which he held." Yet, when Edward was forced by home affairs to quit Scotland, Annandale and certain earldoms, including Carrick, were excepted from the districts he assigned to his followers,—Bruce and the other earls being treated as waverers whose allegiance might still be retained. In 1299 a regency was appointed in Scotland in name of Baliol, and a letter of Baliol mentions Robert Bruce, lord of Carrick, as regent, along with William of Lamberton, bishop of St Andrews, and John Comyn the younger,—a strange combination, Lamberton the friend of Wallace, Comyn the enemy of Bruce, and Bruce a regent in name of Baliol. Comyn in his own interest as Baliol's heir was the active regent; the insertion of the name of Bruce was an attempt to secure his co-operation. For the next four years he kept studiously in the background waiting his time. A statement of Langtoft that he was at the parliament of Lincoln in 1301, when the English barons repudiated the claim of the pope to the suzerainty of Scotland, is not to be credited, though his father may have been there. In the campaign of 1304, when Edward renewed his attempt on Scotland and reduced Stirling, Bruce supported the English king, who in one of his letters to him says, "If you complete that which you have begun we shall hold the war ended by your deed and all the land of Scotland gained." But, while apparently aiding Edward, Bruce had taken a step which bound him to the patriotic cause. On 11th June, a month before the fall of Stirling, he met Lamberton at Cambuskenneth and entered into a secret bond by which they were to support each other against all adversaries and undertake nothing without consulting together. The death of his father in this year may have determined his course and led him to prefer the chance of the Scottish crown to his English estates and the friendship of Edward.

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[1] Benedetto Buglioni (1461-1521) appears to have produced enamelled ware independently of the Robbia family. In 1484 he made a relief of the Harrowing of Hell for the Servite monks at Florence; see Baldinucci, *Notizie de' Professori del Disegno*, Milan, 1811, vi. p. 18.

[2] The Sèvres Museum possesses some fragments of these decorations.

[3] See Laborde, *Château de Madrid*, Paris, 1853, and *Comptes des Bâtiments du Roi*, Paris, 1877-80, in which a full account is given of Girolamo's work in connexion with this palace.

[4] For Robert II. (1316-1390) and Robert III. (d. 1406) of Scotland, see Scotland.

[5] The first Robert de Bruce, a follower of William the Conqueror, was rewarded by the gift of many manors, chiefly in Yorkshire, of which Skelton was the principal. His son, the second Robert, received from David I., his comrade at the court of Henry I., a grant of the lordship of Annandale, and his grandson, the third Robert, siding with David against Stephen at the battle of the Standard, became a Scottish instead of an English baron. The fourth Robert married Isobel, natural daughter of William the Lion, and their son, the fifth Robert, married Isabella, second daughter of David, earl of Huntingdon, niece of the same Scottish king. Thus royal kin made natural the ambition to gain a crown,—an object not beyond the ambition of a powerful noble in feudal times.

This determination closes the first chapter of his life; the second, from 1304 to 1314, is occupied by his contest for the kingdom, which was really won at Bannockburn, though disputed till the treaty of Northampton in 1328; the last, from 1314 to his death in 1329, was the period of the establishment of his government and dynasty by an administration as skilful as his generalship. It is to the second of these that historians, attracted by its brilliancy even amongst the many romances of history and its importance to Scottish history, have directed most of their attention, and it is during it that his personal character, tried by adversity and prosperity, gradually unfolds itself. But all three periods require to be kept in view to form a just estimate of Bruce. That which terminated in 1304, though unfortunately few characteristics, personal or individual, have been preserved, shows him by his conduct to have been the normal Scottish noble of the time. A conflict of interest and of bias led to contradictory action, and this conflict was increased in his case by his father's residence in England, his own upbringing at the English court, his family feud with Baliol and the Comyns, and the jealousy common to his class of Wallace, the mere knight, who had rallied the commons against the invader and taught the nobles what was required in a leader of the people. The merit of Bruce is that he did not despise the lesson. Prompted alike by patriotism and ambition, at the prime of manhood he chose the cause of national independence with all its perils, and stood by it with a constancy which never wavered until he secured its triumph. Though it is crowded with incidents, the main facts in the central decade of Bruce's life may be rapidly told. The fall of Stirling was followed by the capture and execution of Wallace at London on 24th August 1305. Edward hoped still to conciliate the nobles and gain Scotland by a policy of clemency to all who did not dispute his authority. A parliament in London (16th September), to which Scottish representatives were summoned, agreed to an ordinance for the government of Scotland, which, though on the model of those for Wales and Ireland, treating Scotland as a third subject province under an English lieutenant, John de Bretagne, was in other respects not severe. Bruce is reputed to have been one of the advisers who assisted in framing it; but a provision that his castle of Kildrummy was to be placed in charge of a person for whom he should answer shows that Edward not without reason suspected his fidelity. Challenged by the king with the bond between him and Lamberton (according to one account discovered by the treachery of John Comyn, with whom a similar engagement had been made or attempted), Bruce secretly quitted London, and on 10th February 1306 met by appointment, in the church of the Friars Minor at Dumfries, Comyn, whom he slew at the high altar for refusing to join in his plans. So much is certain, though the precise incidents of the interview were variously told. It was not their first encounter, for a letter of 1299 to Edward from Scotland describes Comyn as having seized Bruce by the throat at a meeting at Peebles, when they were with difficulty reconciled by the joint regency.

The bond with Lamberton was now sealed by blood and the confederates lost no time in putting it into execution. Within little more than six weeks Bruce, collecting his adherents in the south-west, passed from Lochmaben to Glasgow and thence to Scone, where he was crowned by the bishop of St Andrews on 25th March, the bishops of Glasgow and Moray, with the earls of Lennox, Athole, and Errol, being present. Two days later Isabella, countess of Buchan, claimed the right of her family the Macduffs, earls of Fife, to place the Scottish king on his throne, and the ceremony was repeated with an addition flattering to the Celtic race. Though a king, Bruce had not yet a kingdom, and his efforts to obtain it were till the death of Edward I. disastrous failures. In June he was defeated at Methven by Pembroke, and on 11th August he was surprised in Strathfillan, where he had taken refuge, by Lord Lorn. The ladies of his family were sent to Kildrummy in January, and Bruce, almost without a follower, fled to Rathlin, an island off Antrim (Ireland). Edward, though suffering from his last illness, came to the north in the following spring. On his way he granted the Scottish estates of Bruce and his adherents to his own followers, Annandale falling to the earl of Hereford. At Carlisle there was published a bull excommunicating Bruce, along with another absolving Edward from the oath he had taken to observe Magna Charta and the other charters on which the English constitution rests. Elizabeth the wife, Marjory the daughter, Christina the sister of Bruce, were captured in a sanctuary at Tain and sent prisoners to England. The countess of Buchan was confined in a cage at Berwick and another of Bruce's sisters, Mary, in a cage at Roxburgh. The bishops of St Andrews and Glasgow and the abbot of Scone were suspended from their benefices and sent as prisoners to the south of England. Nigel Bruce, his youngest brother, was beheaded at Berwick, Christopher Seton, his brother-in-law, at Dumfries. The earl of Athole was sent to London and hanged on a gallows 30 feet higher than the pole on which the head of Wallace still stood. Two other brothers of Bruce, Thomas and Alexander (dean of Glasgow), met the same fate at Carlisle. There were many minor victims, but the chronicler of Lanercost notes that the number of those who wished Bruce to be confirmed in the kingdom increased daily. While thus wreaking his vengeance Edward himself was summoned by death at Burgh-on-the-Sands, on the Solway, on 7th June 1307. By his dying wish the inscription "Edwardus Primus, Scotorum Malleus, Pactum Serva" was put on his tomb. In a moment all was changed. Instead of being opposed to the greatest, Bruce now had as his antagonist the feeblest of the Plantagenets. Quitting Rathlin (after a short stay in Arran), Bruce had before Edward's death attempted to take Turnberry and Ayr, but had failed, though he defeated Pembroke at Loudoun Hill. No sooner was his father dead than Edward II. recalled his banished favourite Gaveston. After wasting the critical moment of the war in the diversions of a youthful court, the new king made an inglorious march to Cumnock and back without striking a blow, and then returned south to celebrate his marriage with Isabella of France, leaving the war to a succession of generals. Bruce, with the insight of military genius, seized his opportunity. Leaving Edward, now his only brother in blood and almost his equal in arms, in Galloway, he suddenly transferred his own operations to Aberdeenshire. In the end of 1307 and again in May 1308 he overran Buchan, where at Inverury on 22d May he defeated its earl, one of his chief Scottish opponents. Then crossing to Argyll he surprised Lord Lorn in the Pass of Brander and took Dunstaffnage. In 1309 a truce, scarcely kept, was effected by the pope and Philip of France, and in 1310, in a general council at Dundee, the clergy of Scotland—all the bishops being present—recognized Bruce as king. The support given him by the national church in spite of his excommunication must have been of great importance in that age, and was probably due to the example of Lamberton. The next three years were signalized by the reduction one by one of the strong places the English still held,—Linlithgow in the end of 1310, Dumbarton in October 1311, Perth by Bruce himself in January 1312. Encouraged by these successes, he made a raid into the north of England, and on his return reduced Butel (in Galloway), Dumfries, and Dalswinton, and threatened Berwick. In March 1313 Sir James Douglas surprised Roxburgh, and Randolph surprised Berwick. In May Bruce was again in England, and, though he failed to take Carlisle, he subdued the Isle of Man. Edward Bruce about the same time took Rutherglen and laid siege to Stirling, whose governor, Mowbray, agreed to capitulate if not relieved before 24th June 1314. Bruce's rapidity of movement was one cause of his success. His sieges, the most difficult part of mediæval warfare, though won sometimes by stratagem, prove that he and his followers had benefited from their early training in the wars of Edward I. We know that he had been specially employed by that king to prepare the siege-train for his attack on Stirling. By the close of 1313 Berwick and Stirling alone remained English. Edward II. felt that if Scotland was not to be lost a great effort must be made. With the whole available feudal levy of England, a contingent from Ireland, and recruits even out of jails—for murderers were pardoned on condition of joining the army —he advanced from Berwick to Falkirk, which he reached on 22d June. After a preliminary skirmish on Sunday the 23d, in which Bruce distinguished himself by a personal combat with Henry de Bohun, whom he felled by a single blow of his axe, the battle of Bannockburn was fought on Monday the 24th; and the complete rout of the English determined the independence of Scotland and confirmed the title of Bruce. The details of the day, memorable in the history of war as well as of Scotland, have been singularly well preserved, and redound to the credit of Bruce, who had studied in the school of Wallace as well as in that of Edward I. He had chosen and knew his ground,—the New Park between St Ninian's and the Bannock, a petty burn, yet sufficient to produce marshes dangerous to heavily-armed horsemen, while from the rising ground on his right the enemy's advance was seen. His troops were in four divisions; his brother commanded the right, Randolph the centre, Douglas the left. Bruce with the reserve planted his standard at the Bore Stone, whence there is the best view of the field. His camp-followers on the Gillies' Hill appeared over its crest at the critical moment which comes in all battles. The plain on the right of the marshes was prepared with pits and spikes. But what more than any other point of strategy made the fight famous was that the Scots fought on foot in battalions with their spears outwards, in a circular formation serving the same purpose as the modern square. A momentary success of the English archers was quickly reversed by a flank movement of Sir Robert Keith. The Scottish bowmen followed up his advantage, and the fight became general; the English horse, crowded into too narrow a space, were met by the steady resistance of the Scottish pikemen, who knew Bruce told them truly that they fought for their country, their wives, their children, and all that freemen hold dear. The English rear was unable to come up in the narrow space or got entangled in the broken ranks of the van. The first repulse soon passed into a rout, and from a rout into a headlong flight, in which Edward himself barely escaped. Like Courtrai and Morgarten, Bannockburn marked the momentous change from mediæval to modern warfare. The armed knights gave place to the common soldiers led by skilful generals as the arbiters of the destiny of nations. In the career of Bruce it was the turning-point. The enthusiasm of the nation he had saved forgot his late adhesion to the popular cause, and at the parliament of Ayr on 25th April 1315 the succession was settled by a unanimous voice on him, and, failing males of his body, on his brother Edward and his heirs male, failing whom on his daughter Marjory and her heirs, if she married with his consent. Soon after she married Walter the Steward.

The last part of Bruce's life, from 1315 to 1329, began with an attempt which was the most striking testimony that could have been given to the effect of Bannockburn, and which, had it succeeded, might have altered the future of the British Isles. This was no less than the rising of the whole Celtic race, who had felt the galling yoke of Edward I. and envied the freedom the Scots had won. In 1315 Edward Bruce crossed to Ireland on the invitation of the natives, and in the following year the Welsh became his allies. In autumn Robert came to his brother, and they together traversed Ireland to Limerick. Dublin was saved by its inhabitants committing it to the flames, and, though nineteen victories were won, of which that at Slane in Louth by Robert was counted the chief, the success was too rapid to be permanent. The brothers retreated to Ulster, and, Robert having left Ireland to protect his own borders, Edward was defeated and killed at Dundalk in October 1318. On his return Bruce addressed himself to the siege of Berwick, a standing menace to Scotland. While preparing for it two cardinals arrived in England with a mission from Pope John XXII. to effect a truce, or, failing that, to renew the excommunication of Bruce. The cardinals did not trust themselves across the border; their messengers, however, were courteously received by Bruce, but with a firm refusal to admit the bulls into his kingdom because not addressed to him as king. Another attempt by Newton, guardian of the Friars Minor at Berwick, had a more ignominious result. Bruce admitted Newton to his presence at Aldcamus, where he might see the works for the siege going on by night and day, and was informed that Bruce would not receive the bulls until his title was acknowledged and he had taken Berwick. On his return Newton was waylaid and his papers seized, not without suspicion of Bruce's connivance.

In March 1318 first the town and then the castle of Berwick capitulated, and Bruce wasted the English border as far as Ripon. In December he held a parliament at Scone, where he displayed the same wisdom as a legislator which he had shown as a general. The death of his brother and his daughter rendered a resettlement of the crown advisable, which was made in the same order as before, with a provision as to the regency in case of a minor heir in favour of Randolph, and failing him Douglas. The defence of the country was next cared for by regulations for the arming of the whole nation, down to every one who owned the value of a cow,—a measure far in advance of the old feudal levy. Exports during war and of arms at any time were prohibited. Internal justice was regulated, and it was declared that it was to be done to poor and rich alike. Leasing-making—a Scottish term for seditious language—was to be sternly punished. The nobles were exhorted not to oppress the commons. Reforms were also made in the tedious technicalities of the feudal law. In 1319 an attempt to recover Berwick was repelled by Walter the Steward, and Bruce took occasion of a visit to compliment his son-in-law and raise the walls 10 feet.

His position was now so strong that foreign states began to testify their respect. Bruges and Ypres rejected a request of Edward to cut off the Scottish trade with Flanders. The pope, who had excommunicated Bruce, was addressed by the parliament of Arbroath in 1320 in a letter which compared Bruce to a Joshua or Judas Maccabæus, who had wrought the salvation of his people, and declared they fought "not for glory, truth, or honour, but for that liberty which no virtuous man will survive." Moved by this language and conscious of the weakness of Edward, the pope exhorted him to make peace with Scotland, and three years later Randolph at last procured the recognition of Bruce as king from the papal see by promising aid in a crusade. In 1326 the French king made a similar acknowledgment by the treaty of Corbeil. Meantime hostilities more or less constant continued with England, but, though in 1322 Edward made an incursion as far as Edinburgh, the fatal internal weakness of his government prevented his gaining any real success. Some of his chief nobles—Lancaster in 1321 and Sir Andrew Hartcla in 1322—entered into correspondence with the Scots, and, though Hartcla's treason was detected and punished by his death, Edward was forced to make a treaty for a long truce of thirteen years at Newcastle on 30th May, which Bruce ratified at Berwick. The intrigue of the queen with Roger Mortimer led to the end of the ignominious reign by Edward's deposition and murder in 1327; and one of the first acts of the new reign, after a narrow escape of the young king from capture by Randolph, was the treaty of York, ratified at Northampton in April 1328, by which it was agreed that "Scotland, according to its ancient bounds in the days of Alexander III., should remain to Robert, king of Scots, and his heirs free and divided from England, without any subjection, servitude, claim or demand whatsoever." Johanna, Edward's sister, was to be given in marriage to David, the infant son of Bruce, and the ceremony was celebrated at Berwick on 12th July.

The chief author of Scottish independence barely survived his work. His last years had been spent chiefly at the castle of Cardross on the Clyde, which he acquired in 1326, and the conduct of war, as well as the negotiations for peace, had been left to the young leaders Randolph and Douglas, whose training was one of Bruce's services to his country. Ever active, he employed himself in the narrower sphere of repairing the castle and improving its domains and gardens, in shipbuilding on the Clyde, and in the exercise of the royal virtues of hospitality and charity. The religious feeling, which had not been absent even during the struggles of manhood, deepened in old age, and took the form the piety of the times prescribed. He made careful provision for his funeral, his tomb, and masses for his soul. He procured from the pope a bull authorizing his confessor to absolve him even at the moment of death. He died from leprosy, contracted in the hardships of earlier life, on 7th June 1329, and was buried at Dunfermline beside his second wife, Elizabeth de Burgh, whom he had married about 1304, and who bore him late his only son, David, who succeeded him. Of two surviving daughters, Matilda married Thomas Ysaak, a simple esquire, and Margaret became the wife of William, earl of Sutherland. Marjory, an only child by his first wife, Isabella of Mar, had predeceased him. Several children not born in wedlock have been traced in the records, but none of them became in any way famous.

In fulfilment of a vow to visit the Holy Sepulchre, which he could not accomplish in person, Bruce requested Douglas to carry his heart there, but his faithful follower perished on the way, fighting in Spain against the Moors, and the heart of Bruce, recovered by Sir William Keith, found its resting-place at Melrose. When his corpse was disinterred in 1819 the breast-bone was found severed to admit of the removal of the heart, thus confirming the story preserved in the verses of Barbour. That national poet collected in the earliest Scottish poem, written in the reign of Bruce's grandson, the copious traditions which clustered round his memory. It is a panegyric; but history has not refused to accept it as a genuine representation of the character of the great king, in spirit, if not in every detail. Its dominant note is freedom—the liberty of the nation from foreign bondage, and of the individual from oppression. It is the same note which Tacitus embodied in the speech of Galgacus at the dawn of Scottish history. Often as it has been heard before and since in the course of history, seldom has it had a more illustrious champion than Robert the Bruce. (Æ. M.)

ROBERT, the name of two dukes of Normandy. See NORMANDY, vol. xvii. p. 542 for ROBERT I. (d. 1035) and p. 544 for ROBERT II. (d. 1134); see also ENGLAND, vol. viii. p. 301.

ROBERT, HUBERT (1753-1808), born at Paris in 1753, deserves to be remembered not so much for his skill as a painter as for the liveliness and point with which he treated the subjects he painted. The contrast between the ruins of ancient Rome and the life of his time excited his keenest interest; and, although he had started for Italy on his own responsibility, the credit he there acquired procured him the protection of the minister Marigny and an official allowance. His incessant activity as an artist, his daring character, his many adventures, attracted general sympathy and admiration. In the fourth canto of his *L'Imagination* Delille celebrated Robert's miraculous escape when lost in the catacombs; later in life, when imprisoned during the Terror and marked for the guillotine, by a fatal accident another died in his place and Robert lived. The quantity of his work is immense; the Louvre alone contains nine paintings by his hand and specimens are frequently to be met with in provincial museums and private collections. In spite of a certain naturalness in details which was wanting to his predecessor Panini, all Robert's work has more or less of that scenic character which justified the taste of Voltaire when he selected him to paint the decorations of his theatre at Ferney. Robert fell, struck by apoplexy, on 15th April 1808. His brush was in his hand; he had painted till the last moment. He was much engraved by the abbé Le Non, with whom he had visited Naples in the company of Fragonard during his early days; in Italy his work has also been frequently reproduced by Chatelain, Liénard, Le Veau, and others.

See C. Blanc, *Hist. des Peintres*; Villot, *Notice des Tableaux du Louvre*; Julius Meyer, *Gesch. mod. fr. Malerei.*

ROBERT, LOUIS LÉOPOLD (1794-1835), French painter, was born at Chaux de Fonds (Neufchâtel) in Switzerland on 13th May 1794, but left his native place with the engraver Girardet at the age of sixteen for Paris. He was on the eve of obtaining the great prize for engraving when the events of 1815 blasted his hopes, for Neufchâtel was restored to Prussia and Robert was struck off the list of competitors as a foreigner. Having fortunately whilst continuing his studies under Girardet never ceased to frequent the studio of David, he now determined to become a painter, and only returned to his native country when his master himself was exiled. At Neufchâtel he had the good fortune to attract the notice of Roullet de Mezerac, who enabled him by a timely loan to proceed to Rome. At Rome Robert soon struck the vein of subject destined to render his talent celebrated. In depicting the customs and life of the people, of southern Italy especially, he showed peculiar feeling for the historical characteristics of their race. All his work of this class was distinguished by an individual style: the actors bore themselves with an air of distinction and something of gravity which witnessed to their ancient lineage, and the rhythmical play of line which characterized all these compositions had a peculiar affinity to the nature of the types which figured in them. The charm of choice in these types, the beauty of this play of line, and the plastic restraint and measure which also marked Robert's treatment of his favourite subjects were the points to which he owed the wide recognition of his talent, for his command of his own powers was anything but ready and his difficulty in bringing out what he desired to produce shackled him, and especially so because painting requires a sure and ready hand if its means are to be used with brilliant effect. After executing many detached studies of Italian life Robert conceived the idea of painting four great works which should represent at one and the same time the four seasons in Italy and the four leading races of its people. In the Return from the Fête of the Madonna dell' Arco (Louvre) he depicted the Neapolitans and the spring. This picture, exhibited at the Salon of 1827, achieved undoubted success and was bought for the Luxembourg by Charles X.; but the work which appeared in 1831 — the Summer Reapers arriving in the Pontine Marshes (Louvre), which became the property of Louis Philippe — established the artist's reputation, and Robert found himself with all his hopes of honour fulfilled and reckoned as one of the leading masters of his day. Florence and her autumn vineyards should now have furnished him with his third subject. He attempted to begin it, but, unable to conquer his unhappy passion for Princess Charlotte Napoleon (then mourning the violent death of her husband, Robert's devoted friend), he threw up his work and went to Venice, where he began and carried through the fourth of the series, the Fishers of the Adriatic. This work was not equal to the Reapers. Worn by the vicissitudes of painful feeling and bitterly discouraged, Robert committed suicide before his easel, 20th March 1835, on the tenth anniversary of the melancholy suicide of a brother to whom he had been much attached.

See Villot, *Notice des Tableaux du Louvre*; C. Blanc, *Hist. des Peintres*; Feuillet de Conches, *Correspondance de L. L. Robert*; Julius Meyer, *Gesch. mod. fr. Malerei.*

ROBERT OF GLOUCESTER, an English antiquary and historical writer, who lived in the second half of the 13th century, was a monk of the abbey at Gloucester, and is supposed by Hearne, the editor of his *Chronicle*, to have been sent to preside over the foundation at Oxford (afterwards Worcester College), where the younger members of the abbey were partly educated. This, however, is mere conjecture. The evidence which establishes his claim to be the author of the *Chronicle* (by which he is best known) is also extremely slight. In the Harleian MS. 201 (from which Hearne printed his edition) there occurs (fol. 159b to 160) an account of the battle of Evesham. The narration implies that the writer was living at that time (1265), for he describes the dark and dismal weather that prevailed on the day of the battle, adding, "This isci Roberd, That verst this boc made,"—a passage, however, which may possibly have reference not to the versifier but to the original compiler of the *Chronicle.*[1] The period at which the *Chronicle* was composed was evidently late in the 13th or early in the 14th century, as it contains a reference to the canonization of St Louis, king of France, which took place on 11th August 1297. From an historical point of view, however, the *Chronicle* is of but little value. The internal evidence shows it to have been a translation from the French and the original in turn to have been a mere compilation. The narrative commences with a description of Britain, taken from Henry of Huntingdon; the material is next derived mainly from Geoffrey of Monmouth, and then, again, from William of Malmesbury, special information being supplied, here and there, from Henry of Huntingdon, Ailred of Rievaulx, and the Annals of Winchester.

On the other hand, the value of the *Chronicle* as an illustration of the versification and language of the period is considerable. As a writer of English verse Robert comes first in order, being prior to both Robert of Brunne and Laurence Minot, and he has accordingly been styled the Ennius of English literature. His diction, again, affords many interesting points of comparison with that known as Old English on the one hand and the language of Chaucer and William Tyndale on the other. In his verses we first find the term "Saxons" used in opposition to Normans (Hearne, p. 363), although "English" is the term by which, throughout the *Chronicle*, the original population is more generally designated. Of the English tongue itself, however, he says (*ib.*, p. 125) that "þe Saxones speche it was, and þorw hem ycome yt ys." Many of the most noteworthy peculiarities of his diction will be found pointed out in Mr. Kingdon Oliphant's *Old and Middle English*, pp. 430-439.

Other compositions attributed to Robert of Gloucester are—a *Life* of St Alban in verse (MS. Ashmole, 43), a *Life* of St Patrick, also in verse (MS. Tanner, 17), a *Life* of St Bridget (MS. C.C.C. Camb., 145), and a *Life* of St Alphege (MS. Cott. Julius, D. ix.).

The only complete edition of the *Chronicle* is that edited by Thomas Hearne (Oxford, 1724), 2 vols. 8vo, partly from the Harleian MS. 201, and partly from the Cottonian MS. Calig. A. xi., and reprinted at London in 1810, 2 vols. 8vo. This, however, is extremely defective, Hearne's collation of the important MS. in the library of the college of Arms being very imperfect. For further information see Hardy's *Descriptive Catalogue of MSS.*, iii. 181-189, i. 25, 68, iii. 623.

ROBERT GUISCARD (*c.* 1015-1085), duke of Apulia and Calabria, sixth of the twelve sons of Tancred de Hauteville, was born at Hauteville near Coutances in Normandy about the year 1015. At an early age he followed into Apulia his three elder brothers William Bras-de-fer, Drogo, and Humphrey, who had established a footing there as military adventurers; and in 1053 he took a prominent part in the battle of Civitella, which resulted in the defeat and captivity of Pope Leo IX. On the death of Humphrey in 1057 Robert, who already had earned the sobriquet of "Guiscard" ("Sagacious" or "Cunning"), succeeded to the chief command of the Norman troops, and, already designated by them duke of Apulia and Calabria, was confirmed in that title in 1059 by Pope Nicholas II., who at the same time named him gonfalonier of the church. For the next one-and-twenty years he was continually engaged, along with his youngest brother Roger, in warlike operations against the Greeks and Saracens in the south of the Italian peninsula and in Sicily, the principal events being the capture of Bari in 1070, that of Palermo in the following year, and that of Salerno in 1077. In 1081 he felt himself strong enough to carry his arms abroad against Alexius Comnenus, ostensibly on behalf of the deposed emperor Michael Ducas, the father-in-law of his daughter. The defeat of Alexius under the walls of Durazzo in October 1081 was followed by the capture of that place in February 1082, and by a victorious march towards Constantinople. But before Robert had reached the capital he was summoned back by Gregory VII., his suzerain, to rescue him from the emperor Henry IV., by whom he was being besieged in Rome. After capturing and sacking the city in May 1084 and conducting Gregory to a place of safety in Salerno, Guiscard resumed his operations against Alexius, defeating the united Greek and Venetian fleets, and raising the siege of Corfu in November 1084. While still engaged in active warfare he died of pestilence at Cephalonia on 17th July 1085. He was succeeded in the dukedom by his younger son Roger Bursa, whose son William died without issue in 1127. Guiscard's eldest son was Marc Bohemond (*q.v.*).

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[1] There were others known by the same name; see Hearne, Pref., p. 58.

ROBERTS, David (1796-1864), landscape painter, was born at Stockbridge, Edinburgh, on 24th October 1796. At an early age he manifested a great love for art; but his father, a shoemaker, wished him to follow the same trade. He was, however, apprenticed for seven years to a painter and house-decorator; and during this time he employed his evenings in the earnest study of art. For the next few years his time was divided between work as a house-painter and as a scene-painter, and he even appeared occasionally on the boards as an actor in pantomimes. In 1820 he formed the acquaintance of Clarkson Stanfield, then painting at the Pantheon, Edinburgh, by whose advice and example he greatly profited and at whose suggestion he began his career as an exhibitor, sending three pictures in 1822 to the "Exhibition of Works by Living Artists," held in Edinburgh. In the same year he removed to London, where he worked for the Coburg Theatre, and was afterwards employed, along with Stanfield, at Drury Lane. In 1824 he exhibited at the British Institution a view of Dryburgh Abbey, and sent two works to the first exhibition of the Society of British Artists, which he had joined, and of which he was elected president in 1831. In the same autumn he visited Normandy, and the works which were the results of this excursion began to lay the foundation of the artist's reputation,—one of them, a view of Rouen Cathedral, being sold for eighty guineas. By his scenes for an opera entitled *The Seraglio*, executed two years later, he won much contemporary praise, and these, along with the scenery for a pantomime dealing with the naval victory of Navarino, and two panoramas executed jointly by him and Stanfield, were among his last work for the theatres. In 1829 he exhibited his imposing subject the Departure of the Israelites from Egypt, a commission from Lord Northwick, in which the style of the painter first becomes clearly apparent; and three years afterwards he travelled in Spain, and passed over to Tangiers, returning in the end of 1833 with a supply of effective sketches, which were speedily elaborated into attractive and popular paintings. His Interior of Seville Cathedral was exhibited in the British Institution in 1834, and sold for £300; and he executed a fine series of Spanish illustrations for the *Landscape Annual* of 1836, a publication to which he contributed for four years; while in 1837 a selection of his *Picturesque Sketches in Spain* was reproduced by lithography, many of the subjects being carefully retouched on the stone by the artist's own hand.

In 1838 Roberts made a long tour in the East, sailing up the Nile, visiting Luxor and Karnak, and afterwards making his way to the Holy Land. He thus accumulated a vast collection of sketches of a class of scenery which had hitherto been hardly touched by British artists, and which appealed to the public with all the charm of novelty. The next ten years of his life were mainly spent in elaborating these materials. Many Eastern subjects were painted, and an extensive series of drawings was lithographed by Louis Haghe in the superb work, *Sketches in the Holy Land and Syria*, 1842-49. In 1851, and again in 1853, Roberts visited Italy, painting the Ducal Palace, Venice, bought by Lord Londesborough, the interior of the Basilica of St Peter's, Rome, Christmas Day, 1853, and Rome from the Convent of St Onofrio, presented to the Royal Scottish Academy. His last volume of illustrations, *Italy, Classical, Historical, and Picturesque*, was published in 1859. He also executed, by command of the queen, a picture of the opening of the Great Exhibition of 1851,—a laborious and rather uncongenial task. In 1839 he was elected an associate, and in 1841 a full member of the Royal Academy; and in 1858 he was presented with the freedom of the city of Edinburgh. The last years of his life were occupied with a series of views of London from the Thames. He had executed six of these and was at work upon a picture of St Paul's Cathedral, when on 25th November 1864 he was seized with an attack of apoplexy and expired the same evening.

The quality of Roberts's work is exceedingly equal and uniform during his whole career. The architecture, which is so prominent a feature in his paintings, is introduced with great picturesqueness and an easy command of its salient points, but with little care for the minutiæ of detail. His art was conventional, essentially scenic and spectacular in character, showing effective composition and an unerring instinct for broad general effect, but destitute of that close adherence to nature, that delicacy and truth of tone and colour, which are becoming increasingly characteristic of the productions of the English school. Something of the scene-painter appears in all his works, and his certainty and speed of execution were undoubtedly founded upon his early practice for the stage.

A *Life* of Roberts, compiled from his journals and other sources by James Ballantine, with etchings and pen-and-ink sketches by the artist, appeared in Edinburgh in 1866.

ROBERTSON, Frederick William (1816-1853), one of the most brilliant and influential preachers of modern times, was born in London, on 3d February 1816. The first five years of his life were passed at Leith Fort, where his father, a captain in the Royal Artillery, was then resident. The impressions made upon the child in those early years were never effaced; the military spirit entered into his blood, and throughout life he was characterized by the qualities of the ideal soldier,—courage, self-devotion, sense of duty, hatred of cruelty and meanness, chivalrous defence of the weak. In 1821 Captain Robertson retired to Beverley, where the boy was educated first at home, then at the grammar-school. At the age of fourteen he spent a year at Tours, from which he returned to Scotland and continued his education at the Edinburgh Academy and university. His father, who had remarked and fostered his singular nobility of character, his passion for purity and truthfulness, and his deepening religious feeling, now proposed that he should choose the church as his profession, but received the decisive answer, "Anything but that; I am not fit for it." At the age of eighteen he was accordingly articled to a solicitor in Bury St Edmunds, but the uncongenial and sedentary employment broke down his health in a year's time. It was then resolved to yield to his deep-rooted craving for a military career: his name was placed upon the list of the 3d Dragoons then serving in India, and for two years he devoted himself with ardour to the work of preparing for the army. But, by a singular conjuncture of circumstances and at the sacrifice of his own natural bent to his father's wish, he matriculated at Brazenose College, Oxford, just two weeks before his commission was put into his hands. Oxford he did not find wholly congenial to his intensely earnest spirit, but he read hard, and, as he afterwards said, "Plato, Aristotle, Butler, Thucydides, Sterne, Jonathan Edwards, passed like the iron atoms of the blood into my mental constitution." At the same time he made a careful study of the Bible, committing to memory the entire New Testament both in English and in Greek. The Tractarian movement had no attraction for him, although he admired some of its leaders. He was at this time a moderate Calvinist in doctrine and enthusiastically evangelical. Ordained in July 1840 by the bishop of Winchester, he at once entered on ministerial work in that city, and during his ministry there and under the influence of Martyn and Brainerd, whose lives he affectionately studied, he carried devotional asceticism to an injurious length, rising early, refraining from meat, subduing his nature by self-imposed austerities, and binding himself to a system of prayer. In less than a year he was compelled to seek relaxation; and going to Switzerland he there met and married Helen, third daughter of Sir George William Denys, Bart. Early in 1842, after a few months' rest, he accepted a curacy in Cheltenham, which he retained for upwards of four years. "It was during this period that the basis of his theological science was entirely changed; his principles of thought attained, but not as yet systematized; his system of interpreting the Bible reduced to order; his whole view of the relation of God to man and man to God built up into a new temple on the ruins of the old." The questioning spirit was first aroused in him by the disappointing fruit of evangelical doctrine which he found in Cheltenham, as well as by intimacy with men of varied reading. But, if we are to judge from his own statement, the doubts which now actively assailed him had long been latent in his mind: "a man who had read theological and philosophical controversy long before with painful interest—a man who at different times had lived in the atmosphere of thought in which Jonathan Edwards, Plato, Lucretius, Thomas Brown, Carlyle, Emerson, and Fichte lived—who has steeped his soul and memory in Byron's strongest feelings—who has walked with Newman years ago to the brink of an awful precipice, and chosen rather to look upon it calmly, and know the worst of the secrets of the darkness, than recoil with Newman, in fear and tenderness, back to the infallibility of Romanism—such a man is not likely to have been influenced by a few casual statements of difficulties which he had read of a thousand times before." This was written from Heidelberg in 1846. The crisis of his mental conflict had just been passed in Tyrol, and he was now beginning to let his creed grow again from the one fixed point which nothing had availed to shift: "the one great certainty to which, in the midst of the darkest doubt, I never ceased to cling—the entire symmetry and loveliness and the unequalled nobleness of the humanity of the Son of Man." After this mental revolution he felt unable to return to Cheltenham, but after doing duty for two months at St Ebbe's, Oxford, he entered in August 1847 on his famous ministry at Trinity Chapel, Brighton. Here he stepped at once into the foremost rank as a preacher. His church was thronged with thoughtful men of all classes in society and of all shades of religious belief, with those also who relished brilliant and sometimes impassioned oratory, and with those who felt their need of sympathetic and helpful teaching. But his closing years were full of sadness. His sensitive nature was subjected to extreme suffering, partly from the misconstruction and hatred of the society in which he lived, partly from his inability to accomplish the heavy work of his position. He was crippled by incipient disease of the brain, which at first inflicted unconquerable lassitude and depression, and latterly agonizing pain. On the 5th June 1853 he preached for the last time; and on the 15th August of the same year, at the age of thirty-seven, he found relief in death.

The causes of his success as a preacher are obvious. His fine appearance, his flexible and sympathetic voice, his manifest sincerity, the perfect lucidity and artistic symmetry of his address, and the brilliance with which he illustrated his points would have attracted hearers even had he had little to say. But he had much to say. No sermons were ever more compact. They were the utterance of a full, vivid, and penetrating mind. He was not, indeed, a scientific theologian; but his insight into the principles of the spiritual life is unrivalled; and for men approaching the truth from the same side as himself he is an invaluable guide. His own lonely and independent struggle had taught him where foothold was secure, and had enabled him to throw light on many a forgotten stepping-stone of truth. As his biographer says, thousands have found in his sermons "a living source of impulse, a practical direction of thought, a key to many of the problems of theology, and above all a path to spiritual freedom." In his hands spiritual facts assume an aspect of reasonableness which is irresistible. Religion is felt to be no longer a mystery for the exercise of professional minds, nor an extravagance suitable for enthusiastic temperaments, but an essential of life for all, and in line with the order of things in which we now are. For his sermons obtained their large circulation partly because they were new in kind. They marked the transition from the period in which religion was treated as a series of propositions to that in which it is presented as an essence penetrating the whole of human life. The accusations of heretical and dangerous teaching which were persistently brought against him, though possibly not so malignant as he himself supposed, were certainly more mischievous than the teaching against which they were levelled. Few men have ever more perfectly understood the spirit of Christ, and few have so fully made that spirit their own.

Robertson's literary remains include five volumes of sermons, two volumes of expository lectures, on Genesis and on the Epistles to the Corinthians, a volume of miscellaneous addresses, and a *Key to 'In Memoriam.'* Robertson's *Life* has been written by Stopford A. Brooke. (M. D.)

ROBERTSON, THOMAS WILLIAM (1829-1871), English dramatist, was born on 9th January 1829. As a dramatist he had a brief but very brilliant career. It is not too much to say that he was the most successful and distinguished writer of plays in his generation. The son of a provincial actor and manager, chief of a "circuit" that ranged from Bristol to Cambridge, Robertson was familiar with the stage from his childhood; but it was not till the last seven years of his life that he made his mark. He was never, as he admitted himself, very successful as an actor. He tried his hand also at writing plays, and a farcical comedy by him, *A Night's Adventure*, was produced at the Olympic under Farren's management as early as 1851. But this did not make good his footing, and he remained for some years longer in the provinces, varying his work as an actor with miscellaneous contributions to newspapers. In 1860 he went to London with the intention, it is said, of making his living by journalism and light literature. He edited a mining journal and contributed to it a novel afterwards dramatized with the title *Shadow Tree Shaft*. He wrote a farce entitled *A Cantab*, which was played at the Strand in 1861. Then, in 1864, came his first marked success, *David Garrick*, produced at the Haymarket with Sothern in the principal character. It was not, however, till the production of *Society* at the Prince of Wales Theatre in 1865, under the management of Miss Marie Wilton, afterwards Mrs Bancroft, that the originality and cleverness of the dramatist were fully recognized. Play-writer and company were exactly suited one to another; the plays and the acting together—the small size of the playhouse being also in their favour—were at once recognized as a new thing, and, while some critics sneered at the "cup-and-saucer comedy," voted it absurdly realistic, said there was nothing in it but commonplace life represented without a trace of Sheridanian wit and sparkle, all London flocked to the little house in Tottenham Street, and the stage was at once inundated with imitations of the new style of acting and the new kind of play.

Robertson, although his health was already undermined, followed up *Society* in quick succession with the series of characteristic plays which made the reputation of himself, the company, and the theatre. *Ours* was produced in 1866, *Caste* in 1867, *Play* in 1868, *School* in 1869, *M.P.* in 1870. For twenty years there probably has not been a week, hardly a night, in which some one of Robertson's plays has not been produced somewhere in Great Britain.

and still they show no sign of abating popularity. The masterly stage-craft is undoubtedly one of the elements in this remarkable conquest of the play-going public; the purity and generous morality of the plays another; the dialogue—which is always bright and clever, without any straining after or indeed much attaining to wit—a third; the humour, distinctness, and typical representativeness of the characters a fourth. That there is more art and individuality in the plays than critics at first were willing to admit is clear from the fact that none of Robertson's numerous imitators have succeeded in catching his happy knack. Another proof of something like genius—dramatic genius if not literary genius—is the skill with which he repeats the same idea with such variations that each time it is as fresh as if it were new. Again and again his situations owe their point to the contrast between generous kindness of heart and sordid worldliness, or between the ardent trustful affections of youth and the cynicism of disenchanted middle age. Pleasant sunny brightness and ingenuity within a narrow range constitute Robertson's distinction rather than breadth or fertility or striking brilliancy of wit. He knew his powers and worked steadily within them, not striving to go beyond. With the exception of *David Garrick* and *Home*, written for the Haymarket, and *Dreams* for the Gaiety, all his well-known plays were written for the Prince of Wales Theatre, with which his distinctive style of comedy is identified. Unhappily he did not live long to enjoy his success, but died in London in February 1871.

ROBERTSON, William (1721-1793), an eminent Scottish historian, born at Borthwick, Midlothian, on the 19th September 1721, was the eldest son of the Rev. William Robertson and of Eleanor Pitcairn. He received his early education at the school of Dalkeith,—at that time one of the best in Scotland; but at the age of twelve he was removed to the university of Edinburgh, where he soon manifested that sustained ardour in the pursuit of knowledge which he preserved throughout his long life. On his commonplace books, written when he was a mere youth, he always inscribed the motto: *Vita sine literis mors est.* He was from the first intended for the ministry; when twenty-two years old he was presented to the living of Gladsmuir in East Lothian, and almost immediately afterwards he lost both his father and his mother, who died within a few hours of each other. The support and education of a younger brother and six sisters then devolved upon him, and, though his income was only £100 a year, he sheltered them all in his house and "continued to educate his sisters under his own roof till they were settled respectably in the world" (Stewart). Robertson's inclination for study was never allowed to interfere with his duties as a parish minister, which he rather increased than diminished: "it was his custom during the summer months to convene on Sunday morning the youth of the parish of Gladsmuir half an hour before the commencement of the regular service of the church, and to employ that time in explaining to them the doctrines of the Catechism." His attention to his pastoral duties and his power and distinction as a preacher had made him a local celebrity while still a young man.

His energy and decision of character were brought out vividly by the rebellion of 1745. When Edinburgh seemed in danger of falling into the hands of the rebels he laid aside the pacific habits of his profession and joined the volunteers in the capital. When the city was surrendered he was one of the small band who repaired to Haddington and offered their services to the commander of the royal forces. Such a man could not remain in obscurity, and in the year 1751, when not quite thirty years of age, we find him already taking a prominent part in the business of the General Assembly. On the first occasion when he spoke (in seconding a motion by John Home for the suspension of certain presbyters who had refused to take part in an unpopular settlement) he was listened to with great attention, but his words had so little immediate effect on the assembly that on a division he was left in a minority of eleven against two hundred. A young man might well have been daunted by such a defeat, but his energy and self-reliance refused to yield. His great oratorical power, at once lucid, cogent, and persuasive, had made an impression on men's minds, and within so short a period as one year, when he again advocated his principles in connexion with what is known as the Inverkeithing case, he carried the house completely with him, and with the deposition of Thomas Gillespie secured a triumph for the policy he had adopted. From that moment his influence in the councils of the Scottish Church as leader of the "moderate party" was for many years nearly supreme (compare Presbyterianism, vol. xix. p. 685). The production of Home's tragedy of *Douglas* on the Edinburgh stage (1757) afforded Robertson another occasion for displaying that union of courage and caution which formed a marked feature of his character. Although the influence of moderatism was now visibly in the ascendant, there was still enough of the older spirit of Scottish Puritanism left to take alarm and raise an outcry against a stage play written by a minister and witnessed by many clergymen who were the author's friends One of these, the famous Dr Alexander Carlyle, was prosecuted before the synod for having gone to the theatre, and he tells us in his *Autobiography* that he purposely contrived to exclude Robertson from the post of moderator because "his speaking would be of more consequence if not in the chair." This testimony is the more noteworthy as Carlyle shows throughout his memoirs a grudging and unfriendly tone when speaking of Robertson. The latter, indeed, was able to render his incriminated colleague great service on this occasion, not only by his talent as a speaker, but by reason of the detached and unassailable position which his customary prudence had led him to take up. He never went to the play himself, he said, but that was not because he thought it wrong but because he had given a solemn promise to his father never to do so. He could not therefore join in censuring other clergymen who were held by no such vow as he had made: "it was sacred to him, but not obligatory on them." Carlyle was acquitted and Robertson had the credit—which he perhaps somewhat too constantly aimed at and generally secured—of standing well with all parties, of advocating the claims of culture and liberal sentiment without giving ground to their opponents for attacking his personal conduct and character.

But during all this period of prominent activity in the public life of Edinburgh Robertson was busy with those historical labours which have given him a permanent place in British literature. He had conceived the plan of his *History of Scotland* as early as the year 1753; in July 1757 he had proceeded as far as the Gowrie conspiracy, and in November of the following year David Hume, then residing in London, was receiving the proof-sheets from Strahan and making friendly but searching criticisms on the work in letters to the author. Till he had finished his book Robertson had never left his native country; but the publication of his history necessitated a journey to London, and he passed the early months of the year 1758 partly in the capital and partly in leisurely rambles in the counties of England. He returned on horseback in company with Alexander Carlyle and other Scotsmen, riding all the way from London to Edinburgh in about eighteen days.

The success of the *History of Scotland* was immediate and splendid, and within a month a second edition was called for. Before the end of the author's life the book had reached its fourteenth edition; and in the opinion of some it remains Robertson's greatest work. It soon brought him other rewards than literary fame. In 1759 he was appointed chaplain of Stirling Castle, in 1761 one of His Majesty's chaplains in ordinary, and in 1762 he was chosen principal of the university of Edinburgh. Two years later the office of king's historiographer was revived in his favour with a salary of £200 a year. His income greatly surpassed the revenue of any Presbyterian minister before him and at least equalled that of some of the bishops when Episcopacy was established in Scotland. It is the more surprising therefore that this moment of exceptional prosperity should have been chosen by some of his most valued friends to advise him to forsake the Scottish for the English Church and try for preferment south of the Tweed; and the surprise becomes wonder when we learn that those friends were Sir Gilbert Elliot and David Hume. The imprudence, to say nothing of the questionable morality, of such a step would seem too glaring to allow of its recommendation by any honourable well-wishers. Perhaps no man was more fitted than Robertson to measure and reject such injudicious advice, and he probably never gave the matter a second thought. He remained at home among his own people.

The rest of Robertson's life was uneventful to a degree even surpassing the proverbial uneventfulness of the lives of scholars. He was casting about for another historical subject in the very year in which his first work appeared, and he was wont to consult his friends on the choice of a period with a naiveté which shows how little the arduousness of historical research was then understood. Hume advised him to write a history of Greece or else lives in the manner of Plutarch. Dr John Blair urged him to write a complete history of England, while Horace Walpole suggested a history of learning. It must be recorded to Robertson's credit that he showed a preference from the first for the subject which he ultimately selected, *The History of the Reign of the Emperor Charles the Fifth.* He took uncommon pains with the work and devoted to it ten consecutive years of labour. It appeared in three volumes quarto in 1769. In 1777 he published his *History of America* and in 1791 his *Disquisition concerning the Knowledge which the Ancients had of India*, which concluded his historical labours and appeared only two years before his death, which occurred near Edinburgh on the 11th June 1793. His fame had long been European, and he left no rival in the field of historical composition save Gibbon alone.

For an adequate appreciation of Robertson's position in British literature, and more especially of his rank as an historian, we have to consider the country and the age in which he was born and his own personal qualities and limits.

Considering the small size and poverty of the country, Scotland had made a more than creditable figure in literature in the great age of the Reformation and the Renaissance. Its scholars, civilians, and professors of logic and philosophy were welcomed wherever learning flourished, except, perhaps, in England. All Europe could not show a more brilliant writer and publicist than Buchanan, and "the best romance that ever was written" (the words are Cowper's) was produced by a Scottish contemporary of Shakespeare, viz., the once famous *Argenis* of John Barclay. But the early triumphs of Scottish genius were all won in a foreign if familiar idiom, the common language of the learned; and when Latin retreated before the growing importance of modern tongues the Scots had no literary vernacular on which to fall back. For a century and a half (1600-1750) a Scottish writer to be read was forced to use a foreign language,—Latin, English, and even occasionally French. As Burton[1] has well remarked, this alone was sufficient to account in a large measure for the literary barrenness of the country. There was unquestionably another cause at work,—the fervent religious zeal with which the principles of the Reformation had been embraced: neither science, literature, nor art could obtain much attention from men who regarded them all as "deceitful vanities," leading the mind away from the one thing needful. In a small and sparsely peopled country, without wealth, commerce, or even politics in the larger sense, theology became a too absorbing and unique mental stimulus. This was, we may say, proved by the fact that as soon as the union with England opened a wider scope for Scottish energy and enterprise the theological temperature immediately fell,—a change witnessed with natural alarm by the more zealous clergy. "The rise of our too great fondness for trade," writes the Rev. Robert Wodrow in 1709, "to the neglect of our more valuable interests, I humbly think, will be written on our judgment" (Buckle, vol. ii. p. 301). The growth of wealth stimulated the growth of the other great factor of civilization, that of knowledge, and by the middle of the 18th century, just at the time when Robertson was planning his *History of Scotland*, a wide spirit of inquiry was abroad. Scottish intellect had risen from the tomb in which it had lain entranced for more than a hundred years. The Scottish contribution to British literature in the last half of the century is distinctly superior to that produced in the southern portion of the island. In philosophy and political and economic science the balance is immensely in favour of Scotland. Robertson was therefore no inexplicable prodigy—an "obscure Scotch parson" writing "like a minister of state," as it pleased Walpole and the London fops to regard him. He lived in a society far more propitious to high literary work than could be found in London or the English universities.

The connexion between philosophy and history is closer than appears at first sight. The study of man and his faculties, even ontological speculations as to the nature and origin of the universe, lead by a logical sequence to a consideration of human evolution in time, that is, to history. The coincidence of philosophical speculation with historical achievement so repeatedly manifested cannot be accidental. The topic cannot be developed here; but from the days of the Attic historians, who lived in an atmosphere electric with speculation, to the Hegelian historical school of Germany, the higher planes of history are found in near proximity to loftier peaks of philosophy. Hume, wonderful in all things, was perhaps most wonderful in this, that in him the two characters of the philosopher and the historian were completely united. He did not only, like Kant and Hegel, speculate about history; he wrote it. Again, we must admire the peculiar fortune of Robertson: he lived during many years in close contact and intimacy with the greatest philosophic genius of his age, perhaps of modern times.

Of the three great British historians of the 18th century two were Scotsmen. The exact place of Robertson with regard to his two friends Hume and Gibbon, and to such historians as the rest of Europe had to offer, presents a question of some nicety, because it is complicated by extraneous considerations, so to speak, which should not weigh in an abstract estimate, but cannot be excluded in a concrete and practical one. If we regard only Robertson's potential historic power, the question is not so much whether he was equal to either of his two friends as whether he was not superior to both. The man who wrote the review of the state of Europe prefixed to the

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[1] *Hist. of Scotland*, vol. viii. p. 544.

History of Charles V., or even the first book of the *History of Scotland*, showed that he had a wider and more synthetic conception of history than either the author of the *Decline and Fall* or the author of the *History of England*. These two portions of Robertson's work, with all their shortcomings in the eye of modern criticism, have a distinctive value which time cannot take away. He was one of the first to see the importance of *general ideas* in history. He saw that the immediate narrative of events with which he was occupied needed a background of broad and connected generalizations, referring to the social state of which the detailed history formed a part. But he did more than this. In the appendix to the view of Europe called "Proofs and Illustrations" he enters into the difficult and obscure question of land tenure in Frankish times, and of the origin of the feudal system, with a sagacity and knowledge which distinctly advanced the comprehension of this period beyond the point at which it had been left by Du Bos, Montesquieu, and Mably. He was fully acquainted with the original documents,—many of them, we may conjecture, not easy to procure in Scotland. It must have been a genuine aptitude for historical research of a scientific kind which led Robertson to undertake the labour of these austere disquisitions of which there were not many in his day who saw the importance. Gibbon, so superior to him for wide reading and scholarship, has pointedly avoided them. It need hardly be said that many, perhaps the majority, of Robertson's views on this thorny topic are out of date now. But he deserves the honour of a pioneer in one of the most obscure if also important lines of inquiry connected with European history. On the other hand, it must be admitted that he showed himself only too tame a follower of Voltaire in his general appreciation of the Middle Ages, which he regarded with the mingled ignorance and prejudice common in the 18th century. In this particular he was not at all in advance of his age.

The neglect and gradual oblivion which are now overtaking the greater part of Robertson's historical work are owing to no fault of his. He had not and could not have the requisite materials: they were not published or accessible. Justice requires that we should estimate his performance in view of the means at his command, and few critics would hesitate to subscribe to the verdict of Buckle, "that what he effected with his materials was wonderful." His style, whether of narrative or disquisition, is singularly clear, harmonious, and persuasive. The most serious reproach made against it is that it is correct to a fault and lacks idiomatic vigour, and the charge is not without foundation. But there can be no doubt that, if Robertson's writings are less read than they formerly were, the fact is to be attributed to no defects of style but to the growth of knowledge and to the immense extension of historical research which has inevitably superseded his initiatory and meritorious labours. (J. C. MO.)

ROBERVAL, GILLES PERSONNE DE (1602-1675), French mathematician, was born at the village of Roberval near Beauvais in 1602. His name was originally Gilles Personne, that of Roberval, by which he is known, being taken from the place of his birth. Like Descartes, he was present at the siege of La Rochelle in 1627. In the same year he went to Paris, where he was appointed to the chair of philosophy in the Gervais College in 1631, and afterwards to the chair of mathematics in the Royal College of France. A condition of tenure attached to this chair was that the holder should propose mathematical questions for solution, and should resign in favour of any person who solved them better than himself; but, notwithstanding this, Roberval was able to keep the chair till his death, which occurred at Paris in 1675.

Roberval was one of those mathematicians who, just before the invention of the calculus, occupied their attention with problems which are only soluble, or can be most easily solved, by some method involving limits or infinitesimals, and in the solution of which accordingly the calculus is always now employed. Thus he devoted some attention to the quadrature of curves and the cubature of surfaces, which he accomplished, in some of the simpler cases, by a method of his own, called by himself the "Method of Indivisibles"; but he lost much of the credit of the discovery as he kept his method for his own use, while Cavalieri published a similar method of his own. Another of Roberval's discoveries was a very general method of drawing tangents, by considering a curve as described by a moving point whose motion is the resultant of several simpler motions. His own description of his method may be translated as follows:—"General rule. By means of the specific properties of the curve, which will be given, examine the different motions of the tracing point at the place where you wish to draw the tangent; the direction of the tangent is that of the resultant of these motions." He also discovered a method of deriving one curve from another, by means of which finite areas can be obtained equal to the areas between certain curves and their asymptotes. To these curves, which were also applied to effect some quadratures, Torricelli gave the name of Robervallian lines. Between Roberval and Descartes there existed a feeling of ill-will, owing to the jealousy aroused in the mind of the former by the criticism which Descartes offered to some of the methods employed by him and by Fermat; and this led him to criticize and oppose the new geometry which Descartes introduced about this time. As results of Roberval's labours outside the department of pure mathematics may be noted a work on the system of the universe, in which he supports the Copernican system and attributes a mutual attraction to all particles of matter; and also the invention of a special kind of balance which goes by his name (see BALANCE, vol. iii. p. 266).

ROBESPIERRE, MAXIMILIEN MARIE ISIDORE (1758-1794), the most fanatical and most famous of the republican leaders of the French Revolution, was born at Arras on 6th May 1758. His family was of Irish descent, having emigrated from Ireland at the time of the Reformation on account of religion, and his direct ancestors in the male line had been notaries at the little village of Carvin near Arras from the beginning of the 17th century. His grandfather, being more ambitious, established himself at Arras as an avocat; and his father followed the same profession, marrying Mademoiselle Josephine Carraut, daughter of a brewer in the same city, in 1757. Of this marriage four children were born, two sons and two daughters, of whom Maximilien was the eldest; but in 1767 Madame Derobespierre, as the name was then spelt, died, and the disconsolate widower at once left Arras and wandered about Europe until his death at Munich in 1769. The children were taken charge of by their maternal grandfather and aunts, and Maximilien was sent to the college of Arras, whence he was nominated in 1770 by the bishop of his native town to a bursarship at the Collége Louis-le-Grand at Paris. Here he had for fellow-pupils Camille Desmoulins and Stanislas Fréron. Completing his law studies with distinction, and having been admitted an avocat in 1781, Robespierre returned to his native city to seek for practice, and to struggle against poverty. His reputation had already preceded him, and the bishop of Arras, M. de Conzié, appointed him criminal judge in the diocese of Arras in March 1782. This appointment, which he soon resigned, to avoid pronouncing a sentence of death, did not prevent his practising at the bar, and he speedily became known as a careful and painstaking advocate. His argument in the question of the legality of paratonnerres or lightning-conductors, which was widely reported and translated into both English and German, raised his fame as an advocate to its height, and with this success his struggles against poverty were over. He now turned to the pleasures of literature and society and came to be esteemed as one of the best writers and most popular dandies of Arras. In December 1783 he was elected a member of the academy of Arras, whose meetings he attended regularly; and, like all other young Frenchmen with literary proclivities, he began to compete for the prizes offered by various provincial academies. In 1784 he obtained a medal from the academy of Metz for his essay on the question whether the relatives of a condemned criminal should also be punished; but the prize was awarded to Lacretelle aîné, an avocat and journalist at Paris, who triumphed again over his provincial antagonist in the Parisian press, and who in after days when Robespierre was all-powerful was surprised that he was not sent to the guillotine. An éloge on Gresset, the author of *Vert-Vert* and *Le Méchant*, written for the academy of Amiens in 1785, was not more successful; but Robespierre was compensated for these failures by his great popularity in the society of the Rosati at Arras,—a little society whose members prided themselves on being men of fashion and wit, and spent one evening a week in conviviality and in reading poems, epigrams, and vers de société. There the sympathetic quality of Robespierre's voice, which afterwards did him such good service in the Jacobin Club, always caused his indifferent verses to be loudly applauded by his friends.

Such had been the life of the future republican leader up to 1788, when he took part in the discussion as to the way in which the states-general should be elected, showing clearly and forcibly in his *Adresse à la Nation Artésienne* that, if the former mode of election by the members of the provincial estates was again adopted, the new states-general would not represent the people of France. Necker also perceived this, and therefore determined to make the old royal bailliages and séné-chaussées the units of election. Under this plan the city of Arras was to return twenty-four members to the assembly of the bailliage of Artois, which was to elect the deputies. The corporation claimed the right to a preponderating influence in these city elections, and Robespierre headed the opposition, making himself very conspicuous and drawing up the cahier or table of complaints and grievances, for the guild of the cobblers. Although the leading members of the corporation were elected, their chief opponent succeeded in getting elected with them. In the assembly of the bailliage rivalry ran still higher, but Robespierre had already made his mark in politics; by the *Avis aux Habitants de Campagne* (Arras, 1789), which is almost certainly by him, he secured the support of the country electors, and, though but thirty years of age, poor, and without influence, he was elected fifth deputy of the tiers état of Artois to the states-general.

When the states-general met at Versailles on 5th May 1789, the young deputy of Artois already possessed the one faculty which was to lead him to supremacy: he was a fanatic. As Mirabeau said, "That young man believes what he says; he will go far." Without the courage and wide tolerance which make a statesman, without the greatest qualities of an orator, without the belief in himself which marks a great man, nervous, timid, and suspicious, Robespierre yet believed in the doctrines of Rousseau with all his heart, and would have gone to death for them; and in the belief that they would eventually succeed and regenerate France and mankind he was ready to work with unwearied patience. While the constituent assembly occupied itself in drawing up an unworkable constitution as the grand panacea, Robespierre turned from the assembly of provincial avocats and wealthy bourgeois to the people of Paris. However, he spoke frequently in the constituent assembly, and often with great success, and was eventually recognized as second only to Pétion de Villeneuve—if second to him—as a leader of the small body of the extreme left,—the thirty voices, as Mirabeau contemptuously called them. It is hardly necessary to examine minutely Robespierre's speeches and behaviour before 1791, when the death of Mirabeau left the way clear for the influence of his party; but what is noteworthy, as proving the religious cast of his mind and his belief in the necessity of a religion, is that he spoke several times in favour of the lower clergy and laboured to get their pensions increased. When he instinctively felt that his doctrines would have no success in the assembly, he turned to the Jacobin Club, which had consisted originally of the Breton deputies only, but which, after the assembly moved to Paris, began to admit among its members various leaders of the Parisian bourgeoisie. As time went on, many of the more intelligent artisans and petits commerçants became members of the club, and among such men Robespierre found the hearers he sought. They did more than listen to him: they idolized him; the fanatical leader had found fanatics to follow him, and their ultimate supremacy became merely a question of time. As the wealthier bourgeois of Paris and deputies of a more moderate type seceded to the club of '89 the influence of the old leaders of the Jacobins (Barnave, Duport, Charles de Lameth) diminished; and, when they themselves, alarmed at the progress of the Revolution, founded the club of the Feuillants in 1791, the followers of Robespierre dominated the Jacobin Club. The death of Mirabeau strengthened Robespierre's influence in the assembly; but in May 1791 he proved his lack of statesmanlike insight and his jealous suspicion of his colleagues by proposing and carrying the motion that no deputies who sat in the constituent could sit in the succeeding assembly. The flight of the king on 21st June and his arrest at Varennes excited Robespierre's suspicions, and made him declare himself at the Jacobin Club to be "ni monarchiste ni republicain." But the vigorous conduct of Lafayette and the National Guard on the Champ de Mars on 17th July 1791 terrified him, for he believed that he was a predestined victim, until he was succoured by Duplay, a cabinetmaker in the Rue St Honoré, and an ardent admirer of his, in whose house he lived (with but two short intervals) till his death. At last came his day of triumph, when on 30th September, on the dissolution of the constituent assembly, the people of Paris crowned Pétion and himself as the two incorruptible patriots.

On the dissolution of the assembly he returned for a short visit to Arras, where he met with a triumphant reception. In November he returned to Paris, and on 18th December made a speech which marks a new epoch in his life. Brissot, the *âme politique* of the Girondin party which had been formed in the legislative assembly, urged vehemently that war should be declared against Austria, and the queen was equally urgent in the hope that a victorious army might restore the old absolutism of the Bourbons. Two men opposed the projects of the queen and the Girondins,—Marat and Robespierre: Marat opposed them for statesmanlike reasons (see Marat), and Robespierre on humanitary grounds and because as a follower of Rousseau he disliked war. This opposition from those whom they had expected to aid them irritated the Girondins greatly, and from that moment began the struggle which ended in the *coups d'état* of 31st May and 2d June 1793. Guadet accused Robespierre of superstition in believing in a providence, and declared that, as the people's idol, he ought to ostracize himself for the good of his country. Robespierre persisted in his opposition to the war, and the Girondins, especially Brissot, attacked him so violently that in April 1792 he resigned the post of public prosecutor at the tribunal of Paris, which he had held since February, and started a journal, *Le Defenseur de la Constitution*, in his own defence. It is noteworthy that during the summer months of 1792, in which the fate of the Bourbon dynasty was being sealed, neither the Girondins in the legislative assembly nor Robespierre took any active part in overthrowing it. Stronger men with practical instincts of statesmanship, like Danton and

Billaud-Varenne, who were not afraid of blood, and who dared to look facts in the face and take the responsibility of doing while others were talking, were the men who made the 10th of August and took the Tuileries. The Girondins, however, were quite ready to take advantage of the accomplished fact; and Robespierre, likewise, though shocked at the shedding of blood, was willing to take his seat on the commune of Paris, which had overthrown Louis XVI., and might check the Girondins. The strong men of the commune were glad to have Robespierre's assistance, not because they cared for him or believed in him, but because of the help got from his popularity, his reputation for virtue, and his influence over the Jacobin Club and its branches, which spread all over France. He it was who presented the petition of the commune of Paris on 16th August to the legislative assembly, demanding the establishment of a revolutionary tribunal and the summons of a convention. The massacres of September in the prisons, which Robespierre in vain attempted to stop, showed that the commune had more confidence in Billaud than in him. Yet, as a proof of his personal popularity, he was a few days later elected first deputy for Paris to the national convention.

On the meeting of the convention the Girondins immediately attacked Robespierre; they were jealous of his popularity and knew that his single-hearted fanaticism would never forgive their intrigues with the king at the end of July, and would always be opposed to their plans for raising the duke of Orleans to the throne. As early as 26th September the Girondin Lasource accused him of aiming at the dictatorship; afterwards he was informed that Marat, Danton, and himself were plotting to become triumvirs; and eventually on 29th October Louvet attacked him in a studied and declamatory harangue, abounding in ridiculous falsehoods and obviously concocted in Madame Roland's boudoir. But Robespierre had no difficulty in rebutting this attack (5th November). All personal disputes, however, gave way by the month of December 1792 before the great question of the king's trial, and here Robespierre took up a position which is at least easily understood. These are his words spoken on 3d December: "This is no trial; Louis is not a prisoner at the bar; you are not judges; you are—you cannot but be statesmen, and the representatives of the nation. You have not to pass sentence for or against a single man, but you have to take a resolution on a question of the public safety, and to decide a question of national foresight. It is with regret that I pronounce the fatal truth; Louis ought to perish rather than a hundred thousand virtuous citizens; Louis must die, that the country may live." This great question settled by the king's execution, the struggle between Robespierre and the Girondins entered upon a more acute stage, and the want of statesmanship among the latter threw upon the side of the fanatical Robespierre Danton and all those strong practical men who cared little for personal questions, and whose only desire was the victory of France in her great struggle with Europe. Had it been at all possible to act with that group of men of genius whom history calls the Girondins, Danton, Carnot, Robert Lindet, and even Billaud-Varenne would have sooner thrown in their lot with them than with Robespierre, whom they thoroughly understood; but the Girondins, spurred on by Madame Roland, refused to have anything to do with Danton. Government became impossible; the federalist idea, which would have broken France to pieces in the very face of the enemy, grew and flourished, and the men of action had to take a decided part. In the month of May 1793 Camille Desmoulins, acting under the inspiration of Robespierre and Danton, published his *Histoire des Brissotins* and *Brissot dévoilé*; Isnard declared that Paris must be destroyed; Robespierre preached insurrection at the Jacobin Club; and on 31st May and 2d June the commune of Paris destroyed the Girondin party. For a moment it seemed as if France would avenge them; but patriotism was stronger than federalism. The defence of Lyons only exasperated the men who were working for France, and the armies who were fighting for her, and on 27th July 1793, when the struggle was practically decided, the convention elected Robespierre to the committee of public safety.

This election marks an important epoch, not only in the life of Robespierre, but in the history of the Revolution. Danton and the men of action had throughout the last two years of the crisis, as Mirabeau had in the first two years, seen that the one great need of France, if she was to see the end of her troubles without the interference of foreign armies, was the existence of a strong executive government. The means for establishing the much-needed strong executive were found in the committee of public safety. The success of this committee in suppressing the Norman insurrection had confirmed the majority of the convention in the expediency of strengthening its powers, and the committee of general security which sat beside it was also strengthened and given the entire management of the internal police of the country. When Danton, who had been a member of the committee from April to 10th July 1793, left it Robespierre was elected; and it was not until then that he became one of the actual rulers of France. Indeed the committee was not finally constituted until the 13th of September, when the last two of the "great" twelve who held office until July 1794 were elected. Of these twelve at least seven, Carnot, Billaud-Varenne, Collot d'Herbois, Prieur (of the Marne), Prieur (of the Côte d'Or), Jean Bon Saint-André, and Robert Lindet, were essentially men of action, all of whom despised rather than feared Robespierre owing to his supposed timidity, and were entirely free from his influence. Of the other four Hérault de Séchelles was a professed adherent of Danton; Barère was an eloquent Provençal, who was ready to be the spokesman to the convention of any view which the majority of the committee might adopt; and only Couthon and Saint-Just shared Robespierre's political enthusiasm for the regeneration of France by the gospel of Rousseau. It is necessary to dwell upon the fact that Robespierre was always in a minority in the great committee in order to absolve him from the blame of being the inventor of the enormities of the Terror, as well as to deprive him of the glory of the gallant stand made against Europe in arms.

After this examination of Robespierre's position it is not necessary to investigate closely every act of the great committee during the year which was pre-eminently the year of the Terror; the biographer is rather called upon to examine his personal position with regard to the establishment of the Terror and the fall of the Hébertists and Dantonists, and then to dwell upon the last three months in which he stood almost alone trying to work up an effective counterbalance to the power of the majority of the great committee. The Terror was the embodiment of the idea of Danton, that it was necessary to have resort to extreme measures to keep France united and strong at home in order to meet successfully her enemies upon the frontier. This idea was systematized by the committee of public safety, or rather by two members of it acting for the majority, Billaud-Varenne and Collot d'Herbois, without much consideration as to who were to be the victims. With the actual organization of the Terror Robespierre had little or nothing to do; its two great engines, the revolutionary tribunal and the absolute power in the provinces of the representatives on mission, were in existence before he joined the committee of public safety, and the laws of the maximum and of the suspects were by no means of his creation. The reason why he is almost universally regarded as its creator and the dominant spirit in the committee of public safety is not hard to discover. Men like Carnot and Billaud-Varenne were not conspicuous speakers in the convention, nor were they the idols of any section of the populace: but Robespierre had a fanatical following among the Jacobins and was admittedly the most popular orator in the convention. His panegyrics on the system of revolutionary government and his praise of virtue led his hearers to believe that the system of the Terror, instead of being monstrous, was absolutely laudable; his pure life and admitted incorruptibility threw a lustre on the committee of which he was a member; and his colleagues offered no opposition to his posing as their representative and reflecting some of his personal popularity upon them so long as he did not interfere with their work. Moreover, he alone never left Paris, whilst all the others, except Barère, were constantly engaged on missions to the armies, the navy, and the provinces. It has been asserted that Robespierre, Couthon, and Saint-Just took upon themselves the direction of "la haute politique," while the other members acted only in subordinate capacities; undoubtedly it would have suited Robespierre to have had this believed, but as a matter of fact he was in no way especially trusted in matters of supreme importance.

After this explanation it may be said at once that Robespierre was not the author of the overthrow of the Dantonists and the Hébertists, though he thoroughly agreed with the majority and had no desire to save them, the principles of both parties being obnoxious to him. The Hébertists were communists in the true meaning of the word. They held that each commune should be self-governing, and, while admitting the right of a central authority to levy men and money for the purposes of the state, they believed that in purely internal matters, as well as in determining the mode in which men and money were to be raised, the local government ought to be supreme. This position of the Hébertists was of course obnoxious to the great committee, who believed that success could only be won by their retention of absolute power; and in the winter of 1794-95 it became obvious that the Hébertist party must perish, or its opposition to the committee would grow too formidable owing to its paramount influence in the commune of Paris. Robespierre shared his colleagues' fear of the Hébertist opinions, and he had a personal reason for disliking that party of atheists and sansculottes, since he believed in the necessity of religious faith, and was too much of a gentleman not to detest their imitation of the grossness that belongs to the lowest class of the populace. In 1792 he had indignantly thrown from him the cap of liberty which an ardent admirer had placed upon his head; he had never pandered to the depraved tastes of the mob by using their language; and to the last day of his life he wore knee-breeches and silk stockings and wore his hair powdered. His position towards the Dantonist party was of a different character. After having seen established the strong executive he had laboured for, and having moved the resolutions which finally consolidated the power of the committee of public safety in September 1793, Danton retired to his country house to enjoy the pleasures of domestic life. But to his retreat came the news of the means the committee used to maintain their supremacy. Danton was not a man who scrupled to shed blood when necessary, but he did not see that this continuous series of sacrifices on the guillotine was necessary; hence he inspired Camille Desmoulins to protest against the Terror in the *Vieux Cordelier*, the noblest expression of revolutionary thought. Where is this system of terror to end? what is the good of a tyranny comparable only to that of the Roman emperors as described by Tacitus? Such were the questions which Camille Desmoulins asked under Danton's inspiration. This "moderantism," as it was called, was as objectionable to the members of the great committee as the doctrines of the Hébertists. Both parties must be crushed. Before the blows at the leaders of those two parties were struck, Robespierre retired for a month (from 13th February to 13th March 1794) from active business in the convention and the committee, apparently to consider his position; but he came to the conclusion that the cessation of the Reign of Terror would mean the loss of that supremacy by which he hoped to establish the ideal of Rousseau, for Danton, he knew, was essentially a practical statesman and laughed at his ideas. He must have considered too that the result of his siding with Danton would probably have been fatal to himself. The result of his deliberations was that he abandoned Danton and co-operated in the attacks of the committee on the two parties. On the 15th of March he reappeared in the convention; on the 19th Hébert and his friends were arrested; and on the 24th they were guillotined. On the 30th of March Danton, Camille Desmoulins, and their friends were arrested, and on the 5th of April they too were guillotined.

It was not until after the execution of Danton that Robespierre began to develop a policy distinct from that of his colleagues in the great committee, an opposition which ended in his downfall. He began by using his influence over the Jacobin Club to dominate the commune of Paris through his devoted adherents, two of whom, Fleuriot-Lescot and Payan, were elected respectively mayor and procureur of the commune. He also attempted to usurp the influence of the other members of the great committee over the armies by getting his young adherent, Saint-Just, sent on a mission to the frontier. In Paris Robespierre determined to increase the pressure of the Terror: no one should accuse him of moderantism; through the increased efficiency of the revolutionary tribunal Paris should tremble before him as the chief member of the great committee; and the convention should pass whatever measures he might dictate. To secure his aims, Couthon, his other ally in the committee, proposed and carried on the 10th of June the outrageous law of 22d Prairial, by which even the appearance of justice was taken from the tribunal, which, as no witnesses were allowed, became a simple court of condemnation. The result of this law was that between the 12th of June and the 28th of July, the day of Robespierre's death, no less than 1285 victims perished on the guillotine at Paris. But before this there had taken place in Robespierre's life an episode of supreme importance as illustrating his character and his political aims: on the 7th of May he secured a decree from the convention recognizing the existence of the Supreme Being. In His honour a great fête was held on the 8th of June; Robespierre, as president of the convention, walked first and delivered his harangue, and as he looked around him he may well have believed that his position was secured and that he was at last within reach of a supreme power which should enable him to impose his belief on all France, and so ensure its happiness. The majority of the great committee found his popularity—or rather his ascendency, for as that increased his personal popularity diminished—useful to them, since by increasing the stringency of the Terror he strengthened the position of the committee, whilst attracting to himself, as occupying the most prominent position in it, any latent feeling of dissatisfaction at such stringency. Of the issue of a struggle between themselves and Robespierre they had little fear: they controlled the committee of general security through their alliance with its leaders, Amar and Vadier; they were certain of obtaining a majority in the convention, for they knew that the chief deputies on the left or the Mountain were Dantonists, who burned to avenge Danton's death; while they felt sure also that the mass of the deputies of the centre or the Marsh could be hounded on against Robespierre if they were to accuse him of aiming at the dictatorship and pour on him the obloquy of having increased the Terror; and they knew finally that his actual adherents, though devoted to him, were few in number. The devotion of these admirers had been further excited by the news that a half-witted girl, named Cécile Renault, had been found wandering near his house, with a knife in her possession, intending to play the part of Charlotte Corday. She was executed on the 17th of June, on the very day that Vadier raised a laugh at Robespierre's expense in the convention by his report on the conspiracy of Catherine Théot, a mad woman, who had asserted that Robespierre was a divinity.

For a statesman to be laughed at in France is fatal to his power, and Robespierre himself felt that he must strike his blow now or never. Yet he was not sufficiently audacious to strike at once, as Payan and Coffinhal, the ablest of his adherents, would have had him do, but retired from the convention for some weeks, as he had done before the overthrow of the Hébertists and the Dantonists, to prepare his plan of action. This retirement seemed ominous to the majority of the great committee, and they too prepared for the struggle by communicating with the deputies of the Mountain, who were either friends of Danton or men of proved energy like Barras, Fréron, and Tallien. These weeks, the last of his life, Robespierre passed very peacefully, according to his wont all through the Revolution. He continued to live with the Duplays, with whose daughter Éléonore he had fallen in love, and used to wander with her and his favourite dog, a great Danish hound, named Bruant, in the Champs Élysées during the long summer evenings. At last, on the 26th of July, Robespierre appeared for the first time for more than four weeks in the convention and delivered a carefully studied harangue, which lasted for more than four hours, in which he declared that the Terror ought to be ended, that certain deputies who had acted unjustly and exceeded their powers ought to be punished, and that the committees of public safety and general security ought to be renewed. Great was the excitement in the convention: all wondered who were the deputies destined to be punished; all were surprised that the Terror should be imputed as a fault to the very committee of which Robespierre had been a member. The majority of the great committee determined to act promptly. The convention, moved by Robespierre's eloquence, at first passed his motions; but he was replied to by Cambon the financier, Billaud-Varenne, Amar, and Vadier, and the convention rescinded their decrees and referred Robespierre's question to their committees. On the following day, the 27th of July, or in the revolutionary calendar the 9th Thermidor, Saint-Just commenced to speak on behalf of the motions of Robespierre, when violent interruptions showed the temper of the convention. Tallien, Billaud-Varenne, and Vadier again attacked Robespierre; cries of "Down with the tyrant!" were raised; and, when Robespierre hesitated in his speech in answer to these attacks, the words "C'est le sang de Danton qui t'étouffe" showed what was uppermost in the minds of the Mountain. The excitement increased, and at five in the afternoon Robespierre, Couthon, and Saint-Just, with two young deputies, Augustin Robespierre and Lebas, the only men in all the convention who supported them, were ordered to be arrested. Yet all hope for Robespierre was not gone; he was speedily rescued from his prison with the other deputies by the troops of the commune and brought to the Hôtel de Ville. There he was surrounded by his faithful adherents, led by Payan and Coffinhal, but the day was past when the commune could overawe the convention; for now the men of action were hostile to the commune, and its chief was not a master of *coups d'état*. On the news of the release of Robespierre, the convention had again met, and declared the members of the commune and the released deputies *hors de la loi*. The national guards under the command of Barras had little difficulty in making their way to the Hôtel de Ville; Robespierre was shot in the lower jaw by a young gendarme named Merda while signing an appeal to one of the sections of Paris to take up arms for him, though the wound was afterwards believed to have been inflicted by himself; and all the released deputies were again arrested. After a night of agony Robespierre was the next day taken before the tribunal, where his identity as an outlaw was proved, and without further trial he was executed with Couthon and Saint-Just and nineteen others of his adherents on the Place de la Révolution on the 10th Thermidor (28th July) 1794.

The character of Robespierre when looked upon simply in the light of his actions and his authenticated speeches, and apart from the innumerable legends which have grown up about it, is not a difficult one to understand. A well-educated and accomplished young lawyer, he might have acquired a good provincial practice and lived a happy provincial life had it not been for the Revolution. Like thousands of other young Frenchmen, he had read the works of Rousseau and taken them as gospel. Just at the very time in life when this illusion had not been destroyed by the realities of life, and without the experience which might have taught the futility of idle dreams and theories, he was elected to the states-general. At Paris he was not understood till he met with his audience of fellow-disciples of Rousseau at the Jacobin Club. His fanaticism won him supporters; his singularly sweet and sympathetic voice gained him hearers; and his upright life attracted the admiration of all. As matters approached nearer and nearer to the terrible crisis, he failed, except in the two instances of the question of war and of the king's trial, to show himself a statesman, for he had not the liberal views and practical instincts which made Mirabeau and Danton great men. His admission to the great committee gave him power, which he hoped to use for the establishment of his favourite theories, and for the same purpose he acquiesced in and even heightened the horrors of the Reign of Terror. It is here that the fatal mistake of allowing a theorist to have power appeared: Billaud-Varenne systematized the Terror because he believed it necessary for the safety of the country; Robespierre intensified it in order to carry out his own ideas and theories. Robespierre's private life was always respectable: he was always emphatically a gentleman and man of culture, and even a little bit of a dandy, scrupulously honest, truthful, and charitable. In his habits and manner of life he was simple and laborious; he was not a man gifted with flashes of genius, but one who had to think much before he could come to a decision, and he worked hard all his life.

The great authority for Robespierre's life is Ernest Hamel's elaborate *Vie de Robespierre*, 3 vols., Paris, 1865-67, in which every fact regarding him is carefully sifted; it is indeed an unqualified defence and eulogy throughout, but, without adopting his particular views, Hamel's biography is the only one of any value. Consult also for his early life M. Paris's *La Jeunesse de Robespierre* The *Mémoires de Robespierre* and the *Mémoires de Charlotte Robespierre* are both worthless forgeries. (H. M. S.)

ROBIN HOOD. The oldest mention of Robin Hood at present known occurs in the second edition—what is called the B text of *Piers the Plowman*, the date of which is about 1377. In passus v. of that poem the figure of Sloth is represented as saying:

"I can nouȝte perfitly my pater-noster, as the prest it syngeth:
But I can rymes of Robyn Hood and Randolf Erle of Chesterer."

He is next mentioned by Wyntown in his *Scottish Chronicle*, written about 1420:

"Lytel Jhon and Robyne Hude
Waythmen ware commendyd gude;
In Yngilwode and Barnysdale
Thai oysyd all this time [c. 1283] thare trawale";

next by Bower in his additions to Fordun's *Scotichronicon* about 1450:

"Hoc in tempore [1266] de exhereditatis et bannitis surrexit et caput erexit ille famosissimus sicarius Robertus Hode et Littill Johanne cum eorum complicibus, de quibus stolidum vulgus hianter in commœdiis et tragœdiis prurienter festum faciunt et super ceteras romancias, mimos, et bardanos cantitare delectantur."

Of his popularity in the latter half of the 15th and in the 16th centuries there are many signs. Just one passage must be quoted as of special importance because closely followed by Grafton, Stow, and Camden. It is from Mair's *Historia Majoris Britanniæ tam Angliæ quam Scotiæ*, which appeared in 1521.

"Circa hæc tempora [Ricardi Primi], ut auguror, Robertus Hudus Anglus et Parvus Joannes latrones famatissimi in nemoribus latuerunt, solum opulentorum virorum bona deripientes. Nullum nisi eos invadentem vel resistentem pro suarum rerum tuitione occiderunt. Centum sagittarios ad pugnam aptissimos Robertus latrociniis aluit, quos 400 viri fortissimi invadere non audebant. *Rebus hujus Roberti gestis tota Britannia in cantibus utitur.* Fœminam nullam opprimi permisit nec pauperum bona surripuit, verum eos ex abbatum bonis sublatis opipare pavit. Viri rapinam improbo, sed latronum omnium humanissimus et princeps erat."

In the Elizabethan era and afterwards mentions abound; see the works of Shakespeare, Ben Jonson, Drayton, Warner, Munday, Camden, Stow, Braithwaite, Fuller, &c.

Of the ballads themselves, *Robin Hood and the Monk* is possibly as old as the reign of Edward II.; *Robin Hood and the Potter* and *Robyn and Gandelyn* are certainly not later than the 15th century. Most important of all is *A Lytell Geste of Robyn Hode*, which perhaps was first printed about 1490, although the earliest extant complete copy belongs to about 1520. This is evidently founded on older ballads; we read in *The Seconde Fytte*, ll. 176 and 177:

"He wente hym forthe full mery syngynge,
As men have told in tale."

In fact it does for the Robin Hood cycle what a few years before Sir Thomas Malory had done for the Arthurian romances,—what in the 6th century B.C. Pisistratus is said to have done for the Homeric poems.

These are the facts about him and his balladry. Of conjectures there is no end. He has been represented as the last of the Saxons,—as a Saxon holding out against the Norman conquerors so late as the end of the 12th century (see Thierry's *Norman Conquest*, and compare *Ivanhoe*). Others maintain that he was a follower of Simon de Montfort. A third theory associates him with the earl of Lancaster of Edward II.'s time: Hunter believed that he could identify him with a certain Robin Hood mentioned in the Exchequer accounts of this reign.

For our part, we are not disinclined to believe that the Robin Hood story has some historical basis, however fanciful and romantic the superstructure. We parallel it with the Arthurian story, and hold that, just as there was probably a real Arthur, however different from the hero of the trouvères, so there was a real Hood, however now enlarged and disguised by the accretions of legend. That Charlemagne and Richard I. of England became the subjects of romances does not prevent our believing in their existence; nor need Hood's mythical life deprive him of his natural one. Sloth in Langland's poem couples him, as we have seen, with Randle, earl of Chester; and no one doubts this nobleman's existence because he had "rymes" made about him. We believe him to have been the third Randle (see Bishop Percy's Folio MS., ed. Hales and Furnivall, i. 260). And possibly enough Hood was contemporary with that earl, who "flourished" in the reigns of Richard I., John, and Henry III. Wyntown and Major, as we have seen, assign him to that period. It is impossible to believe with Hunter that he lived so late as Edward II.'s reign. This would leave no time for the growth of his myth; and his myth was, as is evident from what we have already said and quoted, full grown in the first half of the 14th century.

But, whether he lived or not, and whenever he lived, it is certain that many mythical elements are contained in his story. Both his name and his exploits remind us of the woodland spirit Robin Goodfellow and his merry pranks. He is fond of disguising himself, and devoted to fun and practical jokes. And the connexion of the May games with him points to a fusion with some older memory,—with some sun-god. In fact, the outlaw would seem to have become a centre around which gathered and settled older traditions of men and of spirits and of gods. Folklore that was rapidly perishing thus gave itself a new consistency and life. The name Robin (a French form from Rob, which is of course a short form for Robert) would serve both for "the shrewd and knavish sprite"—the German Knecht Ruprecht (see Grimm's *Teut. Myth.*, p. 504, trans. Stallybrass)—and for the bandit (see "Roberdes Knaues" in the Prologue of *Piers the Plowman*, l. 44 and the note in Warton's *Hist. of Eng. Poet.*, ii. 95, ed. 1840). The name Hood is still a common enough surname, of which the earlier shape is Odo (see "Houdart," &c., in Larchey's *Dict. des Noms*); notice too the name Hudson. But it also reminds one of the German familiar spirit Hudekin, or possibly of the German Witikind (see Wright's *Essays on the Middle Ages*, ii. 207). How certain it is that the Robin Hood story attracted to it and appropriated other elements is illustrated by its subsequent history,—its history after the 14th century. Thus later on we find it connected with the Morris dance; but the Morris dance was not known in England before the 16th century, or late in the 15th. And the form of the story was greatly modified in the beginning of the 17th century to suit the ideas of the age. It was then that a peer was imported into it, and the yeoman of the older version was metamorphosed into the earl of Huntingdon, for whom in the following century Stukeley discovered a satisfactory pedigree! At last, with the change of times, the myth ceased growing. Its rise and development and decay deserve a more thorough study than they have yet received.

What perhaps is its greatest interest as we first see it is its expression of the popular mind about the close of the Middle Ages. Robin Hood is at that time the people's ideal as Arthur is that of the upper classes. He is the ideal yeoman as Arthur is the ideal knight. He readjusts the distribution of property: he robs the rich and endows the poor. He is an earnest worshipper of the Virgin, but a bold and vigorous hater of monks and abbots. He is the great sportsman, the incomparable archer, the lover of the greenwood and of a free life, brave, adventurous, jocular, open-handed, a protector of women. Observe his instructions to Little John:—

"Loke ye do no housbonde harme
  That tylleth with his plough.
No more ye shall no good yeman
  That walketh by grene wode shawe,
Ne no knyght ne no squyer
  That wolde be a good felawe.
These bysshoppes and thyse archebysshoppes
  Ye shall them bete and bynde;
The hye sheryfe of Notynghame
  Hym holde in your mynde."

And we are told

"Robin loved our dere lady
  For doute of dedely synne;
Wolde he never do company harme
  That ony woman was ynne."

See also Drayton's *Polyolbion*, Song xxvi. The story is localized in Barnsdale and Sherwood, *i.e.*, between Doncaster and Nottingham.

The best collections of the Robin Hood poems are those of Ritson (8vo, 1795) and Gutch (2d ed., 1847), and of Professor Child in the 5th volume of his invaluable *English and Scotch Ballads*. The versions in the Percy Folio MS. are unhappily mutilated; but they should be consulted, for they are all more or less unique, and that on "Robin Hoode his death" is of singular interest. The literary and artistic value of the Robin Hood ballads cannot be pronounced considerable; their value is great, but it is in other respects. There is, however, real vigour and force in this fragment on the hero's death. The earliest "Garland" was printed in 1670. (J. W. H.)

ROBIN REDBREAST. See REDBREAST.

ROBINS, BENJAMIN (1707-1751), an English natural philosopher, was born at Bath in 1707. His parents were Quakers in poor circumstances, and gave him very little education. Aided solely by his own talent for exact science, he made considerable progress, and attracted so much notice that he was introduced to Pemberton, who befriended and encouraged him. For a time he maintained himself by teaching mathematics, but soon devoted himself to more congenial work. In particular he carried out an extensive series of experiments in gunnery, the results of which were afterwards embodied in his famous treatise on *New Principles in Gunnery* (8vo, London, 1742). In this treatise is described the ballistic pendulum, an instrument which has become classical in the history of dynamics, and which bears the name of its inventor. Robins also made a number of very important experiments on the resistance of the air to the motion of projectiles, and on the force of gunpowder, with computation of the velocities thereby communicated to military projectiles. He compared the results of his theory with experimental determinations of the ranges of mortars and cannon, and gave practical maxims for the management of artillery. He also made observations on the flight of rockets and wrote on the advantages of rifled barrels. So great was his fame as a scientific artillerist that Euler translated his work on gunnery into German and added to it a critical commentary of his own. Of less interest nowadays are Robins's more purely mathematical writings, such as his *Discourse concerning the Nature and Certainty of Sir Isaac Newton's Methods of Fluxions and of Prime and Ultimate Ratios* (8vo, London, 1735), "A Demonstration of the Eleventh Proposition of Sir Isaac Newton's Treatise of Quadratures" (*Phil. Trans.*, 1727), and similar works. Besides his scientific labours Robins took an active part in politics. He wrote pamphlets in support of the opposition to Sir Robert Walpole, and was secretary of a committee appointed by the House of Commons to inquire into the conduct of that minister. He also wrote a preface to the *Report on the Proceedings of the Board of General Officers on their Examination into the Conduct of Lieutenant-General Sir John Cope*, in which he gave an apology for the affair at Prestonpans. In 1750 he was appointed engineer-general to the East India Company, and went out to superintend the reconstruction of their forts. The climate, however, disagreed with him, and he died on 29th July 1751. His works were published in two volumes 8vo in 1761.

ROBINSON, EDWARD (1794-1863), author of the *Biblical Researches*, a son of the Rev. William Robinson, of Puritan ancestry, was born at Southington, Connecticut, United States, on 10th April 1794 He was educated at Hamilton College, New York, where he graduated in 1816. He served as a tutor at the college during 1817-18, and then engaged in private study of the Greek classics until 1821, when he went to Andover, Massachusetts, in order to publish an edition of the *Iliad*. There he became a pupil of Moses Stuart, the enthusiastic professor of Biblical studies in the theological seminary, and was made instructor of Hebrew there in 1823. In 1826 he resigned his position at Andover and went to Europe, where he studied Hebrew under Gesenius at Halle, and also history at Berlin under Neander, remaining in Europe until 1830. In 1828 he married Therese Albertine Luise von Jakob, daughter of an eminent professor of philosophy at Halle. This highly cultured lady was already well known as an authoress under the pseudonym of "Talvj." She became of great assistance to her husband in his learned pursuits. In 1830 he was again called to Andover as professor extraordinary of Biblical literature, and entered with enthusiasm upon the work of instruction and the publication of scholarly works upon the Bible. In 1831 he founded the *Biblical Repository*, a theological review which introduced a new era in theological periodicals in America, and which subsequently passed over into the *Bibliotheca Sacra*. In the same year he received the degree of D.D. from Dartmouth College. In 1832 he published a revised edition of Taylor's translation of Calmet's *Dictionary of the Bible*, and in the ensuing year a popular *Dictionary of the Bible* and a translation of Buttmann's *Greek Grammar* (3d ed., 1851). Such severe literary work deprived him of his health and he was compelled to resign his professorship. He now devoted himself entirely to literary pursuits for some years. In 1834 he published a revised edition of Newcome's *Greek Harmony of the Gospels*. In 1836 he issued a translation of Gesenius's *Hebrew Lexicon* and in the same year a *Greek and English Lexicon of the New Testament*. These lexicons have been the companions of Biblical students until the present time, having passed through a series of revisions. The *Hebrew Lexicon* reached a fifth edition in 1854, the *Greek Lexicon* a second edition in 1847. They are both now (1885) passing through another revision by his pupils. In 1837 Robinson was called to the professorship of Biblical literature in the Union Theological Seminary, New York, in which position he remained until his death, giving it the reputation of his scholarship and the benefits of his great experience in Biblical study and practical skill in instruction. In his letter of acceptance he gave an outline of the field of Biblical study which showed his mastery of the subject and his forecast of its future in America. He accepted this position with the understanding that he should receive leave of absence for some years in order to explore the lands of the Bible. He spent a considerable portion of the year 1838 in these explorations and became the pioneer and father of modern Biblical geography. He published his *Biblical Researches* in 1841 in three volumes, simultaneously in Berlin and Boston. His services were recognized by a gold medal from the Royal Geographical Society of London in 1842, the degree of D.D. from the university of Halle in 1842, and the degree of LL.D. from Yale College in 1844. In 1852 he made a second visit to Palestine and published its results in the supplemental volume to the second edition of his *Biblical Researches* in 1856. The third edition of the whole work appeared in 1867 in three volumes. Robinson regarded these researches as preliminary to a systematic work on the geography of the Bible; but he was spared only to complete a mere fragment, which was published posthumously under the title of *Physical Geography of the Holy Land* in 1865. In 1845 Robinson also issued a *Greek Harmony of the Gospels* and in 1846 an *English Harmony*, both of which have passed through many editions and have remained the standard text-books in America until the present day. The *Greek Harmony* has renewed its life in a revised edition by Professor Riddle in 1885. Besides these more important works he published from time to time a vast number of articles in periodicals, and in 1859 a *Memoir of the Rev. William Robinson*, his father. Robinson was an ordained minister of the Presbyterian Church, but his voice was seldom heard in the pulpit or in ecclesiastical bodies. In his declining years he was afflicted with an incurable disease of the eyes and other maladies. He died in New York City on 27th January 1863.

Robinson's work in Biblical geography was both fundamental and monumental. Dean Stanley once said, "Dr Robinson was the first man who saw Palestine with his eyes open to what he ought to see"; and Ritter recognizes the "union of the acutest observation of topographical and local conditions with much preparatory study." He was gifted with great practical sense and unusual accuracy of observation; but he was extreme in his criticism of the local legends of the Holy Land, and not sufficiently skilled in historic criticism. Although great progress has been made in Biblical geography in the last quarter of this century, yet the work of Robinson is still classical.

See *The Life, Writings, and Character of Edward Robinson*, by Henry B. Smith and Boswell D. Hitchcock (New York, 1863), and *Services in Adam Chapel at the Dedication of the New Buildings of Union Theological Seminary* (New York, 1885).

ROBINSON, John (1575-1625), one of the founders of Independency in England (see vol. xii. p 725), was born most probably near Scrooby in Nottinghamshire in 1575. He was entered of Corpus Christi College, Cambridge, in 1592, and graduated in ordinary course, becoming a fellow in 1599. Having taken orders he officiated for some time in the neighbourhood of Norwich, but his Puritan leanings soon caused his suspension by the bishop. After having ministered for some time to a congregation of sympathizers in Norwich he resigned his fellowship in 1604, and, proceeding to Gainsborough in Lincolnshire, he there joined a company who had bound themselves by covenant before God "to walk in all His ways made known or to be made known unto them, according to their best endeavours, whatever it should cost them." In 1606 he became minister at Scrooby, but the increasing hostility of the authorities towards nonconformity soon forced him and his people to think of flight, and, not without difficulty, they succeeded in making their escape in detachments to Holland. Robinson settled in Amsterdam in 1608, but in the following year removed to Leyden, and ministered there to members of his former congregation. In 1620 a considerable minority of these sailed for England in the "Speedwell," and ultimately crossed the Atlantic in the "Mayflower"; it was Robinson's intention to follow as soon as practicable along with the rest of his flock, but he died before the plan could be carried out, on 1st March 1625.

Besides preaching to his congregation, and, during his later years, corresponding with those of his people who had settled in New England, Robinson devoted himself to theological study, and became a member of the university of Leyden. Amongst his other publications may be mentioned *Justification of Separation from the Church* (1610), *Apologia Brownistarum* (1619), *A Defence of the Doctrine propounded by the Synod of Dort* (1624), and a volume of *Essays, or Observations Divine and Moral*, printed in 1628. His *Works*, with a memoir by R. Ashton, were reprinted in 3 vols. in 1851.

ROBINSON, John Thomas Romney (1792-1882), the inventor of the cup-anemometer, was born in Dublin on 23d April 1792. He studied at Trinity College and obtained a fellowship in 1814; for some years he was deputy professor of natural philosophy, until he relinquished his fellowship in 1821 on obtaining the college living of Enniskillen. In 1823 he was appointed astronomer of the Armagh observatory (see Observatory), with which he (from 1824) combined the living of Carrickmacross, but he always resided at the observatory, engaged in researches connected with astronomy and physics, until his death on 28th February 1882.

Robinson wrote a number of papers in scientific journals and transactions, and the Armagh catalogue of stars (*Places of 5345 Stars observed from 1828 to 1854 at the Armagh Observatory*, Dublin, 1859), but he is best known as the inventor of the cup-anemometer for registering the velocity of the wind. This instrument (which he erected at the Armagh observatory in 1846 and which has since come into general use) consists of four light arms forming a horizontal cross, carrying four hemispherical cups and turning freely about a vertical axis. By an endless screw attached to the axis a system of wheelwork is set going, and the velocity of the wind is indicated by one or more dials, or it may be registered continuously by a pencil drawn by clockwork along a dial or drum turned by the anemometer, or (as in the modification now generally used) by a metallic screw of only one thread, which leaves a tracing on a sheet of metallic paper folded round a drum revolving by clockwork. It has been found by elaborate experiments by Dr Robinson (*Trans. R. Irish Academy*, vol. xxii.; *Phil. Trans.*, 1878 and 1880) and others that the centre of each cup moves with a velocity very nearly equal to one-third of that of the wind.

ROB ROY (*c.* 1660-1734), the popular designation of a famous Highland outlaw whose prowess is the theme of one of Sir Walter Scott's novels, was by descent a Macgregor, being the younger son of Donald Macgregor of Glengyle, who had attained the rank of lieutenant-colonel in the army of James II., by his wife, a daughter of William Campbell of Glenfalloch. He received the name Roy from the red hair which clustered in thick curls over his brow, and latterly adopted Campbell as his surname on account of the Acts proscribing the name of his clan. Though in stature not much above the middle height, he was so muscular and thickly set that few were his equals in feats of strength, while the unusual length of his arms gave him an extraordinary advantage in the use of the sword. His eyes were remarkably keen and piercing, and his whole expression indicated a mental prowess forming an appropriate complement to his powerful physical frame. He inherited a small property on the Braes of Balquhidder, and at first devoted himself to the rearing of cattle. Having formed a band of armed clansmen, he obtained, after the accession of William III., a commission from James II. to levy war on all who refused to acknowledge him as king, and in the autumn of 1691 made a descent on Stirlingshire to carry off the cattle of Lord Livingstone, when, being opposed by the villagers of Kippen, he also seized the cattle from all the byres of the village. Shortly afterwards he married Mary, daughter of Macgregor of Comar. On the death of Gregor Macgregor, the chief of the clan, in 1693 he managed, though not the nearest heir, to get himself acknowledged chief, obtaining control of the lands stretching from the Braes of Balquhidder to the shores of Loch Lomond, and situated between the possessions of Argyll and those of Montrose. To assist in carrying on his trade as cattle-dealer he borrowed money from the duke of Montrose, and, being on account of losses unable to repay it, he was in 1712 evicted from his property and declared an outlaw. Taking refuge in the more inaccessible Highlands, Rob Roy from this time forward supported himself chiefly by depredations committed in the most daring manner on the duke and his tenants, all attempts to capture him being unsuccessful. During the rebellion of 1715, though nominally siding with the Pretender, he did not take an active part in the battle of Sheriffmuir except in plundering the dead on both sides. He was included in the Act of Attainder; but, having for some time enjoyed the friendship of the duke of Arygll, he obtained, on making his submission at Inveraray, a promise of protection. He now established his residence at Craigroyston near Loch Lomond, whence for some time he levied black mail as formerly upon Montrose, escaping by his wonderful address and activity every effort of the English garrison stationed at Inversnaid to bring him to justice. In his later years he was, through the mediation of Argyll, reconciled to Montrose. According to a notice in the *Caledonian Mercury* he died at Balquhidder on 28th December 1734. He was buried in Balquhidder churchyard.

K. Macleay, *Historical Memoirs of Rob Roy* (1818; new ed. 1881); Sir Walter Scott, *Highland Clans*; A. H. Miller, *Story of Rob Roy* (1883).

ROBUSTI, Jacopo (1518-1594), commonly called Il Tintoretto or Tintoret, one of the greatest painters of the Venetian or of any school, was born in Venice in 1518, though most accounts say in 1512. His father, Battista Robusti, was a dyer, or "tintore"; hence the son got the nickname of "Tintoretto," little dyer, or dyer's boy. In childhood Jacopo, a born painter, began daubing on the dyer's walls; his father, noticing his bent, took him round, still in boyhood, to the studio of Titian, to see how far he could be trained as an artist. We may suppose this to have been towards 1533, when Titian was already fifty-six years of age. Ridolfi is our authority for saying that Tintoret had only been ten days in the studio when Titian sent him home once and for all. The reason, according to the same writer, is that the great master observed some very spirited drawings, which he learned to be the production of Tintoret; and it is inferred that he became at once jealous of so promising a scholar. This, however, is mere conjecture; and perhaps it may be fairer to suppose that the drawings exhibited so much independence of manner that Titian judged that young Robusti, although he might become a painter, would never be properly a pupil. From this time forward the two always remained upon distant terms,—Robusti being indeed a professed and ardent admirer of Titian, but never a friend, and Titian and his adherents turning the cold shoulder to Robusti. Active disparagement also was not wanting, but it passed disdainfully unnoticed by Tintoret. The latter sought for no further teaching, but studied on his own account with laborious zeal; he lived poorly, collecting casts, bas-reliefs, &c., and practising by their aid. His noble conception of art and his high personal ambition were evidenced in the inscription which he placed over his studio,—"Il disegno di Michelangelo ed il colorito di Tiziano" (Michelangelo's design and Titian's colour). He studied more especially from models of Buonarroti's Dawn, Noon, Twilight, and Night, and became expert in modelling in wax and clay,—a method (practised likewise by Titian) which afterwards stood him in good stead in working out the arrangement of his pictures. The models were sometimes taken from dead subjects dissected or studied in anatomy schools; some were draped, others nude, and Robusti was wont to suspend them in a wooden or cardboard box, with an aperture for a candle. Now and afterwards he very frequently worked by night as well as by day. The young painter Schiavone, four years Robusti's junior, was much in his company. Tintoret helped Schiavone gratis in wall-paintings; and in many subsequent instances he worked also for nothing, and thus succeeded in obtaining commissions. The two earliest mural paintings of Robusti—done, like others, for next to no pay—are said to have been Belshazzar's Feast and a Cavalry Fight, both long since perished. Such, indeed, may be said to have been the fate of all his frescos, early or later. The first work of his which attracted some considerable notice was a portrait-group of himself and his brother—the latter playing a guitar—with a nocturnal effect; this also is lost. It was followed by some historical subject, which Titian was candid enough to praise. One of Tintoret's early pictures still extant is in the church of the Carmine in Venice, the Presentation of Jesus in the Temple; also in S. Benedetto are the Annunciation and Christ with the Woman of Samaria. For the Scuola della Trinità (the scuole or schools of Venice were more in the nature of hospitals or charitable foundations than of educational institutions) he painted four subjects from Genesis. Two of these, now in the Venetian Academy, are Adam and Eve and the Death of Abel, both noble works of high mastery, which leave us in no doubt that Robusti was by this time a consummate painter,—one of the few who have attained to the highest eminence by dire study of their own, unseconded by any training from some senior proficient.

Towards 1546 Robusti painted for the church of S. Maria dell' Orto three of his leading works—the Worship of the Golden Calf, the Presentation of the Virgin in the Temple, and the Last Judgment—now shamefully repainted; and he settled down in a house hard by the church. It is a Gothic edifice, looking over the lagoon of Murano to the Alps, built in the Fondamenta de' Mori, still standing, but let out cheap to artisans. In 1548 he was commissioned for four pictures in the Scuola di S. Marco—the Finding of the Body of St Mark in Alexandria (now in the church of the Angeli, Murano), the Saint's Body brought to Venice, a Votary of the Saint delivered by invoking him from an Unclean Spirit (these two are in the library of the royal palace, Venice), and the highly and justly celebrated Miracle of the Slave. This last, which forms at present one of the chief glories of the Venetian Academy, represents the legend of a Christian slave or captive who was to be tortured as a punishment for some acts of devotion to the evangelist, but was saved by the miraculous intervention of the latter, who shattered the bone-breaking and blinding implements which were about to be applied. These four works were greeted with signal and general applause, including that of Titian's intimate, the too potent Pietro Aretino, with whom Tintoret, one of the few men who scorned to curry favour with him, was mostly in disrepute. It is said, however, that Tintoret at one time painted a ceiling in Pietro's house; at another time, being invited to do his portrait, he attended, and at once proceeded to take his sitter's measure with a pistol (or else a stiletto), as a significant hint that he was not exactly the man to be trifled with. The painter having now executed the four works in the Scuola di S. Marco, his straits and obscure endurances were over. He married Faustina de' Vescovi, daughter of a Venetian nobleman. She appears to have been a careful housewife, and one who both would and could have her way with her not too tractable husband. Faustina bore him several children, probably two sons and five daughters.

The next conspicuous event in the professional life of Tintoret is his enormous labour and profuse self-development on the walls and ceilings of the Scuola di S. Rocco, a building which may now almost be regarded as a shrine reared by Robusti to his own genius. The building had been begun in 1525 by the Lombardi, and was very deficient in light, so as to be particularly ill-suited for any great scheme of pictorial adornment. The painting of its interior was commenced in 1560. In that year five principal painters, including Tintoret and Paul Veronese, were invited to send in trial-designs for the centre-piece in the smaller hall, named Sala dell' Albergo, the subject being S. Rocco received into Heaven. Tintoret produced not a sketch but a picture, and got it inserted into its oval. The competitors remonstrated, not unnaturally; but the artist, who knew how to play his own game, made a free gift of the picture to the saint, and, as a bye-law of the foundation prohibited the rejection of any gift, it was retained *in situ*,—Tintoret furnishing gratis the other decorations of the same ceiling. In 1565 he resumed work at the scuola, painting the magnificent Crucifixion, for which a sum of 250 ducats was paid. In 1576 he presented gratis another centre-piece,—that for the ceiling of the great hall, representing the Plague of Serpents; and in the following year he completed this ceiling with pictures of the Paschal Feast and Moses striking the Rock,—accepting whatever pittance the confraternity chose to pay. Robusti next launched out into the painting of the entire scuola and of the adjacent church of S. Rocco. He offered in November 1577 to execute the works at the rate of 100 ducats per annum, three pictures being due in each year. This proposal was accepted and was punctually fulfilled, the painter's death alone preventing the execution of some of the ceiling-subjects. The whole sum paid for the scuola throughout was 2447 ducats. Disregarding some minor performances, the scuola and church contain fifty-two memorable paintings, which may be described as vast suggestive sketches, with the mastery, but not the deliberate precision, of finished pictures, and adapted for being looked at in a dusky half-light. Adam and Eve, the Visitation, the Adoration of the Magi, the Massacre of the Innocents, the Agony in the Garden, Christ before Pilate, Christ carrying His Cross, and (this alone having been marred by restoration) the Assumption of the Virgin are leading examples in the scuola; in the church, Christ curing the Paralytic.

It was probably in 1560, the same year when he began working in the Scuola di S. Rocco, that Tintoret commenced also his numerous paintings in the ducal palace; he then executed there a portrait of the doge, Girolamo Priuli. Other works which were destroyed in the great fire of 1577 succeeded,—the Excommunication of Frederick Barbarossa by Pope Alexander III. and the Victory of Lepanto. After the fire Tintoret started afresh, Paul Veronese being his colleague, their works have for the most part been disastrously and disgracefully retouched of late years, and some of the finest monuments of pictorial power ever produced are thus degraded to comparative unimportance. In the Sala dello Scrutinio Robusti painted the Capture of Zara from the Hungarians in 1346 amid a hurricane of missiles; in the hall of the senate, Venice, Queen of the Sea; in the hall of the college, the Espousal of St Catherine to Jesus; in the Sala dell' Anticollegio, four extraordinary masterpieces—Bacchus, with Ariadne crowned by Venus, the Three Graces and Mercury, Minerva discarding Mars, and the Forge of Vulcan—which were painted for fifty ducats each, besides materials, towards 1578; in the Antichiesetta, St George and St Nicholas, with St Margaret (the female figure is sometimes termed the princess whom St George rescued from the dragon), and St Jerome and St Andrew; in the hall of the great council, nine large compositions, chiefly battle-pieces. We here reach the crowning production of Robusti's life, the last picture of any considerable importance which he executed, the vast Paradise, in size 74 feet by 30, reputed to be the largest painting ever done upon canvas. It is a work so stupendous in scale, so colossal in the sweep of its power, so reckless of ordinary standards of conception or method, so pure an inspiration of a soul burning with passionate visual imagining, and a hand magical to work in shape and colour, that it has defied the connoisseurship of three centuries, and has generally (though not with its first Venetian contemporaries) passed for an eccentric failure; while to a few eyes (including those of the present writer) it seems to be so transcendent a monument of human faculty applied to the art pictorial as not to be viewed without awe nor thought of without amazement. While the commission for this huge work was yet pending and unassigned Robusti was wont to tell the senators that he had prayed to God that he might be commissioned for it, so that paradise itself might perchance be his recompense after death. Upon eventually receiving the commission in 1588 he set up his canvas in the Scuola della Misericordia and worked indefatigably at the task, making many alterations and doing various heads and costumes direct from nature. When the picture had been brought well forward he took it to its proper place and there finished it, assisted by his son Domenico for details of drapery, &c. All Venice applauded the superb achievement, which has in more recent times suffered from neglect, but fortunately hardly at all from restoration. Robusti was asked to name his own price, but this he left to the authorities. They tendered a handsome amount; Robusti is said to have abated something from it, which is even a more curious instance of ungreediness for pelf than earlier cases which we have cited where he worked for nothing at all.

After the completion of the Paradise Robusti rested for a while, and he never undertook any other work of importance, though there is no reason to suppose that his energies were exhausted, had his days been a little prolonged. He was seized with an attack in the stomach, complicated with fever, which prevented him from sleeping and almost from eating for a fortnight, and on 31st May 1594 he died. A contemporary record states his age to have been seventy-five years and fifteen days. If this is accurate, 16th May 1519 must have been the day of his birth; but we prefer the authority of the register of deaths in S. Marciliano, which states that Tintoret died of fever, aged seventy-five years, eight months, and fifteen days,—thus bringing us to 16th September 1518 as the true date of his birth. He was buried in the church of S. Maria dell' Orto by the side of his favourite daughter Marietta, who had died in 1590, aged thirty; there is a well-known tradition that as she lay dead the heart-stricken father painted her portrait. Marietta had herself been a portrait-painter of considerable skill, as well as a musician, vocal and instrumental; but few of her works are now traceable. It is said that up to the age of fifteen she used to accompany and assist her father at his work, dressed as a boy; eventually she married a jeweller, Mario Augusta. In 1866 the grave of the Vescovi and Robusti was opened, and the remains of nine members of the joint families were found in it; a different locality, the chapel on the right of the choir, was then assigned to the grave. Tintoret painted his own portrait at least twice, one of the heads being in the Uffizi Gallery of Florence and the other, done when his age was advanced, in the Louvre. It is a very serious face, somewhat blunt and rugged, but yet refined without the varnish of elegance—concentrated and resolute, its native ardours of frankness and energy welded down into lifelong laboriousness, with a pent look as of smouldering fire. The eyes are large, dark, and round; the grizzled hair close and compact. The face has been held to bear some resemblance to that of Michelangelo, but this does not go very far. Robusti appears also as one of the figures in the two vast pictures by Paul Veronese,—the Marriage in Cana and the Feast in the House of Levi.

Audacious and intrepid, though not constantly correct, as a draughtsman, majestically great as a colourist, prodigious as an executant, Tintoret was as absolute a type of the born painter as the history of art registers or enables us to conceive. Whatever he did was imaginative—sometimes beautiful and suave (and he was eminently capable of painting a lovely female countenance or an heroic man), often imposing and romantic, fully as often turbulent and reckless, sometimes trivial, never unpainter-like or prosaic. When he chose—which was not always—he painted his entire personages characteristically; but, like the other highest masters of Venice, he conceded and attended little to the expression of his faces as evincing incidental emotion. In several of his works—as especially the great Crucifixion in S. Rocco—there is powerful central thought, as well as inventive detail; but his imagination is always concrete: it is essentially that of a painter to whom the means of art—the form, colour, chiaroscuro, manipulation, scale, distribution—are the typical and necessitated realities. What he imagines is always a visual integer, a picture—never a treatise, however thoughtfully planned or ingeniously detailed. Something that one could see—that is his ideal, not something that one could narrate, still less that one could deduce and demonstrate. In his treatment of action or gesture the most constant peculiarity is the sway and swerve of his figures: they bend like saplings or rock like forest-boughs in a gale; stiffness or immobility was entirely foreign to his style, which has therefore little of the monumental or severe character. Perhaps he felt that there was no other way for combining "the colour of Titian with the design of Michelangelo." The knitted strength and the transcendent fervour of energy of the supreme Florentine might to some extent be emulated; but, if they were to be united with the glowing fusion of hue of the supreme Venetian, this could only be attained by a process of relaxing the excessive tension and modifying muscular into elastic force. In this respect he was a decided innovator; but he had many imitators, comparatively feeble, if we except Paul Veronese.

Tintoret scarcely ever travelled out of Venice. He loved all the arts, played in youth the lute and various instruments, some of them of his own invention, and designed theatrical costumes and properties, was versed in mechanics and mechanical devices, and was a very agreeable companion. For the sake of his work he lived in a most retired fashion, and even when not painting was wont to remain in his working room surrounded by casts. Here he hardly admitted any, even intimate friends, and he kept his modes of work secret, save as regards his assistants. He abounded in pleasant witty sayings whether to great personages or to others, but no smile hovered on his lips. Out of doors his wife made him wear the robe of a Venetian citizen; if it rained she tried to indue him with an outer garment, but this he resisted. She would also when he left the house wrap up money for him in a handkerchief, and on his return expected an account of it; Tintoret's accustomed reply was that he had spent it in alms to the poor or to prisoners. In 1574 he obtained the reversion of the first vacant broker's patent in a fondaco, with power to bequeath it,—an advantage granted from time to time to pre-eminent painters. For his phenomenal energy in painting he was termed "Il Furioso." An agreement is extant showing that he undertook to finish in two months two historical pictures each containing twenty figures, seven being portraits. The number of his portraits is enormous; their merit is unequal, but the really fine ones cannot be surpassed. Sebastian del Piombo remarked that Robusti could paint in two days as much as himself in two years; Annibale Caracci that Tintoret was in many pictures equal to Titian, in others inferior to Tintoret. This was the general opinion of the Venetians, who said that he had three pencils—one of gold, the second of silver, and the third of iron. The only pictures (if we except his own portrait) on which he inscribed his name are the Miracle of Cana in the church of the Salute (painted originally for the brotherhood of the Crociferi), the Miracle of the Slave, and the Crucifixion in the Scuola di S. Rocco; the last was engraved in 1589 by Agostino Caracci. Generally he painted at once on to the canvas without any preliminary. Some of his dicta on art have been recorded as follows by Ridolfi:—"the art of painting remains increasingly difficult"; "painters in youth should adhere to the best masters, these being Michelangelo and Titian, and should be strict in representing the natural forms"; "the first glance at a picture is the crucial one"; "black and white, as developing form, are the best of colours"; "drawing is the foundation of a painter's work, but drawing from life in the nude should only be essayed by well-practised men, as the real is often wanting in beauty."

Of pupils Robusti had very few; his two sons and Martin de Vos of Antwerp were among them. Domenico Robusti (1562-1637), whom we have already had occasion to mention, frequently assisted his father in the groundwork of great pictures. He himself painted a multitude of works, many of them on a very large scale; they would at best be mediocre, and, coming from the son of Tintoret, are exasperating; still, he must be regarded as a considerable sort of pictorial practitioner in his way.

We conclude by naming a few of the more striking of Tintoret's very numerous works not already specified in the course of the article. In Venice—(S. Giorgio Maggiore), a series of his later works, the Gathering of the Manna, Last Supper, Descent from the Cross, Resurrection, Martyrdom of St Stephen, Coronation of the Virgin, Martyrdom of St Damian; (S. Francesco della Vigna) the Entombment; (the Frari) the Massacre of the Innocents; (S. Cassiano) a Crucifixion, the figures seen from behind along the hill slope; (St Mark's) a mosaic of the Baptism of Christ,—the oil-painting of this composition is in Verona. In Milan (the Brera), St Helena and other saints. In Florence (Pitti Gallery), Venus, Vulcan, and Cupid. In Cologne (Wallraff-Richarts Museum), Ovid and Corinna. In Augsburg (the town-hall), some historical pictures, which biographers and tourists alike have unaccountably neglected,—one of the siege of a fortified town is astonishingly fine. In England—(Hampton Court), Esther and Ahasuerus, and the Nine Muses; (the National Gallery) Christ washing Peter's Feet, a grand piece of colour and execution, not greatly interesting in other respects, also a spirited smallish work, St George and the Dragon.

The writer who has done by far the most to establish the fame of Tintoret at the height which it ought to occupy is Professor Ruskin in his *Stones of Venice* and other books; the depth and scope of the master's power had never before been adequately brought out, although his extraordinarily and somewhat arbitrarily used executive gift was acknowledged. Ridolfi (*Meraviglie dell' Arte*) gives interesting personal details; the article by Dr Janitschek in *Kunst und Künstler* (1876) is a solid account. For an English reader the most handy narrative is that of Mr W. R. Osler (*Tintoretto*, 1879), in the series entitled "The Great Artists." Here the biographical facts are clearly presented; the æsthetic criticism is enthusiastic but not perspicuous. (W. M. R.)

ROC, or more correctly RUKH, a fabulous bird of enormous size which carries off elephants to feed its young. The legend of the roc, familiar to every one from the *Arabian Nights*, was widely spread in the East; and in later times the home of the monster was sought in the direction of Madagascar, whence gigantic fronds of the *Raphia* palm very like a quill in form appear to have been brought under the name of roc's feathers (see Yule's *Marco Polo*, bk. iii. ch. 33, and *Academy*, 1884, No. 620). Such a feather was brought to the Great Khan, and we read also of a gigantic stump of a roc's quill being brought to Spain by a merchant from the China seas (Abu Ḥámid of Spain, in Damírí, *s.v.*). The roc is hardly different from the Arabian *'anká*, already mentioned under PHŒNIX; it is also identified with the Persian *símurgh*, the bird which figures in Firdausi's epic as the foster-father of the hero Zal, father of Rustam. When we go farther back into Persian antiquity we find an immortal bird, *amru*, or (in the *Minôi-khirudh*) *sînamrú*, which shakes the ripe fruit from the mythical tree that bears the seed of all useful things. Sínamrú and símurgh seem to be the same word. In Indian legend the *garuḍa* on which Vishnu rides is the king of birds (Benfey, *Pantschatantra*, ii. 98). In the Pahlavi translation of the Indian story as represented by the Syrian *Kalílag and Damnag* (ed. Bickell, 1876), the símurgh takes the place of the garuḍa, while Ibn al-Moḳaffa' (*Calila et Dimna*, ed. De Sacy, p. 126) speaks instead of the 'anḳa. The later Syriac, curiously enough, has *behmoth*,—apparently the behemoth of Job transformed into a bird.

For a collection of legends about the roc, see Lane's *Arabian Nights*, chap. xx. notes 22, 62, and Yule, *ut supra*. Also see Bochart, *Hieroz.*, bk. vi. ch. xiv.; Damírí, i. 414, ii. 177 *sq.*; Kazwíní, i. 419 *sq.*; Ibn Baṭúṭa, iv. 305 *sq.*; Spiegel, *Eran. Alterthumsk.*, ii. 118.

ROCH, ST (Lat. *Rochus*; Ital. *Rocco*; Span. *Roque*; Fr. *Roch* or *Roque*), according to the *Roman Breviary*, was a native of Montpellier, France. The name of his father was John and that of his mother Franca or Libera. He was born with the mark of a red cross upon his person, and this was at once interpreted as signifying his future eminence. In his twelfth year he began to manifest strict asceticism and great devoutness, and on the death of his parents in his twentieth year he gave all his substance to the poor and joined the Franciscan Tertiaries. Coming to Italy during an epidemic of plague, he was very diligent in tending the sick in the public hospitals at Aquapendente, Cesena, and Rome, and effected many miraculous cures by prayer and simple contact. After similar ministries at Piacenza he himself fell ill, and would have perished as he passed through the forest had not the dog of a certain nobleman daily supplied him with bread. On his return to Montpellier he was arrested as a spy and thrown into prison, where he died, having previously obtained from God this favour, that all plague-stricken persons invoking him should be healed. The date of his death was 16th August 1327, in the thirty-second year of his age. During the sittings of the council of Constance in 1414, when the city was visited with the plague, the efficacy of St Roch's intercession was "most manifestly" experienced. His remains were removed in 1385 to Venice, where they now lie. He is commemorated, chiefly in Italy and France, as the patron of the sick, and especially of the plague-stricken.

ROCHDALE, a municipal and parliamentary borough of south-east Lancashire, is situated on the river Roch and on the Lancashire and Yorkshire railway, 11 miles north-north-east of Manchester and 12 east of Bolton. By means of the Rochdale Canal, extending from the duke of Bridgewater's canal, Manchester, to the Calder and Hebble navigation at Sowerby Bridge, it has water communication with the most important towns in the north of England. Within recent years the town has largely increased. Though inhabited chiefly by the working classes, the streets generally are spacious and regular. The sanitary arrangements are very satisfactory, the main drainage having been executed on a very large scale. The gasworks and waterworks are in the hands of the corporation, which also erected public baths in 1868. There is a public cemetery belonging to the corporation, and also a public park 12 acres in extent. The parish church of St Chad, occupying the high grounds overlooking the town, is built on the site of a church which was erected in the 12th century. The town-hall is a very extensive and elaborate structure in the Decorated Gothic style, and had originally a tower surmounted by a gilded spire 140 feet in height, which was destroyed by fire in 1883. The building, completed in 1871 at a cost of £150,000, includes a large hall for public meetings and various municipal rooms. For the free public library, with about 40,000 volumes, a new building was opened in 1884. Of the educational charities the principal are the Archbishop Parker free grammar-school, founded in 1565, and the free English school. Among the other public institutions are the infirmary (lately much enlarged), the literary and scientific society, and the art society. The staple manufactures are those of woollens and cottons. There are, besides, foundries, iron-works, and machine-factories. Coal and stone are obtained extensively in the neighbourhood of the town. Rochdale was the birthplace of the co-operative movement. The town was first incorporated in 1856 and divided into three wards, but when the area of the municipal borough was extended and made coextensive with the parliamentary borough it was divided into ten wards, governed by a mayor, ten aldermen, and thirty councilmen. Rochdale has returned one member to the House of Commons since the Reform Act of 1832. The population of the borough (area, 4172 acres) in 1871 was 63,485, and in 1881 it was 68,866.

In early times Rochdale was situated entirely in the township of Castleton, where at one time stood the castle which gave its name to the township. Near the town are the remains of a Roman road leading over the Blackstone Edge Hills, which separate Lancashire and Yorkshire. The name Rochdale appears in Domesday Book as *Recedam*, and it was subsequent to the Norman Conquest that the town began to spread into the valley of the Roch. From the time of William the Conqueror the manor and estates were held by the De Lacys, but after some centuries they became merged in the crown. By Elizabeth they were bestowed on Sir John Byron, and in 1823 they were sold by Lord Byron the poet to James Dearden, in whose family they now remain. The town obtained a charter for a market in the reign of Richard I.; this charter was confirmed by Henry III., who added the privilege of holding an annual fair.

ROCHEFORT, a town of France, the chef-lieu of an arrondissement of the department of Charente Inférieure and of the fourth maritime prefecture, lies on the right bank of the Charente, 9 miles from the Atlantic, and is built partly on the side of a rocky hill and partly on old marshland, which renders the position unhealthy. The town is laid out with great regularity in chess-board fashion. The fortifications are sufficient merely to prevent it being taken by surprise. By rail it is connected with La Rochelle (18 miles north-north-west), Niort, and Saintes. There are both a naval and a commercial harbour. The former has the advantage of deep anchorage well protected by batteries at the mouth of the river, and the roadstead is perfectly safe. The windings of the channel, however, between Rochefort and the sea, and the bar at the entrance render navigation dangerous. This harbour and arsenal, which are separated from the town by a line of fortifications with three gates, contain large covered building yards (where eighteen vessels of the first class may be upon the stocks at once), eleven slips, three repairing docks, and on the right bank of the Charente in the Gardette meadows a large timber basin capable of floating 1,766,000 cubic feet of timber. Besides the various establishments implied in the name, the arsenal is the seat of a ropewalk dating from 1666, a school of navigation and pilotage, a signal-tower 98 feet high (once attached to a church), the offices of the maritime prefecture, the navy commissariat, a park of artillery, and various boards of direction connected with the navy. About 5000 or 6000 men are usually employed in the arsenal. Other Government establishments at Rochefort are barracks for infantry, artillery, and marines, a provision factory, and the naval hospital (800 beds) and school of medicine. In the grounds of this last institution is an artesian well, sunk in 1862-66 to a depth of 2800 feet and yielding water at a temperature of 107° Fahr. The commercial harbour, higher up the river than the naval harbour, has two basins with an aggregate area of 5 acres and 3400 feet of quays, and a third basin is being constructed (1885) 25 acres in extent with 3800 feet of quays, capable of admitting large vessels on every day of the year. The town has good public and botanic gardens, and the Place Colbert contains an allegorical group representing the ocean and the Charente mingling their waters. Besides shipbuilding, which forms the staple industry of Rochefort, sailcloth and furniture are the local manufactures, and hemp for cordage is grown in the vicinity. Along with Tonnay-Charente, 4 miles higher up, Rochefort has a trade in brandies, salt, grain, flour, cattle, horses, fish, colonial wares, timber, and coal. There is regular steamboat communication with the United Kingdom. In 1882 285 vessels (128,570 tons) entered and 270 (123,501) cleared. The population of the town was 26,022 in 1881 (27,85 in the commune).

The lordship of Rochefort, held by powerful nobles as early as the 11th century, was united to the French crown by Philip the Fair in 1303; but it was alternately seized in the course of the Hundred Years' War by the English and the French, and in the wars of religion by the Catholics and Protestants. Colbert having in 1665 chosen Rochefort as the seat of a repairing port between Brest and the Gironde, the town rapidly increased in importance: by 1674 it had 20,000 inhabitants; and, when the Dutch admiral Tromp appeared at the mouth of the river with seventy-two vessels for the purpose of destroying the new arsenal, he found the approaches so well defended that he gave up his enterprise. It was at Rochefort that the naval school now transferred to Brest was originally founded. The town continued to flourish in the later part of the 17th century. In 1690 and in 1703 it escaped from the attempts made by the English to destroy it. Its fleet under the command of La Galissonnière, a native of the place, did distinguished service in the wars of American independence, the republic, and the empire. But the destruction of the French fleet by the English in 1809 in the roadstead of Île d'Aix, the preference accorded to the harbours of Brest and Toulon, and the unhealthiness of its climate have seriously interfered with the prosperity of the place. The convict establishment founded at Rochefort in 1777 was suppressed in 1852.

ROCHEFOUCAULD. See LA ROCHEFOUCAULD.

ROCHELLE, LA, a town and seaport of France, the chef-lieu of the department of Charente-Inférieure, is situated on the Atlantic coast in 46° 9′ N. lat., 296 miles by rail south-west of Paris. Its fortifications, which were constructed by Vauban, have a circuit of 3½ miles with seven gates. In population (20,028 in 1881; 22,464 in the commune) it ranks after Rochefort. The harbour, one of the safest and most accessible on the coast, comprises an outer harbour, a tidal basin, a wet dock, and a graving dock. The outer harbour is still protected by the dry stone mole, about a mile long, constructed by Richelieu. The wet dock (7 acres) is capable of receiving ships of 1000 tons. Behind these is the Maubec basin, the water of which along with that of the Niort Canal helps to scour the port and navigable channel. On the fortifications towards the sea are three towers, of which the oldest (1384) is that of St Nicholas. The apartment in the first story was formerly used as a chapel. The chain tower (1476) was at one time connected with that of St Nicholas by a great pointed arch. The lantern tower (1475-76), seven stories high, affords a fine view of the town, the roadstead, and the surrounding islands, and at present is used as a military prison. Of the ancient gateways only one has been preserved in its entirety, that of the "grosse horloge," a huge square tower of the 14th or 15th century, the corner turrets of which have been surmounted with trophies since 1746. The cathedral of La Rochelle (St Louis or St Bartholomew) is a heavy Grecian building (1742-1862) with a dome above the transept, erected on the site of the old church of St Bartholomew, destroyed in the 16th century and now represented by a solitary tower dating from the 14th century. Externally the town-house (1486-1607) has the appearance of a fortress in the Gothic style and internally that of a Renaissance palace. The belfries are beautifully decorated with carved work, and the council-chamber, where the mayor Guiton presided during the siege, is now adorned by his statue. In the old episcopal palace (which was in turn the residence of Sully, the prince of Condé, Louis XIII., and Anne of Austria, and the scene of the marriage of Alphonso VI. of Portugal with a princess of Savoy) accommodation has been provided for a library of 25,000 volumes, a collection of records going back to the 13th century, and a museum founded in 1842 by the society of the Friends of the Arts. Other buildings of note are an arsenal, an artillery museum, a large hospital, a special Protestant hospital, a military hospital, and a lunatic asylum for the department. In the public gardens there is a museum of natural history. Mediæval and Renaissance houses still give a peculiar character to certain districts of the town: several have French, Latin, or Greek inscriptions of a moral or religious turn and in general of Protestant origin. Of these old houses the most interesting is that of Henry II. or Diana of Poitiers. The parade-ground, which forms the principal public square, occupies the site of the castle, demolished in 1590. Some of the streets have side-arcades; the public wells are fed from a large reservoir in the Champ de Mars; and among the promenades are the Cours des Dames with the statue of Admiral Duperré (1869), and, outside, the tree-planted ramparts and the Mail, a beautiful piece of greensward. In this direction are the sea-bathing establishments. La Rochelle, besides a celebrated manufactory of barrels, contains saw-mills, copper and iron foundries, and factories for patent fuel made out of coal dross. In 1882 465 vessels (225,449 tons) entered and 431 (215,820) cleared. Coals from England and iron-ore from Spain are among the staple imports. In the neighbourhood the principal industries are getting salt from the marshes and rearing oysters and mussels.

La Rochelle existed at the close of the 10th century under the name of Rupella. In 1199 it received a communal charter from Eleanor, duchess of Guienne, and it was in its harbour that John Lackland disembarked when he came to try to recover the domains seized by Philip Augustus. Captured by Louis VIII. in 1224, it was restored to the English in 1360 by the treaty of Brétigny, but it shook off the yoke of the foreigner when Duguesclin recovered Saintonge. During the 14th, 15th, and 16th centuries La Rochelle, then an almost independent commune, was one of the great maritime cities of France. From its harbour in 1402 Jean de Béthencourt set out for the conquest of the Canaries, and its seamen were the first to turn to account the discovery of the New World. The salt-tax provoked a rebellion at Rochelle which Francis I. had to come to repress in person; in 1568 the town secured exemption by the payment of a large sum. At the Reformation La Rochelle early became one of the chief centres of Calvinism, and during the religious wars it armed privateers which preyed on Catholic vessels in the Channel and the high seas. In 1571 a synod of the Protestant churches of France was held within its walls under the presidency of Beza for the purpose of drawing up a confession of faith. After the massacre of St Bartholomew, La Rochelle held out for six and a half months against the Catholic army, which was ultimately obliged to raise the siege after losing more than 20,000 men. The peace of 24th June 1573, signed by the people of La Rochelle in the name of all the Protestant party, granted the Calvinists full liberty of worship in several places of safety. Under Henry IV. the town remained quiet, but under Louis XIII. it put itself again at the head of the Huguenot party. Its vessels blockaded the mouth of the Gironde and stopped the commerce of Bordeaux, and also seized the islands of Ré and Oléron and several vessels of the royal fleet. It was then that Richelieu resolved to subdue the town once for all. In spite of the assistance rendered by the English troops under Buckingham and in spite of the fierce energy of their mayor Guiton, the people of La Rochelle were obliged to capitulate after eight months' siege (October 1628). During this investment Richelieu raised the celebrated mole which cut off the town from the open sea. La Rochelle then became the principal port for the trade between the mother-country of France and the colony of Canada. But the revocation of the Edict of Nantes deprived it of 3000 of its most industrious inhabitants, and the loss of Canada by France completed the ruin of its commerce. Its privateers, however, still maintained a vigorous struggle with the English during the republic and the empire.

Among the men of mark born at La Rochelle may be mentioned Jean Guiton, Tallemant des Réaux, Réaumur the physicist, Admiral Duperré, Bonpland the botanist, and the painters Fromentin and Bouguereau.

ROCHELLE SALT See Tartaric Acid.

ROCHESTER, an episcopal city and municipal and parliamentary borough of Mid-Kent, is situated on the Medway, on the Medway Canal, and on the London, Chatham, and Dover and the South-Eastern railway lines, 33 miles east of London, contiguous to Chatham and Strood. Here the river is crossed by a railway bridge and by an iron swing bridge for carriage traffic, erected to take the place of a stone bridge destroyed in 1856. The present bridge occupies the site of that which spanned the Medway before the Conquest. On the eminence overlooking the right bank of the river and commanding a wide view of the surrounding country are the extensive remains of the Norman castle which is generally supposed to have been built by Gundulph, bishop of Rochester, towards the close of the 11th century, and which was besieged by King John, by Simon de Montfort in the reign of Henry III., and in the reign of Richard II. by a party of rebels during the insurrection of Wat Tyler. It was repaired by Edward IV., but soon afterwards fell into decay, although the massive keep is still in good preservation. The cathedral was originally founded by Augustine in 604, but was partially destroyed by the Danes, and was rebuilt by Bishop Gundulph in the beginning of the 12th century. Though a comparatively small building, being only 310 feet in length and 68 in breadth at the nave, it is of considerable architectural interest, the most remarkable feature being the Norman west front with a richly sculptured door. There is a large number of monuments of great antiquity. In the garden of the deanery there are portions of the wall of St Andrew's priory, founded about the same time as the cathedral. Among the principal public buildings of a secular character are the town-hall (1687), the corn exchange (1871), the county court offices (1862), the working men's institute (1880), and the Richard Watts's almshouses, in the Tudor style. Besides these almshouses there are a number of other charities. The principal schools are the cathedral grammar-school, founded in the reign of Henry VIII., and the Williamson mathematical school, formerly for the sons of freemen, but now open to all. The oyster fishing is of some importance, and there is a considerable shipping trade, a quay and landing-place having been erected by the corporation at great expense. In 1883 the number of vessels that entered the port was 5969 of 855,019 tons burden, and the number that cleared 5496 of 709,040 tons. There is a large steam-engine manufactory. Rochester returned two members to parliament down to 1885, when it was deprived of one. The population of the borough (area,[1] 2909 acres) in 1871 was 18,352, and in 1881 it was 21,307; this includes 5395 persons in the town of Strood, situated on the opposite side of the Medway

Rochester was the *Durobrivæ* of the Romans, and was intersected by the Roman Watling Street from Canterbury. It was formerly surrounded with walls, of which there are still a few remains. It was the foundation of the cathedral by Ethelbert that first raised it to importance. By the Saxons it was named *Hrofe-ceastre*, which was gradually corrupted into the present name. In 676 it was plundered by Ethelred, king of Mercia, and subsequently it suffered severely from the ravages of the Danes. About 930, when three mints were established there by Athelstan, it had grown to be one of the principal ports of the kingdom. William the Conqueror granted the town to his half brother Odo, bishop of Bayeux, who, on account of his connexion with the conspiracy in favour of Robert, duke of Normandy, was besieged in the castle and deprived of his possessions. In 1130 and again in 1137 the city was nearly destroyed by fire. A grand tournament was held in the castle by Henry III. in 1251. The city was visited in 1522 by Henry VIII. accompanied by the emperor Charles V., and in 1573 Elizabeth remained there five days. Charles II. passed through it on his way to London at the Restoration, and at the Revolution James II. embarked at the port on his way to France. The bishopric was founded in 600, and the city received its first charter of incorporation from Henry II. in 1165. It has returned members to parliament since the 23d of Edward I.

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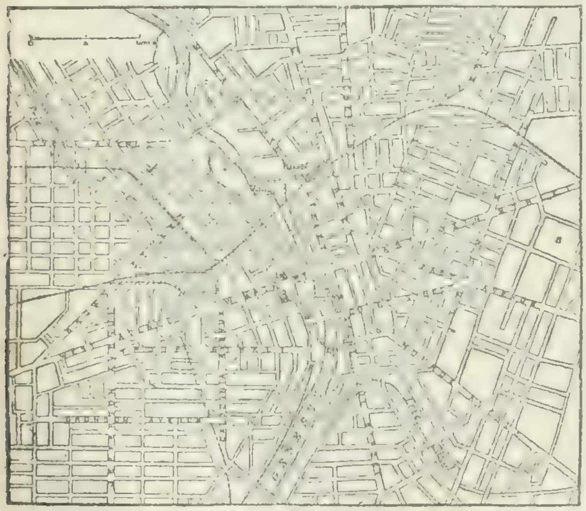
[1] The parliamentary borough also includes 11,768 acres of tidal water and foreshore along the river Medway.

ROCHESTER, a city of the United States, capital of Monroe county, New York, lies 229 miles to the west of Albany (43° 9′ 22″·44 N. lat. and 77° 36′ 56″·97 W. long.), in a rich agricultural region, upon a plateau on both banks of the Genesee river, 7 miles from its mouth at Lake Ontario and 263 feet above the lake level. There are three falls in the river of 96, 26, and 83 feet respectively within the city limits, the banks below the first fall varying in height from 100 to 210 feet. To this abundant water-power of the Genesee, supplemented by the transportation facilities afforded by the Erie Canal and the various railway connexions, Rochester mainly owes its progress and prosperity. The streets of the city are generally wide, and well paved and lighted (partly by electricity), and trees and flowering plants are abundant. Rochester is an important railway centre. The New York Central Railroad, with elevated tracks through the city, has two lines east to Syracuse, two west to Buffalo and Niagara Falls respectively, and one north to Charlotte, where connexion is made with the Rome, Watertown, and Ogdensburg line; a branch of the New York, Lake Erie, and Western Railway connects with the main line at Corning and with the Buffalo branch at Avon; the Rochester and Pittsburgh Railway runs south to Salamanca, and the Genesee Valley Railway to Olean, crossing the West Shore Railway a short distance south of the city line; and there are also railway lines to Irondequoit Bay and Windsor beach, and about 30 miles of street railway, radiating from the centre in all directions. The manufactures of Rochester are numerous and varied. Though no longer at the head of the flour industry, it still possesses twenty mills, capable of producing 2900 barrels daily. The principal manufacture is that of ready-made clothing, the sales reaching $9,000,000 annually. In its boot and shoe trade the city ranks fourth in the country (5000 hands; annual sales, $6,500,000). There are also sixteen breweries and ten malt-houses; some eighty or ninety cigar-makers and tobacconists have a total output of about 2,000,000 ℔ of tobacco, 18,000,000 cigars, and 140,000,000 cigarettes; while furniture-making employs 1000 hands. The lumber business is extensive; and of late years the city has been one of the principal centres for the distribution of the anthracite and bituminous coal of Pennsylvania. Its numerous nurseries are a peculiar feature of the place; and there is a great variety of other industries. The main supply of water is brought in iron conduits (147 miles of pipe) from Hemlock Lake, 29 miles to the south; an additional supply for subsidiary purposes is drawn from the Genesee river (11¼ miles of pipe). The total cost of the works has been $3,744,749. The principal cemetery, Mount Hope, with an area of 200 acres, is exceedingly picturesque and well cared for. Rochester has two State institutions, the Western House of Refuge and the Western New York Institution for Deaf Mutes. The former, opened in 1849, is a substantial structure of brick, with accommodation for 600 inmates, built at a cost of $373,000; it receives juvenile delinquents committed by magistrates; they are instructed in trades and labour upon the farm belonging to the refuge. The institution for deaf mutes (1875) instructs about 160 pupils annually. Among the eleemosynary institutions of the city are the Rochester city hospital, St Mary's hospital, the Rochester, St Patrick's, St Mary's, St Joseph's, and the Jewish orphan asylums, the home for the friendless, the industrial school, the church home, the home of industry, and the home for truant children. There are 75 churches, including the Roman Catholic cathedral, 6 Baptist, 10 Methodist Episcopal, 10 Protestant Episcopal, 11 Presbyterian, 5 Lutheran, and 11 Roman Catholic churches, and 5 Jewish synagogues. The public school system of Rochester includes a free academy (cost $125,000) and thirty grammar-schools (with classes in the orphan asylums), in which 200 teachers are engaged and 10,000 pupils taught. There are also thirty private institutions, academies, seminaries, and parochial schools. The university of Rochester was established in 1850, under Baptist auspices; its faculty consists of a president and ten professors, and the annual attendance of students is about 160. It has two buildings,—Anderson Hall and Sible Hall. The Rochester theological seminary (Baptist), founded in 1850 and housed in two commodious buildings—Trevor and Rockefeller Halls—has eight professors and about seventy students, besides a German department. Other public libraries in addition to those of the university and the theological seminary are the central and Reynolds. There are four English and two German daily newspapers, and twelve weekly and nine monthly publications. Among edifices not already mentioned are the city-hall, the United States Government building, the court-house, the Warner astronomical observatory, the Rochester and East Side savings banks, the Powers buildings, with their famous art gallery, and the Warner and Kimball factories. The population (89,366 in 1880) was estimated at 115,000 in 1885; the area of the city, which is divided into sixteen wards, is 4 square miles. The assessed valuation of real and personal property in 1885 was $40,952,070, and the debt was $5,249,000.



Plan of Rochester.

Rochester derives its name from Nathaniel Rochester, who projected a settlement here in 1810; the first house was built in 1812; and the incorporation of the city dates from 1834.

ROCHESTER, John Wilmot, Earl of (1647-1680), born in Oxfordshire in 1647, was one of the unworthies of the reign of the "merry monarch, scandalous and poor,"

"Who never said a foolish thing
Nor ever did a wise one."

Rochester is the author of both these imperishable descriptions of Charles II., and by them and his poem "Upon Nothing," and his death-bed conversation with Bishop Burnet he is now chiefly known. His poetry has hardly had a fair chance against that of his contemporaries, for owing to his scandalous character, which was probably worse than the time only in respect of his ostentatious defiance of proprieties, all kinds of indecencies were fathered upon him and inserted in unauthorized editions of his works. This has ensured his exclusion from decent libraries, an edition issued in 1691 by friends careful of his memory having been pushed out of sight by these more piquant publications. His letters to his wife and his son show that the real man was much better than the public estimate of him, which he invited by his occasional daring breaches of decorum and morality. Some of his lyrics are very pretty, full of ingenious fancy and musical rhythm, but wit and intellect are more marked in his writing than the free flow of lyrical sentiment. For wit, versatility, and intense vitality of intellect this strangely wasted life stood high above the level of its age. In his youth Rochester distinguished himself in the Dutch wars by acts of signal personal bravery; his alleged cowardice afterwards in street brawls and personal quarrels looks rather like daringly contemptuous cynicism. Rochester had a taste for the humours of low life, and is said to have haunted the low quarters of the town in various disguises, on one occasion personating a mountebank on Tower Hill. He died on 26th July 1680, at the early age of thirty-three, and the common account is that his constitution was undermined and exhausted by profligate excesses.

ROCHE-SUR-YON, La, a town of France, the chief town of the department of La Vendée, lies 278 miles south-west of Paris by the railway to Sables d'Olonne, on an eminence 164 feet above the sea on the right bank of the Yon, a little tributary of the Lay, itself an affluent of the Pertuis Breton. In 1881 the population of the town was 9965, of the commune 10,634. The castle of La Roche-sur-Yon, which probably existed before the time of the crusades, and which was frequently attacked or taken in the Hundred Years' War and in the wars of religion, was finally dismantled under Louis XIII.; and when Napoleon in 1805 made this place the chief town of a department the stones from its ruins were employed in the erection of the administrative buildings, which, being all produced at once after a regular plan, have a monotonous effect. The equestrian statue of Napoleon I. in an immense square overlooking the rest of the town; the statue of General Travot, who was engaged in the "pacification" of La Vendée; the museum, with several paintings by P. Baudry, a living native artist of note, are the only objects of interest. The dog fairs of Roche-sur-Yon are important. Napoleon-Vendée and Bourbon-Vendée, the names borne by the town according to the dominance of either dynasty, gave place to the original unpolitical name after the revolution of 1870.

ROCKET. See Ammunition and Pyrotechny; for the use of rockets to rescue the shipwrecked see Lifeboat, vol. xiv. p. 572.

ROCKFORD, a city of the United States, the county seat of Winnebago county, Illinois, on both banks of the Rock river, which, rising in Wisconsin, falls into the Mississippi after a course of 350 miles. By rail it lies 92 miles north-west of Chicago and is a junction of the Chicago and North-Western, the Chicago, Milwaukee, and St Paul, and the Chicago, Burlington, and Quincy Railroads. Abundant water-power was secured by a dam 800 feet long constructed across the river in 1844. The chief objects of industry of Rockford, one of the largest manufacturing centres in the Mississippi valley, are agricultural implements, furniture, watches, silver-plated ware, cutlery, tacks and nails, bolts, wire-cloth, netting, woollen and cotton goods, paper, flour, oatmeal, glucose. Waterworks on the Holly system (1874) are capable of pumping 5,500,000 gallons through the mains in twenty-four hours. The city stands in a fine agricultural district, is handsomely built and well shaded, and has a public library, a public high school, and ten other public school buildings, a seminary for girls (1849), five banks, and twenty-one churches. The population was 6976 in 1860, 11,049 in 1870, and 13,129 in 1880 (township, 14,525). Rockford was settled about 1836; in 1852 it received incorporation as a city.

ROCKHAMPTON, a town of Queensland, is situated some 40 miles up the Fitzroy river, nearly on the Tropic of Capricorn. The streets are well formed and kept, bordered by trees, with ever-flowing water down the channels. Embosomed in hills, it has a climate, in spite of heat, of singular salubrity, the death-rate being only about half that of London. The population in 1884 was about 11,000. Rockhampton is the gateway to a fine pastoral interior and is a port of export for wool. The hills in its neighbourhood are rich in metallic wealth; and Mount Morgan, 30 miles from Rockhampton, seems likely to eclipse the production of Victoria and New South Wales. If anything be needed to complete the prospective importance of Rockhampton, it is the growing development of sugar plantations at no great distance from the town.

ROCKINGHAM, Charles Watson Wentworth, second Marquis of (1730-1782), twice prime minister of England, was the only son of Thomas Watson Wentworth, whose father had inherited the great Wentworth estates in Yorkshire on the death of William Wentworth, fourth earl of Strafford, and who had himself succeeded his second cousin as sixth Lord Rockingham in 1746 and been created marquis of Rockingham in the same year. Charles Watson Wentworth was born in 1730 on the 19th of March (Albemarle), or the 13th of May (Collins), and was educated at Eton. He showed his spirit as a boy by riding across from Wentworth to Carlisle in 1745 with but one servant, to join the duke of Cumberland in his pursuit of the Young Pretender. He was created earl of Malton in the peerage of Ireland on 4th September 1750, and succeeded his father as second marquis of Rockingham on 14th December in the same year. In 1751 he became lord-lieutenant of the North and West Ridings of Yorkshire and a lord of the bedchamber, and in 1760 was made a knight of the Garter. After George III. had begun his policy of dividing the great Whig families, those Whig noblemen and gentlemen who did not choose to join the sections headed by the Grenvilles, the duke of Bedford, or any other great nobleman, selected as their chief the young marquis of Rockingham. In May 1762 the king's favourite, the earl of Bute, became first lord of the treasury, and the marquis of Rockingham was amongst those who in the following year were dismissed from their lord-lieutenancies. The opposition now grew so strong that Lord Bute resigned in April 1763 and the king, true to his policy, appointed George Grenville to be his successor. But Grenville's section of the Whig party was not strong enough to maintain him in power long, and on 12th July 1765 Lord Rockingham formed his first administration with General Conway and the duke of Grafton as secretaries of state. The cabinet seemed stronger than it really was, for it was divided by intestine quarrels, and the earl of Chatham refused to have anything to do with it. Nevertheless Rockingham recovered his lord-lieutenancies and won reputation as a good administrator. In May 1766 the duke of Grafton, a far abler man than Rockingham, though neither so conciliatory in his manners nor so generally popular, seceded from the Government, and in August

1766 he succeeded his former chief as first lord of the treasury and prime minister. Then followed many years of fruitless opposition to the king's personal authority as exhibited through his ministers, but at last, on 27th March 1782, Lord Rockingham again became prime minister with Fox and Shelburne as secretaries of state. This time he enjoyed office for but a few weeks, for he died on 1st July 1782. A few words from his epitaph by Burke deserve quotation as giving the reason of the predominance of such an ordinary man as Lord Rockingham over a party abounding in men of great abilities: "A man worthy to be held in esteem, because he did not live for himself. . . . He far exceeded all other statesmen in the art of drawing together, without the seduction of self-interest, the concurrence and co-operation of various dispositions and abilities of men, whom he assimilated to his character and associated in his labours."

See *Memoirs of the Marquis of Rockingham and his Contemporaries* by George Thomas, Earl of Albemarle. 2 vols., 1852, and such biographical works as Macknight's *Life of Burke*, Lord E. Fitzmaurice's *Life of Lord Shelburne*, &c.

ROCK ISLAND, a city of the United States, the capital of Rock Island county, Illinois, is situated opposite Davenport on the left bank of the Mississippi, about 3 miles above the mouth of the Rock river and at the foot of the Upper Rapids, which extend for about 16 miles. Distant by rail 181 miles west of Chicago and 247 miles north of St Louis, Rock Island is one of the great centres of railroad and river traffic. With Davenport (in Iowa) it is connected by a two-story road and railway bridge constructed by the Government in 1870. Among the public buildings are a large public library and St Augustana College, founded by the Swedish Lutherans. Glass-works, a plough factory, a distillery, flour-mills, and a stove factory are the principal industrial establishments. The city, however, is best known from the great national arsenal situated on the island from which it derives its name. This island is a ridge of limestone rock about 3 miles long and with an area of 960 acres. As the site of Fort Armstrong it became known in the Black Hawk War; the prison was used for the detention of Confederate prisoners during the Civil War; and since that date the Government has constructed the present extensive works, intended to be the central United States armoury. There are ten vast stone workshops, each with a stone house in the rear, as well as officers' quarters, offices, &c. The population of Rock Island city was 5130 in 1860, 7890 in 1870, and 11,659 in 1880. Its charter dates from 1849.

ROCKLAND, a city and seaport of the United States, county town of Knox county, Maine, is situated 60 miles by rail east-north-east of Portland on Owl's Head Bay, an inlet of Penobscot Bay. It was incorporated in 1854, has an area of 7000 acres and a sea frontage of about 4¼ miles, and numbered 7599 inhabitants in 1880 (in 1870 7074). Lime-burning is the staple trade (1,000,000 barrels per annum). The adjacent islands—Dix Island, Hurricane Island, &c.—are known by their granite quarries. Water for the city is obtained from Lake Chickawaukie.

ROCKY MOUNTAINS. See UNITED STATES.

ROCROI, a town of France, the chef-lieu of an arrondissement in the department of Ardennes, lies 15 miles in a straight line north-north-west of Mézières and within 2 miles of the Belgian frontier, at a height of 1083 feet above the sea. As a fortified place it commands the Ardennes plateau between the valley of the Meuse and the headwaters of the Oise. The present fortifications were constructed by Vauban. In 1881 the population was 1649 (commune 2977).

This spot, originally called Croix-de-Rau or Rau Croix, was fortified in the 16th century and besieged by the imperialists in 1555. Invested by the Spaniards in 1643, it was relieved by the young duke of Enghien (afterwards the Great Condé) after a brilliant victory. Captured in 1658 by the same duke, then in the Spanish service, it was not restored to France till the treaty of the Pyrenees in 1659. In 1815 Rocroi was besieged for a month by the allies.

RODBERTUS, KARL JOHANN (1805-1875), by some considered to be the founder of scientific socialism, was born at Greifswald on 12th August 1805, his father being a professor at the university there. He studied law at Göttingen and Berlin, thereafter engaging in various legal occupations; and, after travelling for some time, he bought the estate of Jagetzow in Pomerania, whence his name of Rodbertus-Jagetzow. In 1836 he settled on this estate, and henceforward devoted his life chiefly to economic and other learned studies, taking also some interest in local and provincial affairs. After the revolution of March 1848 Rodbertus was elected member of the Prussian national assembly, in which body he belonged to the left centre; and for fourteen days he filled the post of minister of public worship and education. He sat for Berlin in the second chamber of 1849, and moved the adoption of the Frankfort imperial constitution, which was carried. When the system of dividing the Prussian electorate into three classes was adopted, Rodbertus recommended abstention from voting. His only subsequent appearance in public life was his candidature for the first North German diet, in which he was defeated. His correspondence with Lassalle was an interesting feature of his life. At one time Rodbertus had some intention of forming a "social party" with the help of the conservative socialist Rudolf Meyer and of Hasenclever, a prominent follower of Lassalle; but no progress was made in this. Rodbertus was neither disposed nor qualified to be an agitator, being a man of a quiet and critical temperament, who believed that society could not be improved by violent changes, but by a long and gradual course of development. He warned the working men of Germany against connecting themselves with any political party, enjoining them to be a "social party" pure and simple. He died on 8th December 1875.

The general position of Rodbertus was "social, monarchical, and national." With his entire soul he held the purely economic part of the creed of the German social-democratic party, but he did not agree with their methods, and had no liking for the productive associations with state help of Lassalle. He regarded a socialistic republic as a possible thing, but he cordially accepted the monarchic institution in his own country and hoped that a German emperor might undertake the rôle of a social emperor. He was also a true patriot and was proud and hopeful of the career that lay before the regenerated empire of Germany. The basis of the economic teaching of Rodbertus is the principle laid down by Adam Smith and Ricardo and insisted on by all the later socialists, that labour is the source and measure of value. In connexion with this he developed the position that rent, profit, and wages are all parts of a national income produced by the united organic labour of the workers of the community. Consequently there can be no talk of the wages of labour being paid out of capital; wages is only that part of the national income which is received by the workmen, of a national income which they have themselves entirely produced. The wages fund theory is thus summarily disposed of. But the most important result of the theory is his position that the possession of land and capital enables the landholders and capitalists to compel the workmen to divide the product of their labour with those non-working classes, and in such a proportion that the workers only obtain as much as can support them in life. Thus the iron law of wages is established. Hence also Rodbertus deduces his theory of commercial crises and of pauperism, and in the following way. In spite of the increasing productivity of labour, the workers obtain in general only sufficient to support their class, and therefore a smaller relative share of the national income. But the producers form also the large mass of consumers, and, with the decline of their relative share in the national income, must decline the relative purchasing power of this large class of the people. The growing production is not met by a correspondingly growing consumption; expansion is succeeded by contraction of production, by a scarcity of employment, and a further decline in purchasing power on the part of the workers. Thus we have a commercial crisis bringing with it pauperism as a necessary result. In the meantime the purchasing power of the non-producing capitalists and landholders continues relatively to increase; but, as they have already had enough to buy all the comforts of life, they spend the more in the purchase of luxuries, the production of which increases.

A fundamental part of the teaching of Rodbertus is his theory of social development. He recognized three stages in the economic progress of mankind: (1) the ancient heathen period in which property in human beings was the rule; (2) the period of private property in land and capital; (3) the period, still remote, of property as dependent on service or desert. The goal of the human race is to be one society organized on a communistic basis; only in that way can the principle that every man be rewarded according to his work be realized. In this communistic or socialistic state of the future land and capital will be national property, and the entire national production will be under national control; and means will be taken so to estimate the labour of each citizen that he shall be rewarded according to its precise amount. An immense staff of state officials will be required for this function. As we have already said, Rodbertus believed that this stage of social development is yet far distant; he thought that five centuries will need to pass away before the ethical force of the people can be equal to it.

From temperament, culture, and social position Rodbertus was averse to agitation as a means of hastening the new era; and, in the measures which he recommends for making the transition towards it he showed a scrupulous regard for the existing interests of the capitalists and landholders. He proposed that those two classes should be left in full possession of their present share of the national income, but that the workers should reap the benefit of the increasing production. To secure them this increment of production he proposed that the state should fix a "normal working day" for the various trades, a normal day's work, and a legal wage, the amount of which should be revised periodically, and raised according to the increase of production, the better workman receiving a better wage. By measures such as these carried out by the state in order to correct the evils of competition would Rodbertus seek to make the transition into the socialistic era.

The economic work of Rodbertus is therefore an attempt made in a temperate and scientific spirit to elucidate the evil tendencies inherent in the competitive system, especially as exemplified in the operation of the iron law of wages. The remedy he proposes is a state management of production and distribution, which shall extend more and more, till we arrive at a complete and universal socialism,—and all based on the principle that as labour is the source of value so to the labourer should all wealth belong. It is therefore an attempt to place socialism on a scientific basis; and he is certainly entitled to be regarded as one of the founders of "scientific socialism" (see SOCIALISM).

The following are the most important works of Rodbertus:—*Zur Erkenntniss unserer staatswirthschaftlichen Zustände* (1842); *Sociale Briefe an von Kirchmann* (1850); *Creditnoth des Grundbesitzes* (2d ed., 1876); "Der Normal-Arbeitstag," in *Tub. Zeitschrift* (1878); *Letters* to A. Wagner, &c., *Tub. Zeitschrift* (1878-79); *Letters* to Rudolf Meyer (1882). Within recent years Rodbertus has received great attention in Germany, especially from Adolf Wagner (*Tub. Zeitschrift*, 1878); see also Kozak's work on Rodbertus (1882), and an excellent monograph by G. Adler (Leipsic, 1884).

RODERICK. See SPAIN.

RODEZ, a town of France, chef-lieu of the department of Aveyron and the see of a bishop, 412 miles south of Paris by the railway which continues to Béziers, is built at a height of 2077 feet on a promontory surrounded by the Aveyron, a sub-tributary of the Garonne by the Tarn. In population—14,425 inhabitants (15,333 in the commune) in 1881—it ranks next to the industrial town of Millau. The cathedral was built between 1277 and 1535. A great flamboyant rose window and a gallery in the same style are the chief features of the principal façade. Each transept has a fine Gothic doorway. At the north side of the building rises a tower (erected in the beginning of the 16th century) which ranks by its height as one of the wonders of the south of France, and bears aloft a colossal statue of the Virgin surrounded by the four evangelists. The interior has a fine rood loft and several interesting tombs. The episcopal palace with its collection of sculptured stones; the church of St Amans, in the Romanesque style, but entirely restored externally in the 18th century; and several curious old houses of the 13th, 15th, and 16th centuries, such as the Hôtel d'Armagnac, on the site of the old palace of the counts, also deserve to be mentioned. The ruins of a Roman amphitheatre still exist, and the town is supplied with water by the old Roman aqueduct recently restored.

Rodez, called Segodunum under the Gauls and Ruthena under the Romans, was the capital of a tribe allied to the Arvernians. In the 4th century it adopted the Christian faith and St Amans, its first bishop, was elected in 401. During the Middle Ages contests were rife between the bishops in the "city" and the counts in the "bourg." The Albigenses were defeated near Rodez in 1210. The countship of Rodez depended in succession on the count of Toulouse, on the king of France, and from the close of the 13th century on the count of Armagnac. From 1360 to 1368 the English held the town. After the confiscation of the estates of the Armagnacs in 1473 it passed to the dukes of Alençon and then to the D'Albrets Henry IV. finally annexed it to the crown of France. Neither the Protestants nor the Leaguers any more than in earlier days the Albigenses were able to make themselves masters of Rodez.

RODNEY, GEORGE BRYDGES RODNEY, BARON (1718-1792), English admiral, second son of Henry Rodney of Walton-on-Thames, was born there on 19th February 1718. His father had served in Spain under the earl of Peterborough, and on quitting the army obtained command of the king's yacht. George was sent to Harrow when quite young, and on leaving entered the navy By warrant dated 21st June 1732 he was appointed as volunteer on board the "Sunderland," a fourth-rate. While serving on the Mediterranean station under Admiral Haddock he was made lieutenant in the "Dolphin," his promotion dating 15th February 1739. In 1742 he attained the rank of post-captain, having been appointed to the "Plymouth," 9th November. After minor services of an active character in home waters, he obtained command of the "Eagle," sixty guns, and in this ship took part in Hawke's victory off Ushant, 14th October 1747, over the French fleet under L'Etanduère. On that day Rodney gained his first laurels for gallantry, under a chief to whom he was in a measure indebted for subsequent success. On 9th May 1749 he was appointed governor and commander-in-chief of Newfoundland, with the rank of commodore, it being usual at that time to appoint a naval officer, chiefly on account of the fishery interests. Returning home, he was elected M.P. for Saltash in May 1751, and married his first wife, Jane Compton, sister to the earl of Northampton, 3d February 1753. During the Seven Years' War Rodney rendered important service. In 1757 he had a share in the expedition against Rochefort, commanding the "Dublin," seventy-four. Next year, in the same ship, he served under Admiral Boscawen at the taking of Louisburg (Cape Breton). On 19th May 1759 Rodney became a rear-admiral and was shortly after given command of a small squadron intended to destroy a large number of flat-bottomed boats and stores which were being collected at Havre for an invasion of the English coasts. He bombarded the town for two days and nights without ceasing, and inflicted great loss of war-material on the enemy. In July 1760, with another small squadron, he succeeded in taking many more of the enemy's flat-bottomed boats and in blockading the coast as far as Dieppe. Elected M.P. for Penryn in 1761, he was in October of that year appointed commander-in-chief of the Leeward Islands station, and within the first three months of 1762 had reduced the important island of Martinique, while both St Lucia and Grenada had surrendered to his squadron. During the siege of Fort Royal his seamen and marines rendered splendid service on shore. At the peace of 1763 Admiral Rodney returned home, having been during his absence made vice-admiral of the Blue and voted the thanks of both Houses of Parliament.

In 1764 Rodney was created a baronet by patent of 21st January, and the same year he married Henrietta, daughter of John Clies of Lisbon. From 1765 to 1770 he was governor of Greenwich Hospital, and on the dissolution of parliament in 1768 he successfully contested Northampton at a ruinous cost. When appointed commander-in-chief of the Jamaica station in 1771 he lost his Greenwich post, but a few months later received the office of rear-admiral of Great Britain. Till 1774 he held the Jamaica command, and during a period of quiet was active in improving the naval yards on his station. Sir George struck his flag with a feeling of disappointment at not obtaining the governorship of Jamaica, and was shortly after forced to settle in Paris. Election expenses and losses at play in fashionable circles had shattered his fortune and now broke up his family till the eve of war with France. In February 1778, having just been promoted admiral of the White, he used every possible exertion to obtain a command from the Admiralty, to free himself from his money difficulties. By May he had, through the splendid generosity of his Parisian friend Maréchal Biron, effected the latter task, and accordingly he returned to London with his children. Sir George was enabled to remit at once to his benefactor the full loan, and it is worthy of record that the English Government in later years awarded pensions to the maréchal's daughters in recognition of their father's chivalrous act.[1] That an attempt was made by the French ministry during the war crisis to seduce Rodney into accepting high rank in the French navy is undeniable from the evidence we possess, but the details of the common version must be accepted with reserve, excepting the undoubted instant rejection of the offer. To the English cabinet the honour of both Rodney and Biron remained untarnished, if we may judge of the former by his letters, public and private, and of the latter by the pension awarded to his relatives.[2]

Sir George was appointed once more commander-in-chief of the Leeward Islands, 1st October 1779, but did not sail till 29th December. He captured a Spanish convoy bound to Cadiz on 8th January 1780, and eight days later defeated the Spanish admiral Don Juan de Langara off Cape St Vincent, taking or destroying seven ships. On 17th April an action, which, owing to the carelessness of some of Rodney's captains, was indecisive, was fought off Martinique with the French admiral Guichen. Rodney, acting under orders, captured the valuable entrepôt of St Eustatius, and by his strong measures for stopping illegal and contraband trade evoked an attempt at censure on the part of his political opponents. After a few months in England, recruiting his health and defending himself in parliament, Sir George returned to his command in February 1782, and a running engagement with the French fleet on 9th April led up to his crowning victory off Dominica, when on 12th April with thirty-five sail of the line he defeated Comte de Grasse, who had thirty-three sail. The French inferiority in numbers was more than counterbalanced by the greater size and superior sailing qualities of their ships, yet five were taken and one sunk, after eleven hours' fighting. This important battle saved Jamaica and ruined French naval prestige, while it enabled Rodney to write—"Within two little years I have taken two Spanish, one French, and one Dutch admirals." A long and wearisome controversy exists as to the originator of the manœuvre of "breaking the line" in this battle, but the merits of the victory have never seriously been affected by any difference of opinion on the question. A shift of wind broke the French line of battle, and advantage was taken of this by the English ships in two places.

Rodney arrived home in August to receive unbounded honour from his country. He had already been created Baron Rodney of Rodney Stoke, Somerset, by patent of 19th June 1782, and the House of Commons had voted him a pension of £2000 a year. From this time he led a quiet country life till his death, which occurred on 24th May 1792, in London, while on a visit to his son. Next to Nelson we may fairly place Rodney, not only because of his well-merited successes, but for masterly decision and confident boldness in grappling with fleets of the three chief maritime states of Europe while in the plenitude of their power. He fought his equals in naval science, but conquered by superior practical skill.

See General Mundy, *Life and Correspondence of Admiral Lord Rodney*, 2 vols., 1830; Rodney letters in 9th *Report* of Hist. MSS. Com., pt. iii.; "Memoirs" in *Naval Chronicle* i. 353-393; and Charnock, *Biographia Navalis* v. 204-228. Lord Rodney published in his lifetime (probably 1789) *Letters to His Majesty's Ministers, &c., relative to St Eustatius, &c.*, of which there is a copy in the British Museum. Most of these letters are printed in Mundy's *Life*, vol. ii., though with many variant readings. (G. F. H.)

RODOSTO, a town of European Turkey, in the sandjak of Tekfur Daghi or Rodosto in the vilayet of Adrianople (Edirne), is situated on the coast of the Sea of Marmora about midway between Gallipoli and Constantinople. Its picturesque bay is enclosed by the great promontory of Combos, a spur about 2000 feet in height from the hilly plateau to the north, and round about the town are stately cypress groves. The church of Panagia Rhevmatoeratissa contains the graves, with long Latin inscriptions, of the Hungarian exiles of 1696. Rodosto has long been a great depôt for the produce of the Adrianople district, but its trade has suffered considerably since Dedeagatch became the terminus of the railway up the Maritza. In 1880 the value of exports and imports was £230,824. The population, formerly about 30,000, was in 1840 about 10,000, and at present (1885) may be estimated at 17,000, about half Turks, a quarter Armenians, and the remainder Greeks, Jews, and Latins.

Rodosto is the ancient Rhædestus or Bisanthe, said to have been founded by Samians. In Xenophon's *Anabasis* it is mentioned as in the kingdom of the Thracian prince Seuthes. Its restoration by Justinian is chronicled by Procopius. In 813 and again in 1206 it was destroyed by the Bulgarians, but it continues to appear as a place of considerable note in later Byzantine history, being captured and recaptured in successive wars.

RODRIGUEZ, an island in the Indian Ocean in 19° 41′ S. lat. and 63° 23′ E. long., which, after the Seychelles, forms since 1814 the most important dependency of the British colony of Mauritius, from which it is distant 344 nautical miles. It is the easternmost of all the islands considered as belonging to Africa. With a length of 13 miles east and west and a breadth of 3 to 6 north and south it has an area estimated at 42½ square miles. On all sides it is surrounded by a coral reef, which on the north and south forms a large flat area partly dry at low water. The island proper was long believed to consist of granite overlaid with limestone and other modern formations, and thus it was regarded as a striking exception to the rule that all mid-ocean islands are of volcanic origin, and served in the hands of Peschel and others as a proof of the former existence in the Indian Ocean of the hypothetical continent of Lemuria. The investigations of the Transit of Venus Expedition have shown that it is built up of "doleritic lavas which have been poured out at a considerable number of orifices," now difficult to identify, at successive periods of uncertain date. The lavas are rich in olivine. In some places, as in the Cascade Valley, the disintegration of the rocks has produced beds of earthy clays varying in colour from a dull brick red to a liver brown, and forming a prominent feature in the landscape. A central ridge of considerable elevation (Grande Montagne, 1140 feet) runs through the island from east to west, sending off a variety of spurs (Le Piton, 1160 feet). Deep-cut river valleys, often interrupted by cascades, run down in all directions to the sea. On the south-west there is a large plain of coralline limestone, remarkable for the caves of all sizes (some beautifully stalactitic) with which it is riddled

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[1] See Barrow's *Life of Anson*, pp. 328-329.

[2] See *Naval Chronicle*, 1799, i. 369-370; Mundy, *Life of Rodney*, i. 183; *United Service Journal*, 1830, pt. ii. pp. 37-38, for divergent evidence about the French offer of service. See also *Academy*, 4th October 1884, for the identification of a letter which perhaps bears upon Sir G. Rodney's prospects in 1778.

Along the north and west coast there are on the reef a number of islands of volcanic origin; those on the south-east are all of coralline limestone or sand. There are only two passages through the reef available for large vessels,—these leading respectively to Port Mathurin and to Port South-East. Rodriguez is comparatively arid; and the streams are as short-lived for the most part as they are beautiful. The climate is like that of Mauritius, but more subject to hurricanes during the north-west monsoon (November to April).

About 1845 the population of Rodriguez was about 250 persons. The original nucleus consisted of slaves from Mauritius, and recruits arrived from Madagascar and the African continent. By 1871 they had increased to 1108 and by 1881 to 1436. The island is governed by a civil commissioner, who is also a police magistrate. Capitalists from Mauritius are beginning to pay attention to the natural advantages of the island. A carriage road has been constructed from Mathurin to Gabriel, the only other village, where the Roman Catholic priests have their chapel and residence.

When originally discovered and down into the 17th century Rodriguez was clothed with fine timber trees; but goats, cattle, and bush-fires have combined to destroy the great bulk of the old vegetation, and the indigenous plants have in many cases been ousted by intrusive foreigners. When the island was in French possession many settlers cultivated large estates, and fortunes were realized; but with the liberation of the slaves the area of cultivation decreased, and it is now of very limited extent. The staple crop is the sweet potato; and manioc, maize, millet, and rice grow well, but are not much cultivated. Wheat is seldom seen, mainly because of the parakeets and the Java sparrows. Beans (*Phaseolus lunatus*), lentils, gram (*Cicer arietinum*), dholl (*Cajanus indicus*), and ground-nuts are all grown to a certain extent in spite of the ravages of the rats (Balfour). Mangoes, bananas, guavas, pine-apples, custard-apples, and especially oranges, citrons, and limes, are the fruits that flourish best. Of the timber trees the most common are *Elæodendron orientale*, much used in carpentry and for pirogues, and *Latania Verschaffelti* (Leguat's plantane). At least two species of screw-pine (*Pandanus heterocarpus*, Balf. fil. and *P. tenuifolius*) occur freely throughout the island. The total number of known species, according to Professor I. B. Balfour, is 470, belonging to 85 families and 293 genera; and of these 297 are phanerogamous and 173 cryptogamous. The families represented by the greatest number of species are *Gramineæ* (21 indigenous, 6 introduced), *Leguminosæ* (14 ind., 15 intr.), *Convolvulaceæ* (11 ind., 4 intr.), *Malvaceæ* (9 ind.), *Rubiaceæ* (8 ind.), *Cyperaceæ* (8 ind.), *Euphorbiaceæ* (8 ind.), *Liliaceæ* (6 ind.), *Compositæ* (5 ind., 6 intr.). *Mathurina penduliflora* (*Turneraceæ*) is interesting, as its nearest congener is in Central America, and the family has not hitherto been found in the Mascarenes. Of 33 species of mosses 17 are peculiar. Variability of species and heterophylly are characteristic of the flora to quite an unusual degree. To the naturalist Rodriguez is as interesting as it is to the botanist. At present the only indigenous mammal is a species of fruit-eating bat (*Pteropus rodericensis*), and the introduced species are such familiar creatures as the pig, rabbit, rat, mouse, &c.; but down to a recent period the island was the home of a very large land-tortoise (*Testudo Vosmaeri* or *rodericensis*), and its limestone caves have yielded a large number of skeletons of the dodo-like solitaire (*Pezophaps solitarius*), which still built its mound-like nest in the island in the close of the 17th century, but is now extinct (see vol. iii. p. 732). Of indigenous birds 13 species have been registered. The guinea-fowl (introduced) has become exceedingly abundant, partly owing to a protective game-law; and a francolin (*F. ponticerianus*), popularly a "partridge," is also common. The marine fish-fauna does not differ from that of Mauritius, and the freshwater species, with the exception of *Mugil rodericensis* and *Myxus cæcuticus*, are common to all the Mascarenes. Thirty-five species of crustaceans are known. The insects (probably very imperfectly registered) comprise 60 species of *Coleoptera*, 15 *Hymenoptera*, 21 *Lepidoptera*, 15 *Orthoptera*, and 20 *Hemiptera*. Forty-nine species of coral have been collected, showing a close affinity to those of Mauritius, Madagascar, and the Seychelles.

Rodriguez or Diego Ruy's Island was discovered by the Portuguese in 1645. In 1690 Duquesne prevailed on the Dutch Government to send a body of French refugees to the Island of Bourbon, at that time, he believed, abandoned by the French authorities. As the refugees, however, found the French in possession they proceeded to Rodriguez, and there eight of their number were landed on 30th April 1691 with a promise that they should be visited by their compatriots within two years. The two years were spent without misadventure, but, instead of waiting for the arrival of their friends, the seven colonists (for one had meanwhile died) rashly left the island on 8th May 1693 and made their way to Mauritius, where they were treated with great cruelty by the governor. The account of the enterprise left us by Francis Leguat—*Voyages et Aventures* (London, 1708), or, as it is called in the English translation, *A New Voyage to the East Indies* (London, 1708)—is a most garrulous and amusing narrative, and was for a long time almost the only source of information about Rodriguez. His description of the solitaire is of course unique.

See Charles Grant, *Hist. of Mauritius and the Neighbouring Islands*, 1801; Higgin, in *Jour. R. G. Soc.*, London, 1849; the *Report of the results of the Transit of Venus Expedition*, 1874-75, published as an extra volume of *The Philosophical Transactions* (clxviii.), London 1879 (Botany, by I. B. Balfour; Petrology, by N. S. Maskelyne, &c.); Behm, in *Petermann's Mittheilungen*, 1880; *Colonial Office List*, 1884, 1885.

ROE. See Deer, vol. vii. p. 24.

ROE or Row, Sir Thomas (1568?-1644), an eminent political agent of the reigns of James I. and Charles I., was born in 1568 (?) at Low Leyton near Wanstead in Essex (being a grandson of Sir Thomas Roe, a well-known lord mayor of London). He was entered as a commoner at Magdalen College, Oxford, in 1593, but shortly afterwards he left the university and, having read for the bar, became esquire of the body to Queen Elizabeth. From James I. he received the honour of knighthood in 1604, and in 1609 he was sent by Prince Henry on a mission to the West Indies, during which he visited Guiana and the river Amazons. As member of parliament in 1614 he supported the principles of Sandys and Whitelocke. His permanent reputation was mainly secured by the success which attended his embassy in 1615-18 to the court at Agra of the Great Mogul (Jahangir, son of Akbar), whose importance had been made known by Sir John Hawkins,—the principal object of the mission being to obtain the protection of an English factory at Surat. Sir Thomas Roe's *Journal*, reprinted in a more or less complete shape in the collections of Purchas, Pinkerton, and Kerr, forms one of the leading authorities for the reign of Jahangir. Appointed ambassador to the Porte in 1621, he filled this difficult position under Osman, Mustapha, and Amurat; and after his return from the East he continued to be employed on various political missions to Poland, Denmark, and other European courts, till in 1641 he was sent by Charles I. to the diet of Ratisbon. Roe died in 1644.

The Society for the Encouragement of Learning proposed to publish a whole series of Roe's papers, but owing to lack of funds only one of the five volumes, edited by Samuel Richardson, ever saw the light—*The Negotiations of Sir Thomas Roe in his Embassy to the Ottoman Porte, 1621-1628* (London, 1740). In regard to his minor publications and manuscript remains see Wood's *Athenæ Oxonienses*, Allibone's *Dictionary of British . . . Authors*; and *Notes and Queries*, vii., viii., ix., and xi. (2d ser.).

ROEBLING, John Augustus (1806-1869), civil engineer, was born at Mühlhausen, Prussia, 6th June 1806. Soon after his graduation from the polytechnic school at Berlin he removed to the United States, and in 1831 entered on the practice of his profession in western Pennsylvania. He established at Pittsburgh a manufactory of wire rope, and in May 1845 completed his first important structure, the suspended aqueduct of the Pennsylvania Canal across the Monongahela river. This was followed by the Monongahela suspension bridge at Pittsburgh and several suspended aqueducts on the Delaware and Hudson Canal. Removing his wire manufactory to Trenton, New Jersey, he began, in 1851, the erection at Niagara Falls of a long span wire suspension bridge with double roadway, for railway and carriage use (see Bridge, vol. iv. pp. 338-339), which was completed in 1855. Owing to the novelty of its design, the most eminent engineers, including Stevenson, regarded this bridge as foredoomed to failure; but, with its complete success, demonstrated by long use, the number of suspension bridges rapidly multiplied, the use of wire-ropes instead of chain-cables becoming all but universal. The completion, in 1867, of the still more remarkable suspension bridge over the Ohio river at Cincinnati, with a clear span of 1057 feet (see Cincinnati, vol. v. p. 782), added to Roebling's reputation, and his design for the great bridge spanning the East River between New York and Brooklyn was accepted.[1] While personally engaged in laying out the towers for the bridge, Roebling received an accidental injury, which resulted in his death, at Brooklyn, from tetanus, 22d July 1869.

At the time of his death Roebling's work on *Long and Short Span Bridges* New York, 1869) was in the press. It is devoted to an exposition of his belief that "the principle of suspension will of necessity become the main feature in our future long span railway bridges," and was intended as the initial volume of a series relating to his general theory of bridge construction, with detailed plans and descriptions of the larger works erected by him.

ROEMER, Ole (Latinized Olaus) (1644-1710), Danish astronomer, was born at Aarhuus in Jutland, 25th September 1644. He studied mathematics at the university of Copenhagen until 1671, when he assisted Picard in determining the geographical position of Tycho Brahe's observatory (Uranienburg on the island of Huen). In 1672 he accompanied Picard to Paris, where he remained nine years, occupied with observations at the new royal observatory and hydraulic works at Versailles and Marly. In 1675 he read a paper before the Academy on the successive propagation of light as revealed by a certain inequality in the motion of the first of Jupiter's satellites (see Parallax, vol. xviii. p. 251). In 1681 he returned to Copenhagen, where he spent the remainder of his days as professor of astronomy, but his great ability and practical talents were made use of in several other public employments. He died on 23d September 1710.

Roemer's name is now best known by his discovery of the finite velocity of light. Most of his contemporaries doubted the reality of this discovery, chiefly because the eclipses of the three outer satellites of Jupiter did not show similar irregularities to those exhibited by the first satellite. This is not surprising, as the mutual attraction of the satellites makes their motions far more complicated than astronomers imagined before the development of the theory of gravitation, and it should perhaps be chiefly ascribed to chance that Roemer brought forward his theory, which Bradley's discovery of the aberration of light about fifty years later proved to be a true one. Roemer's ingenuity has, however, appeared very prominently in the important improvements which he carried out in the construction of astronomical instruments. The large "armillary spheres," first constructed by the astronomers of Alexandria and also used by Tycho Brahe, had been superseded by the meridian or mural quadrant for measuring meridian zenith distances, and by the sextant for measuring distances between stars in order to find their difference of right ascension by solving the spherical triangle between the pole and the two stars. Both these instruments were introduced by Tycho Brahe. Roemer, however, saw that Tycho's idea of making the rotating earth itself an astronomical instrument by observing the transits of stars across the meridian could be carried out better by fixing a telescope at right angles to a horizontal axis placed exactly east and west, so that the telescope could only move in the meridian. The first transit instrument was constructed in 1689 and erected in Roemer's house in 1690. In the same year he erected in the university observatory an instrument with altitude and azimuth circles (for observing equal altitudes on both sides of the meridian) and an equatorial instrument. In 1704 he constructed a private observatory at Vridlosemagle, a few miles west of Copenhagen, and mounted a meridian circle (the transit instrument and vertical circle combined) and a transit instrument moving in the prime vertical. Roemer may thus be considered the inventor of nearly all our modern instruments of precision, and it is much to be regretted that his ideas were not adopted by astronomers until about a century later. All the results of his observations were destroyed in a great conflagration in 1728, except three days' work, which has been discussed by Galle (*O. Roemeri triduum observationum astronomicarum a. 1706 institutarum*, Berlin, 1845). His disciple Horrebow has left us a very detailed description of Roemer's instruments and ideas in his *Opera mathematico-physica* (3 vols., Copenhagen, 1740-41). Grant's *History of Physical Astronomy* (London, 1852) gives a very correct account of Roemer and his inventions. About his life see also an article by Philipsen in *Nordisk Universitets Tidsskrift*, vol. v., 1860.

ROERMOND or Roermonde (i.e., "Roer-Mouth"), a town of the Netherlands in the province of Limburg (formerly Guelderland), on the right bank of the Maas (Meuse) at the mouth of the Roer, which separates it from the suburb of St Jacob. It is 29½ miles from Maestricht by the railway to Venlo (opened 1865). The old fortifications were dismantled in 1819 and have been partly turned into promenades. At this point the Maas is crossed by a bridge erected in 1866-67, and the Roer by one dating from 1771 and replacing the older structure destroyed in 1764. The finest building in the town is the Romanesque minster church, begun in 1218, and dedicated by Archbishop Engelbert of Cologne. In the middle of the nave is the tomb of Count Gerhard III. of Guelderland and his wife Margaret. The cathedral of St Christopher is also of note; on the top of the tower (246 feet) is a copper statue of the saint and the interior is adorned with paintings by Rubens, Jacob de Wit, &c. The Reformed church was once the chapel of the monastery of the Minorites. The old bishop's palace is now the court-house, and the old Jesuits' monastery with its fine gardens is now occupied as a higher burgher school. Woollen, cotton, silk, and mixed stuffs, paper, flour, and beer are manufactured at Roermond. The population of the town was 5712 in 1840 and 8797 in 1870; and that of the commune has increased from 6005 in 1840 to 10,470 in 1879.

Till the 13th century Roermond was only a village with a hunting lodge known as Pot. The erection of the monastic church in 1218 was followed by the building of town walls in 1231 by Count Otho II. In 1543 Roermond was occupied by the troops of Charles V., and in the course of the Eighty Years' War few places more frequently changed hands. The peace of Münster (1648) left it in the Spanish Netherlands; but between 1702 and 1716 it was held by the forces of the United Provinces.

ROGATION DAYS, the Monday, Tuesday, and Wednesday before Ascension Day. The week in which they occur is sometimes called Rogation Week. See Litany, vol. xiv. pp. 695-696.

ROGER I., "grand count" of Sicily, the twelfth and youngest son of Tancred de Hauteville in Normandy, was born about 1031. He joined his brother Robert Guiscard (*q.v.*) in Italy in 1058, and after taking part with him in his conquests on the mainland passed over to Sicily in 1061. There such success attended his arms that in 1071 he took the title of count; in 1089 he became "grand count" and in 1098 received from the pope for himself and his successors the title of "legate apostolical" in Sicily. He died in 1101. See Sicily.

ROGER II., count of Sicily, son of the preceding, was born about 1093 and died in 1154. He obtained from the antipope Anacletus II. the title of king of Sicily in 1130, and was crowned in the same year. The title was afterwards confirmed in 1139 by Innocent II. See Sicily.

ROGER of Hovedon. See Hovedon, vol. xii. p. 319.

ROGER of Wendover, who was a monk in the abbey of St Albans, and who died prior of Belvoir in 1237, was long regarded as the sole author of a Latin chronicle entitled *Flores Historiarum*, being a history of the world from the creation down to the year 1235. Recent investigation, however, has disclosed that only the portion from 1189 onwards is from his pen, and that the remainder must be attributed to John de Cella, who was abbot of St Albans from 1195 to 1214. See vol. xv. p. 634.

ROGERS, John (*c.* 1500-1555), editor of the English Bible known as Matthew's. See vol. viii. p. 386.

ROGERS, Samuel (1763-1855), the "melodious Rogers" of Byron, the "memory Rogers" of the general reader, has a unique reputation among English men of letters. Not only was he a poet of sufficient mark to be hailed by Byron—with perverse but sincere admiration—as one of the few men of genuine weight in an age of scribblers, but he was also for fifty years the most celebrated entertainer of celebrities in London. From 1803, when he removed from his chambers in the Temple, till the last year of his long life, his house, 22 St James's Place, was the common meeting-ground of men of distinction in every walk of life. Hence, though his poems are no longer read except by the student, his name is kept alive in the letters and diaries of associates whose works are more permanent than his own,—kept alive, too, not merely as that of a cultured Amphitryon but as that of a conversational wit whose tart sayings are worthy of record.

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[1] For description of this the largest wire suspension bridge in the world, see New York City, vol. xvii. p. 465.

He was born at Newington Green (London) on 30th July 1763, the son of a wealthy London banker, and related on the mother's side to the celebrated Nonconformist divines Philip and Matthew Henry. Dr Price, the Unitarian, Burke's antagonist, was the family pastor and a frequent visitor at his father's house. The influence of this writer's philosophy can be traced in Rogers's poems. Rogers was educated at the famous Nonconformist academy at Newington Green, where Defoe had been a pupil a hundred years before. Attention to English studies had been a distinct object in this school from its foundation, and Rogers, his youthful ambition awakened, rushed into print as an essayist in the *Gentleman's Magazine* at the age of eighteen. His main desire then was to be a preacher like Dr Price; but he yielded to his father's advice and entered the paternal bank. But he was far from abandoning his love for literature. He read Gray and Goldsmith on his way to the bank, and in 1786 proved his admiration for these exemplars in a volume containing some pretty imitations of Goldsmith and a wildly apostrophic *Ode to Superstition* after the manner of Gray. This volume contains one of the few passages of his that are often quoted—

"There 's such a charm in melancholy,
I would not, if I could, be gay."

Following Gray's example, the youthful poet took great pains with his verses, and, after nine years' maturing, published in 1792 a more elaborate and more successful bid for poetic laurels, *The Pleasures of Memory*. This poem may be regarded as the last blaze of the poetic diction of the 18th century before its final extinction. We see here carried to the extremest pitch the theory of elevating and refining familiar themes by abstract treatment and noble imagery. So simple an act as that of trying to remember a half-forgotten fact or fancy is elaborately and beautifully compared to the search of an impatient mother for a child lost in a forest. The common organ-grinder becomes "the blithe son of Savoy," and as such is presented in a most romantic situation as an object for refined sympathy. The good familiar creature memory itself is transfigured into a gracious personification of most benignant and wide reaching power. In this art of "raising a subject," as the 18th century phrase was, the *Pleasures of Memory* is much more perfect than Campbell's *Pleasures of Hope*, published a few years later in imitation. Byron's criticism is complete,—"there is not a vulgar line in the poem." This is the acme of positive praise for the fashionable serious poetry of the 18th century: when this can be said of a poet, he has reached the perfection of its ideal of poetic diction. In this poem the characters of the school can be analysed in cold blood, for there is not much excitement in laboured reflexions on the pleasures of memory. Human interest is at a minimum in such frigid exercises; it is almost entirely an affair of diction. The chief feeling excited is astonishment at the pains taken by the poet to provide thick and showy wrappages for such starveling little children of thought.

It was six years before Rogers was ready with another of his elaborate poems,—*An Epistle to a Friend* (1798). This has at least the advantage of some personal interest. It describes the poet's ideal of a comfortable life, and may be put side by side with Pomfret's *Choice* for literary comparison, and with the poet's own life for fifty years afterwards. Although for conventional poetic reasons Rogers establishes his ideal house in the country instead of in St James's Place, still the principles of living are the same which afterwards regulated his real life and were carried out with easy steady perseverance. "It is the design of this Epistle to illustrate the virtue of True Taste; and to show how little she requires to secure not only the comforts but even the elegancies of life. True Taste is an excellent Economist." Rogers illustrated this maxim in proceeding to surround himself with rare and beautiful works of art and letters, and to make his house the centre for all that was most distinguished and agreeable in London society. Many persons in his time spent ten times as much in the pursuit of a similar object without one-tenth of the success. "I believe," Mrs Norton wrote, "no man ever was so much attended to and thought of who had so slender a fortune and such calm abilities. His God was Harmony; and over his life Harmony presided sitting on a lukewarm cloud." When he moved to St James's Place in 1803 he withdrew from active concern in the bank, contenting himself with a moderate income as a sleeping partner; and so careful a manager was he of this income that he was able not only to entertain and to buy choice things—his collection, which seems to have contained hardly a particle of rubbish, fetching £50,000 when sold after his death—but also to extend generous help to struggling men of letters. It was Rogers who came to Sheridan's relief in his last days when he was deserted by his titled friends; Moore and Campbell received help in need from him, as munificent as it was delicately offered; and he was always ready to befriend much less distinguished merit in distress. It was perhaps characteristic of a man so cautious, equable, and dispassionate that his wit had a depreciating turn and was often exercised with calm insolence at the expense of fussy pretence. But that the man was on the whole of a kindly and lovable nature was shown by an incident late in his life. His popularity was put to the test of misfortune by the robbery of his bank. Most of the money was recovered, but upon the news of the misfortune several men of wealth and title came forward with large offers of assistance.

Although the laureateship was pressed upon Rogers by the prince consort on Wordsworth's death in 1850, he had not been a prolific poet during his long life of cultured leisure and social enjoyment. He continued his practice of writing little and writing slowly. Fourteen years intervened between the *Epistle* and the publication of the *Voyage of Columbus* in 1812. In method this poem was a compromise between the old school of reflective poetry and the new school of narrative. The story of Columbus was the theme, but the story was not told: it was only indicated in a series of reflexions on its most striking moments. The experiment helped forward the literary movement; the new school through Byron took the hint, and *The Giaour*, though interpenetrated with a more vigorous life, was avowedly written on the model of *Columbus*, and dedicated to Rogers. In his next poem, *Jacqueline*, which was published in the same volume with Byron's *Lara* in 1814, much to the benefit of the wits of the time, Rogers may be said to have gone over to the new school, adopting their four-accent measure and showing his skill, which was considerable, in pure narrative. His reflective poem on *Human Life*, though published in 1819, can hardly be described as a reversion, for he had been engaged on it off and on for twelve years. It is much the best of his meditative poems, as elegant and finished in diction as the *Memory*, and much more incisive in thought and touching in sentiment. His last, longest, and most interesting published work was *Italy*, the first instalment of which was published in 1821 and the last in 1834. It is said that, when the publisher complained that the public would not buy *Italy*, Rogers affirmed that he "would make them buy it"; and, calling in the aid of Turner and Stothard, he produced the sumptuous illustrated edition at a cost of £15,000. Apart from these adventitious charms *Italy* has much greater general interest than any other of Rogers's poems, and is likely to be read for long, if only as a traveller's companion. The style is studiously simple; the blank verse has quite an Elizabethan flavour, and abounds in happy lines; the reflexions have a keen point; and the incidental stories are told with admirable brevity and effect. Passages of prose are interspersed, wrought with the same care as the verses, and the notes are models of interesting detail concisely put.

For the last five years of his life Rogers, who had been extremely active till his eighty-eighth year, was confined to his chair in consequence of a fall in the street. He died in London on 18th December 1855, in his ninety-third year. Only very fragmentary records are preserved of the brilliant gatherings at breakfast and dinner in his house. Fragments are to be gleaned in the diaries of Byron, Moore, Sydney Smith, and others. *Recollections* of his table-talk were published in 1856, and a volume of his *Recollections* of celebrities in 1857. A complete *Life* is understood (1885) to be in preparation, with Mr P. W. Clayden as editor. Mr Hayward's essay is the most complete account of Rogers hitherto published. (W. M.)

ROHAN, Henri de (1579-1638), a general and writer of eminence and one of the last and best representatives of the independent French noblesse, was born at the château of Bleins in Brittany on 21st August 1579. His father was René II., count of Rohan, and head of a family which had hardly a superior in France for antiquity and distinction, and which was connected with most of the reigning houses of Europe. Rohan was by birth the second son, but his elder brother René dying young he became the heir of the name. He appeared at court and in the army at the age of sixteen, and was a special favourite with Henry IV., after whom, failing the house of Condé, he might be said to be the natural chief of the French Protestants. Having served till the peace of Vervins, he travelled for a considerable time over Europe, including England and Scotland, in the first of which countries he received the not unique honour of being called by Elizabeth her knight, while in the second he was godfather at Charles I.'s christening. On his return to France he was made duke and peer at the age of twenty-four and married Marguerite de Béthune, Sully's daughter, receiving lucrative appointments. After the assassination of Henry IV., which was a great blow to him, Rohan fought with success at the siege of Jülich. But from this time onwards he was for the greater part of many years either in active warfare against the Government of his country, or in active though peaceable opposition to it. For a time, however, he abstained from actual insurrection, and he endeavoured to keep on terms with Marie de' Medici; he even, despite his dislike of De Luynes, the favourite of Louis XIII., reappeared in the army and fought in Lorraine and Piedmont. It was not till the decree for the restitution of church property in the south threw the Bearnese and Gascons into open revolt that Rohan appeared as a rebel. His authority and military skill were very formidable to the royalists, forced them among other checks to raise the siege of Montauban, and brought about the treaty of Montpellier (1623). But Rohan did not escape the results of the incurable factiousness which showed itself more strongly perhaps among the French Huguenots than among any other of the numerous armed oppositions of the 17th century. He was accused of lukewarmness and treachery, though he did not hesitate to renew the war when the compact of Montpellier was broken. Again a hollow peace was patched up, but it lasted hardly any time, and Rohan undertook a third war, the first the events of which are recounted in his celebrated *Memoirs*. This last war (famous for the siege of La Rochelle, in which, however, Rohan's brother Soubise, not Rohan himself, was principally concerned) was one of considerable danger for Rohan: he was condemned to death, and a great reward was offered for him dead or alive. Nor at the close of the war did he think it best to remain in France, but made his way to Venice. Here he lived quietly for some time and is said to have received from the Porte the offer of the sovereignty of Cyprus. It is more certain that his hosts of Venice wished to make him their general-in-chief, a design not executed owing to the peace of Cherasco (1631). Soon afterwards Rohan was again called to serve his lawful sovereign. Richelieu had had experience, though not friendly experience, of his abilities, and when France began once more to take a vigorous part in the Thirty Years' War Rohan was appointed to the task of occupying the Valtelline, and thus cutting off the communication between Germany and Italy. He was entirely successful and repeatedly beat both the imperialists and the Spaniards. But, despite this service, Rohan was still thought dangerous to the peace of France owing to his influence with the Huguenots, and objection was even made to his residence in Geneva. He therefore joined Bernhard of Saxe-Weimar, and was serving in his army when he met with the wound which caused his death at Rheinfelden on 14th March 1638. His body was buried at Geneva and his arms solemnly bequeathed to and accepted by the Venetian republic. Rohan's wife was a woman of talent and energy, though she did not escape scandal. His younger brother Benjamin, generally known as Soubise, was, like him, a famous Huguenot leader. His daughter and only recognized surviving child, named Marguerite, carried the honours of Rohan into the Chabot family.

What has chiefly preserved Rohan's memory is not his military achievements, though they were remarkable, nor his political position, though it was high, but his admirable *Memoirs*. These cover the civil wars in three books, while a fourth contains the narrative of the Valtelline campaigns; and they rank among the best products of the singular talent for memoir-writing which the French aristocracy of the 16th and 17th centuries possessed. Alike in style, in clearness of matter, and in shrewdness of thought they deserve very high praise. The first three books appeared in 1644, that on the Valtelline War not till 1758. Some suspicions were thrown on the genuineness of this latter, but it would seem groundlessly. Rohan also wrote *Le Parfait Capitaine*, an adaptation of the military precepts and examples of Cæsar to modern warfare; an account of his travels; a political tract, *L'Intérêt des États et des Princes de la Chrétienté*, &c. The *Memoirs*, which alone have continued to be reprinted, may be conveniently found in the collection of Michaud and Poujoulat, vol. xix.

ROHAN, Louis René Édouard, Cardinal de (1734-1803), prince de Rohan-Guéménée, archbishop of Strasburg, the hero of the scandal of the diamond necklace, and a cadet of the great family of Rohan (which traced its origin to the kings of Brittany, and was granted the precedence and rank of a foreign princely family by Louis XIV.), was born at Paris on 25th September 1734. Members of the Rohan family had filled the office of archbishop of Strasburg from 1704,—an office which made them princes of the empire and the compeers rather of the German prince-bishops than of the French ecclesiastics. For this high office Louis de Rohan was destined from his birth, and soon after taking orders, in 1760, he was nominated coadjutor to his uncle, Constantine de Rohan-

Rochefort, who then held the archbishopric, and he was also consecrated bishop of Canopus. But he preferred the elegant life and the gaiety of Paris to his clerical duties, and had also an ambition to make a figure in politics. He joined the party opposed to the Austrian alliance, which had been cemented by the marriage of the archduchess Marie Antoinette to the dauphin. This party was headed by the duc d'Aiguillon, who in 1771 sent Prince Louis on a special embassy to Vienna to find out what was being done there with regard to the partition of Poland. Rohan arrived at Vienna in January 1772, and made a great noise with his lavish fêtes. But the empress Maria Theresa was implacably hostile to him; not only did he attempt to thwart her policy, but he spread scandals about her daughter Marie Antoinette, laughed at herself, and shocked her ideas of propriety by his dissipation and luxury. On the death of Louis XV., in 1774, Rohan was recalled from Vienna, and coldly received at Paris; but the influence of his family was too great for him to be neglected, and in 1777 he was made grand almoner, and in 1778 abbot of St Vaast. In 1778 he was made a cardinal on the nomination of Stanislaus Poniatowski, king of Poland, and in the following year succeeded his uncle as archbishop of Strasburg and became abbot of Noirmoutiers and Chaise-Dieu. His various preferments brought him in an income of two and a half millions of livres; yet the cardinal was restless and unhappy until he should be reinstated in favour at court and had appeased the animosity which Marie Antoinette felt against him. Though a man of some ability, he became infatuated with the notorious charlatan Cagliostro in 1780, and lodged him in his palace, and in 1782 he made the acquaintance of Madame de Lamotte-Valois, a descendant of an illegitimate branch of the Valois, but a poor adventuress, and married to an adventurer. These people, having acquired great influence over Rohan, determined to turn his excessive desire to become reconciled to the queen to their own advantage. They persuaded him that Marie Antoinette wished him well, and contrived an interview between him and a girl named Oliva, who greatly resembled the queen, in the gardens of Versailles in August 1784, so skilfully that he believed he had seen the queen herself and that she had given him a rose. The adventuress then persuaded him that the queen would be much gratified by the present of an extremely valuable diamond necklace which she had refused in 1778 and 1781, and on 26th January 1785 the cardinal purchased it for 1,600,000 francs, to be paid in three instalments, and handed it over to a pretended valet of the queen on receipt of a forged letter of thanks signed "Marie Antoinette of France." The comte de Lamotte-Valois at once started for London, and, after breaking up the necklace, began to sell the diamonds separately. The plot soon came to light, and the king sent the cardinal to the Bastille. This arrest of a great nobleman and an archbishop excited the wrath of both the nobility and the bishops, and the large party opposed to the Austrian alliance regarded him as a martyr. In this feeling the old courtiers and the judges of the parlement of Paris participated, for they hated the queen for her abolition of strict etiquette and for her extravagance and frivolity. The people, who had also been taught by pamphleteers to hate her and to regard her as the cause of all their ills, shared the feeling of their superiors in education; and, when the parlement of Paris solemnly absolved the cardinal of all blame on 31st May 1786, his acquittal was received with universal enthusiasm, and regarded as a victory over the court and the queen. Though acquitted by the parlement of Paris, the cardinal was deprived of his office as grand almoner and exiled to his abbey of Chaise-Dieu. He was soon allowed to return to Strasburg, and his popularity was shown by his election in 1789 to the states-general by the clergy of the bailliages of Haguenau and Weissenburg. He at first declined to sit, but the states-general, when it became the national assembly, insisted on validating his election. But as a prince of the church in January 1791 he refused to take the oath to the constitution, and went to Ettenheim, in the German part of his diocese. In exile his character improved, and he spent what wealth remained to him in providing for the poor clergy of his diocese who had been obliged to leave France; and in 1801 he resigned his nominal rank as archbishop of Strasburg. On 17th February 1803 he died at Ettenheim.

For the affair of the diamond necklace and the life of the cardinal see the *Memoires* of his secretary, the Abbé Georgel, of the baroness d'Oberkirch, of Beugnot, and of Madame Campan; the *Memoires inédits du Comte de Lamotte-Valois*, ed. Louis Lacour, 1858, in which Rohan is ably defended and Marie Antoinette stigmatized; *Marie Antoinette et le Procès du Collier*, by Emile Campardon, 1863; and Carlyle's "The Diamond Necklace," in *Fraser's Magazine* (1837), republished in his *Essays*.

ROHILKHAND or **Rohilcund**, a division or commissionership in the North-Western Provinces of India, lying between 27° 35′ and 30° 1′ N. lat. and between 78° 1′ and 80° 26′ E. long. It comprises the six districts of Bijnaur (Bijnor), Murádábád, Budáun, Bareli (Bareilly), Sháhjahánpur, and Pilibhit, together containing an area of 10,885 square miles, with a population (1881) of 5,122,557 (males 2,728,761, females 2,393,796). By religion, Hindus numbered 3,921,989, Mohammedans 1,192,263, and Christians 6304. In the same year there were 11,327 towns and villages in the division and 639,604 occupied houses. Of the total area 6416 square miles were returned as cultivated and 2516 as cultivable. In 1883-84 Rohilkhand division had 2592 miles of road and 163 miles of railway; in the same year its gross revenue amounted to £980,682, of which the land-tax contributed £695,181.

ROHTAK, a British district of India, in the Hissar division, under the lieutenant-governorship of the Punjab, lying between 28° 19′ and 29° 17′ N. lat. and between 76° 17′ and 77° 30′ E. long. It contains an area of 1811 square miles, and is bounded on the N. by Karnal, on the E. by Delhi, on the S. by Gurgaon, and on the W. by Hissar and the native state of Jhind. Rohtak district is situated in the midst of the level tableland separating the Jumna and the Sutlej valleys; it is one unbroken plain, consisting of a hard clay copiously interspersed with light yellow sand, and covered in its wild state by a jungle of scrubby brushwood. It possesses no grand scenery, but on the whole the features of the district are more diversified than many of the plain districts of the Punjab. The only natural reservoir for its drainage is the Najafgarh Jhil, a marshy lake lying within the boundaries of Delhi. The Sahibi, a small stream from the Ajmere hills, traverses a corner of the district, and the northern portions are watered by the Rohtak and Butana branches of the Western Jumna Canal, but the greater portion of the central plain, comprising about two-thirds of the district area, is entirely dependent upon the uncertain rainfall. The climate, though severe in point of heat, is generally healthy; the average rainfall is about 19½ inches. Rohtak has no railway; it is, however, well provided with roads, which cross it in every direction, and telegraphic communication is now under construction.

In 1881 the population of Rohtak district numbered 553,609 (296,224 males and 257,385 females). By religion Hindus numbered 468,965, or nearly 85 per cent. of the total population, and Mohammedans 79,510. There are only two towns in the district with inhabitants exceeding 10,000, namely, Rohtak (see below) and Jhajjar with 11,650. Rohtak is a purely agricultural district, but its produce hardly more than suffices for its home consumption. Of the total area of 1811 square miles, 1416 were in 1883-84 returned as cultivated and 269 as cultivable. The chief products are food grains, pulses, cotton, and sugar-cane. There are no manufactures of more than local importance excepting ornamental turbans at Rohtak and saddlery at Kalanar. Pretty pottery is made at Jhajjar, and cotton cloth for home use is woven in large quantities. The gross revenue of the district in 1883-84 was £78,346, of which £65,440 was derived from the land-tax.

Rohtak was formerly included within the region known as Hariana, which in 1718 was granted by the emperor Faroksher to his minister Rukhan-ad-Daula, who in his turn made over the greater part of it to a Baluch noble, Faujdar Khan, afterwards created nawab of Farakhnagar. The district, together with the other possessions of Scindia west of the Jumna, passed to the East India Company in 1803. Until 1832 Rohtak was under the administration of a political agent, resident at Delhi, but in that year it was brought under the general regulations and annexed to the North-Western Provinces. The outbreak of the mutiny in 1857 led to the abandonment, for a time, of the district by the British, when the mutineers attacked and plundered the civil station of Rohtak, destroying every record of administration. It was not until after the fall of Delhi that the authority of the British Government was permanently restored. The constitution of the present district was then taken in hand, and Rohtak was transferred to the Punjab Government

ROHTAK, municipal town and headquarters of the above district, lying in 28° 54′ N. lat and 76° 38′ E. long., with a population in 1881 of 15,699 (males 8155, females 7544). It is situated 44 miles to the north-west of Delhi on the road to Hissar, and, viewed from the sandhills to the south, forms with its white mosque in the centre and the fort standing out boldly to the east a striking and picturesque object. Rohtak is a town of great antiquity, but beyond the fact that it became the headquarters of a British district in 1824 it is of no considerable importance.

ROJAS-ZORILLA, Francisco de, Spanish dramatist, a contemporary of Lope de Vega and Calderon, was born about the beginning of the 17th century. Of his personal history hardly anything has been recorded, but we know that he lived at Madrid, and about the year 1641 he seems to have become a knight of Santiago. Of his dramatic compositions some thirty still survive, which can be read in the 54th volume of the *Biblioteca de Autores Españoles* (1861); the best by general consent is held to be that entitled *Del Rey abajo Ninguno*, otherwise known by the name of its hero as *Garcia de Castañar*. Of the others, apart from their intrinsic merit, a double literary interest attaches to the *No hay Padre siendo Rey*, which was borrowed by Rotrou for his *Venceslas*, to the *Donde hay Agravios no hay Zelos* and the *Amo criado*, which were imitated by Scarron in his *Jodelet Souffleté* and *Maître Valet*, and to the *Entre Bobos anda el Juego*, to which Thomas Corneille has acknowledged his obligations for his *Bertrand de Cigarral*. The *Garcia de Castañar*, *Donde hay Agravios*, and *Entre Bobos anda el Juego* are given by Ochoa in his *Tesoro del Teatro Español*.

ROKITANSKY, Carl von Rokitansky, Freiherr von (1804-1878), the founder of the Vienna school of pathological anatomy, was born in 1804 at Königgrätz in Bohemia. He got his schooling in his native town as well as at the gymnasium of Leitmeritz, after which he became a student of medicine at Prague. He finished his medical studies at Vienna, graduating there in 1828. Soon after he became assistant to Wagner, the professor of pathological anatomy, and succeeded him in 1834 as prosector, being at the same time made extraordinary professor. It was not until ten years later (1844) that he reached the rank of full professor. To his duties as a teacher he added in 1847 the onerous office of medico-legal anatomist to the city, and in 1863 an influential office in the ministry of education and public worship, wherein he had to advise on all routine matters of medical teaching, including patronage. A seat in the upper house of the reichsrath rewarded his public labours in 1867, and on his retirement from all his offices in 1874 he was made a commander of the Order of Leopold. He joined the Imperial Academy of Sciences as a member in 1848, and became its president in 1869. He was president also of the medical society of the Austrian capital and an honorary member of many foreign societies. On his retirement at the age of seventy his colleagues celebrated the occasion by a function in the aula of the university, where his bust was unveiled. In his leave-taking speech he said that work had always been a pleasure to him and pleasures mostly a toil. His death in 1878 elicited many genuine expressions of affection and of esteem for his upright character. Two of his sons became professors at Vienna, one of astronomy and another of medicine, while a third gained distinction on the lyric stage.

With Rokitansky's name is associated the second great period of the medical school of Vienna, its first success having been identified with the liberal patronage of it by Maria Theresa and with the fame of Van Swieten, whom the empress had attracted thither from Leyden. The basis of its second reputation was morbid anatomy, together with the precision of clinical diagnosis dependent thereon, and associated with the labours of Rokitansky's lifelong friend Skoda. The anatomical vogue had begun under Wagner while Rokitansky was still a student; but it reached its highest point while the latter was assistant in the dead-house and afterwards prosector and professor. The enthusiasm for the post-mortem study of disease brought one very serious consequence at the outset, in the enormous increase of the death-rate from puerperal fever in the lying-in wards of the general hospital. A comparison between the slight mortality in the wards that were afterwards reserved for the training of midwives and the excessive mortality in those set apart for the training of students proved that the cause was the conveyance of cadaveric poison from the dead-house by the hands of the latter The precautions introduced after 1847 succeeded in removing that grave reproach from the study of morbid anatomy. Another and more lasting consequence of the assiduous pursuit of post-mortem study, counterbalancing somewhat the advantage of a more precise and localized diagnosis, was the loss of faith in the power of drugs to remedy the textural changes—the so-called "nihilism" of the Vienna school. The immediate outcome of Rokitansky's close application to the work of the dead-house was his *Handbuch der pathologischen Anatomie* (1842-46), in 3 vols., of which the first was published last. The value of the work lies in the second and third volumes, containing succinct descriptions of the visible changes and abnormalities in the several organs and parts of the body. Whenever Rokitansky touched the vital problems of general pathology, as he did in the postponed first volume, he revealed a metaphysical bent, which was strong in him behind all his undoubted powers of outward observation and accurate description. Being a few years too soon to profit by the microscopic movement which led to the cellular pathology, he endeavoured to reconcile the old humoral doctrine with his anatomical observations, and to read a new meaning into the doctrine of the various dyscrasias. The third and last edition of his *Handbuch* was published from 1855 to 1861. In 1862 he entered into possession of a new pathological institute, in which he found means, for the first time, to display his extensive collection of specimens in a museum. Although he had no direct share in the newer developments of pathology, he was far from indifferent or reactionary towards them; indeed the laboratories and chairs for microscopic and experimental pathology and for pathological chemistry were warmly encouraged and aided by him.

Next to his *Handbuch*, of which the Syd. Soc. published an English translation in 4 vols., 1849-52, his most important writings were four memoirs in the *Denkschriften* of the Vienna Academy of Sciences (on the Anatomy of Goitre, Cysts, Diseases of Arteries, and Defects in the Septa of the Heart), the last as late as 1875. Other papers of less importance brought up the total of his writings to thirty-eight, including three addresses of a philosophical turn, on "Freedom of Inquiry" (1862), "The Independent Value of Knowledge" (1867), and "The Solidarity of Animal Life" (1869).

ROLAND. Jean Marie Roland de la Platrière (1732-1793), who, along with his wife, Manon Jeanne Phlipon (1754-1793), played a prominent part in the history of the French Revolution, in connexion chiefly with the policy and fortunes of the Girondists, was born at Villefranche near Lyons in 1732. He received a good education, and early formed the studious habits which remained with him through life. Proposing to seek his fortune abroad, he went on foot to Nantes, but was there prostrated by an illness so severe that all thoughts of emigration were perforce abandoned. For some years he was employed as a clerk; thereafter he joined a relative who was inspector of manufactures at Amiens, and he himself speedily rose to the position of inspector. To these two employments may be ascribed those qualities of assiduity and accuracy, and that familiarity with the commerce of the country, which distinguished his public career. In 1781 he married Manon Jeanne Phlipon, who was his junior by twenty-two years. She was the daughter of Gratien Phlipon, a Paris engraver, who was ambitious, speculative, and nearly always poor. From her early years she showed great aptitude for study, an ardent and enthusiastic spirit, and unquestionable talent. She was to a considerable extent self-taught: and her love of reading made her acquainted first with Plutarch—a passion for which author she continued to cherish throughout her life—thereafter with Bossuet, Massillon, and authors of a like stamp, and finally with Montesquieu, Voltaire, and Rousseau. These studies marked stages of her development; and as her mind matured she abandoned the idea of a convent which for a year or two she had entertained, and added to the enthusiasm for a republic which she had imbibed from her earlier studies not a little of the cynicism and the daring which the later authors inspired. She almost equalled her husband in knowledge and infinitely excelled him in talent and in tact. Through and with him she exercised a singularly powerful influence over the destinies of France from the outbreak of the Revolution till her death.

For four years after their marriage Roland lived at Amiens, he being still an inspector of manufactures; but his knowledge of commercial affairs enabled him to contribute articles to the *Encyclopédie Nouvelle*, in which, as in all his literary work, he was assisted by his wife. On their removal to Lyons the influence of both became wider and more powerful. Their fervent political aspirations could not be concealed, and from the beginning of the Revolution they threw in their lot with the party of advance. The *Courrier de Lyon* contained articles the success of which reached even to the capital and attracted the attention of the Parisian press. They were from the pen of Madame Roland and were signed by her husband. A correspondence sprang up with Brissot and other friends of the Revolution at headquarters. In Lyons their views were publicly known; Roland was elected a member of the municipality, and when the depression of trade in the south demanded representation in Paris he was deputed by the council of Lyons to defend the interests of the city before the constituent assembly. Accompanied by his wife, he appeared in the capital in February 1791.

They had made many and influential friends in advance, and Madame Roland's salon soon became the rendezvous of Brissot, Pétion, Robespierre, and other leaders of the popular movement. In person Madame Roland was attractive though not beautiful; her ideas were clear and far-reaching, her manner calm, and her power of observation extremely acute. It was almost inevitable that she should find herself in the centre of political aspirations and presiding over a company of the most talented men of progress. Her resolve was fixed, and gradually she impressed it upon all: the France of 1791 was a France of transition; a republic alone was its destiny, was the ideal of philosophy, the expression of liberty, the goal of history. This was the constant aim of her influence and her speech; it was accompanied with a petty animosity, almost hatred, towards the king and queen; but it found a ready echo in the minds of those leaders who willingly admired her calm and learned reasoning. The royal flight in June and the ignominious return lent impetus to these ideas; a journal entitled *The Republican* appeared in Paris, but at its second number was suppressed. In its organization Madame Roland had a hand.

In September 1791, Roland's mission being executed, they returned to Lyons. Meanwhile the inspectorships of manufactures had been abolished; he was thus free; and they could no longer remain absent from the centre of affairs. In December they again reached Paris. Roland became a member of the Jacobin Club. The rupture had not yet been made evident between the Girondist party and that section still more extreme, that of the Mountain. For a time the whole left united in forcing the resignation of the ministers. When the crisis came the Girondists were ready, and in March 1792 Roland found himself appointed minister of the interior. As a minister of the crown Roland exhibited a remarkable combination of political prejudice with administrative ability. While his wife's influence could not increase the latter it was successfully exerted to foment and embitter the former. He was *ex officio* excluded from the legislative assembly, and his declarations of policy were thus in writing,—that is, in the form in which she could most readily exert her power. A great occasion was invented. The decrees against the emigrants and the non-juring clergy still remained under the veto of the king. A letter was penned by Madame Roland and addressed by her husband to Louis. It remained unanswered. Thereupon, in full council and in the king's presence, Roland read his letter aloud. It contained many and terrible truths as to the royal refusal to sanction the decrees and as to the king's position in the state; but it was inconsistent with a minister's position, disrespectful if not insolent in tone, disloyal in spirit, and grossly disfigured by repeated threats of violence on the part of the people. It was meant, and it was used, simply as a lecture to the king's face and as an accusation behind his back. Roland's dismissal followed. Then he completed the plan: he read the letter to the assembly; it was ordered to be printed, became the manifesto of disaffection, and was circulated everywhere. In the demand for the reinstatement of the dismissed ministers were found the means of humiliation, and the prelude to the dethronement, of the king.

After the abolition of royalty on the 10th of August, Roland was recalled to power, one of his colleagues being Danton. To his dismay he found that the passions which he had lent his aid in evoking he was powerless to allay, and that the party of the Mountain was, on the contrary, utilizing these passions for purposes of incredible excess. From this moment, though too late, the conduct of Roland, his wife, and the whole Gironde became heroic. They fearlessly denounced the massacres of September, Roland writing boldly to the assembly on the subject. Both husband and wife became the butt of calumny and the object of increasing dislike on the part of the ultra-revolutionists,—Robespierre shunning them, Danton denouncing them, and Marat in his journal heaping upon them the foulest falsehoods. Still the Girondists, from Vergniaud downwards, banded themselves bravely on their side; but on 22d January 1793 Roland sent in his resignation. It was the day after the execution of the king.

Still they remained in Paris, unflinchingly, but with ever less and less success, attempting to regulate and elevate the Revolution. Calumny continued. Once Madame Roland appeared personally in the assembly to repel the falsehoods of an accuser, and her ease and dignity evoked enthusiasm and compelled acquittal. But violence succeeded violence, and early on the morning of the 1st of June she was arrested and thrown into the prison of the Abbaye. Roland himself escaped secretly to shelter in Rouen. Released for an hour from the Abbaye, she was again arrested and thrown among the horrors of Sainte Pélagie. Finally she was transferred to the Conciergerie. In prison she won the affections of the guards, and was allowed the privilege of writing materials and the occasional visits of devoted friends. She there wrote her

Appeal to an Impartial Posterity, those memoirs which display a strange alternation between self-laudation and patriotism, between the trivial and the sublime. On 8th November 1793 she was conveyed to the guillotine. Before yielding her head to the block, she bowed before the clay statue of Liberty erected in the Place de la Revolution, uttering her famous apostrophe—"O Liberty! what crimes are committed in thy name!" One week later Roland, having heard of his wife's death, wandered some miles from his refuge in Rouen; maddened by despair and grief, he wrote a few words expressive of his horror at those massacres which could only be inspired by the enemies of France, protesting that "from the moment when I learned that they had murdered my wife I would no longer remain in a world stained with enemies." He affixed the paper to his breast, and unsheathing a sword-stick fell upon the weapon, which pierced his heart, on 15th November 1793. (T. S.)

ROLAND, LEGEND OF. The main incident of this legend is founded upon an undoubted historical event,—the Spanish expedition of Charlemagne (778). The Frankish king, having crossed the Pyrenees and captured Pamplona, was beaten back from the walls of Saragossa.[1] On his return the "Gascons" (Basques) surprised his rear-guard, and, according to the testimony of Eginhard, cut it off to a man (*Vit. Car.*, c. i.),—"In which battle were slain Eggihard, provost of the royal table . . . and Hruodlandus, prefect of the Britannic march." This account is supported by other evidence more or less contemporary, as, for example, the *Vita Hludowici*.[2] From this work we gather that at the time of its composition (*c.* 840) the Roncesvalles disaster was already the subject of popular tradition; for its author, speaking of the Frankish chiefs slain in this battle, says, "quorum, quia vulgata sunt, nomina dicere supersedi." Yet in its earliest extant form the legend has already worked in the names and traditions of a later age, *e.g.*, the traitor Ganelon, who probably, as Leibnitz has suggested, represents Wenelon, archbishop of Sens, accused of treason towards Charles the Bald in 859.[3] It is interesting to note that during the last few years Dümmler (*Romania*, ii. 146-148) has discovered what appears to be the epitaph of the above-mentioned Eggihard. This, as G. Paris remarks, renders it highly probable that the similar elegiac verses quoted in the *Pseudo-Turpin* (cc. 24, 25), which make Roland thirty-eight years old at the time of his death, are also genuine survivals from the Carolingian era. According to Dümmler's discovery, the battle of Roncesvalles was fought on 15th August.

Earliest Extant Forms.—The legend of Roland makes its first appearance in (*a*) the so-called *History of Archbishop Turpin* and (*b*) the *Chanson de Roland*. The former, according to Paris, may be divided into two parts; of these the first (cc. 1-5), written about 1050, deals with Charlemagne's conquest of Spain, but contains no allusion to Roland. The latter section, written by a monk of Vienne between 1109 and 1119, gives the main outlines of the familiar legend: Marsilius and Baligant appear (*c.* 21); Roland fights with the giant Ferracute, Ariosto's Ferraù (*Orl. Fur.*, c. 1); then follow the narrative of Ganelon's treachery (c. 21) and punishment (c. 26), the episode of Roland's horn, Roland's address to his sword (c. 22), his last prayer, his death (c. 23), and Charles's vengeance on the Saracens (c. 26).[4] The *Chanson de Roland*, in its extant version probably composed in England between 1066 and 1095, looks like the expansion of an earlier poem written towards the beginning of the same century. It gives the legend in much the same form as the *Pseudo-Turpin*, but with far more detail and poetic fire. There are, however, a few striking differences between the two accounts. Such deal with the causes and method of Ganelon's treachery, the personality of Baldwin, and the fate of Archbishop Turpin. Above all, the Latin prose-writer has no second hero in Oliver and knows nothing of Roland's love for Aude.

Additions to the Early Legend.—The name of Roland was soon transplanted from its native soil in the *gestes* of Roncesvalles into almost the whole cycle of later Charlemagne romance; and by weaving these notices of him together we may construct the legendary story of his life. Thus the *Enfances Roland* (*c.* 1200) tells of his parents' disgrace and his infant valour; in the *Chanson d'Aspremont* (late 12th century) we read how he became possessed of his famous sword Durendal; *Girars de Viane* (*c.* 1200) recounts his great fight with Oliver and his love for that hero's sister Aude. Roland plays scarce less prominent a part in *Renaud de Montauban* (13th century) and figures in *Fierabras* (12th century), *Otinel* (*c.* 1250), and the *Voyage à Jerusalem* (*c.* 1150). Nicholas of Padua's *Entrée en Espagne* (*c.* 1320) makes Roland quarrel with Charles and fly to Persia, whence he only returns to aid in the siege of Pamplona and to perish at Roncesvalles.

Diffusion of the Roland Legend in Literature.—The immense popularity of the *Chanson de Roland* and the *Pseudo-Turpin* may be measured by the influence they have exercised on the literature of nearly every country of western Europe. To the original *Chanson de Roland* a poet of perhaps the reign of Philip Augustus added a new ending of some 2000 lines. From this full version are descended the *Remaniements* or *Roncevaux*, of which so many French MSS. remain. During the 12th century a Swabian priest, Conrad, translated the *Chanson* into rhymed German verse. This *Rolandslied* forms the basis of the Stricker's *Karl* (*c.* 1230), in its turn the foundation for the Roncesvalles section of the so-called *Karl Meinet* (early 14th century). In England Taillefer's singing of a "cantilena Rollandi" prefaced the first Norman charge at Hastings;[5] but, curiously enough, the English *Roland* of the 14th century in some places seems to look back for its original to the *Pseudo-Turpin* rather than to the *Chanson de Roland*, which received its final shape in England.[6] It was probably from that country that the Roland legend passed to Scandinavia and Iceland. There the battle of Roncesvalles forms the eighth section of the great *Karlamagnus Saga* (13th century), which is of critical importance, as it preserves some details not to be found in the *Chanson de Roland* as we now have it. Translated into Danish, this work took the form of the *Kejser Karl Magnus* (15th century), to this day a popular book in Denmark. The legend penetrated eastward into Hungary and Bohemia; while in the west Roland appears in the Welsh *Mabinogion* and the tales of Ireland. M. Bormans has published Flemish fragments of the Roncesvalles story; and these, which belong to the 13th and the 14th century, are based on the *Chanson*. In the 16th century the same legend circulated throughout the Low Countries in one of the most popular books of the day. In the 13th century the Spanish "fabulæ histrionum," of which Roderic of Toledo speaks (d. 1247), and which may, on one hypothesis, have been the sources whence the Pseudo-Turpin drew his materials, gave way to a new and more patriotic legend, in which Bernard del Carpio takes the leading place; but three centuries later (1528) Nicolas di Piamonte revived the purer Frankish tradition in the still popular *Karlo Magno*.

It is, however, on the literature of Italy that the Roland legend has exercised its widest influence. Here the songs, chanted by the early French jongleurs, towards the end of the 12th century made place for the Italianized ***Remaniements***, till the epoch of Nicholas of Padua (*c.* 1320), whose gigantic *Entrée en Espagne* (with its supplement the *Prise de Pampelune*, though but a mosaic of earlier materials, formed the groundwork of the Tuscan poem. the *Spagna* (1350-1380), on which the *Rotta di Roncisvalle* in its turn is founded. Somewhat later than the verse *Spagna* came the *Spagna* in prose; and the extraordinary popularity of the legend in its new guise made the names of Charlemagne's paladins familiar down to the age of the Renaissance. We have now reached the era of the great Italian poets Pulci (*Morgante Maggiore*, 1481), Boiardo (*Orlando Innamorato*, 1486), Ariosto (*Orlando Furioso*, 1516), and Berni (1541), whose poems, however, with the exception of Pulci's, are indebted to those of their predecessors for little more than the names of their chief characters and their general plan.

Roland in Mediæval Art.—The earliest remaining statue of

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[1] *Annales Eginhardi*, 778, with which comp. Dozy, *Hist. des Muss. d'Espagne*, i. 376-380.

[2] Ap. Pertz, ii. 608.

[3] *Ann. Imperii*, ed. Pertz, i. 77.

[4] *Turp. Hist.*, ed. Castets, 1880.

[5] Will. of Malmes., *Gest. Reg. Angl.*, iii. 242; Wace, ed. Andresen, ii. ll. 8035-40.

[6] Still more applicable is this remark to *Roland and Vernagou* (*c.* 1330), and the death of Roland in Caxton's *Charles the Grete*. All three works have been edited for the Early English Text Society by Mr Herrtage.

Roland seems to be the 12th-century statue in the church of San Zeno at Verona.[1] The whole history of Roncesvalles is blazoned in the 13th-century window in Chartres cathedral.[2] A similar window existed formerly in the abbey church of St Denis. M. Vétault (*Hist. de Ch.*, p. 496) has also figured a Carolingian coin which bears the names of both Roland and Charles. The so-called Roland statues of Germany are most probably symbolical of the judicial and other rights once possessed by the people of those towns where they are to be found. In some cases at least the name seems to have been transferred to what were originally meant to be representations of the first Othos (10th century). The earliest known allusion to a "statua Rolandi" under this name occurs in a privilegium granted by Henry V. to the town of Bremen (1111). The word "Rolandssäule" is perhaps a piece of folk-etymology for an earlier "Rothland-saule" or red-land-pillar, *i.e.*, the before-mentioned figure or pillar, which signified that the state in which it stood had the power of life and death,—in other words, was a Blutgerichtstätte. Grimm suspects a connexion between the Roland statues and those old Teutonic pillars of which the Irminsul destroyed by Charlemagne is the best-known example.[3] These Roland statues are sometimes in the open air, as at Bremen and Magdeburg; or against the town-house, as at Halberstadt; or in the church, as formerly at Gottingen. Sometimes they ride on horseback, as at Haldensleben near Magdeburg; but more generally they are to be found standing upright. They always bear a sword in their right hand and very frequently a shield in their left. They are usually armoured, as at Magdeburg, but are occasionally dressed in more peaceful robes, as at Halle (on the Saale), or both cloaked and armoured, as at Wedel in Holstein and at Bremen. Sometimes they are crowned, as at Wedel and Nordhausen. The heads of the statues differ extremely,—being long-bearded at Erfurt, short-bearded at Wedel, and absolutely smooth-faced at Bremen. At Brandenburg the Roland was ornamented with silver and perhaps with gold. The statues are often of colossal height, that of Belgern (Merseburg) being over 9 ells high, exclusive of its pedestal. Perhaps the most famous Roland pillar still remaining is that of Bremen.

For further information on this subject see Leibnitz, *Annales Imperii*, i. 478, &c.; the treatises of Gryphiander (ed. 1666) Eggelingius (1700), B. Carpzov (1742), J. H. Hartmann (1735), and Nicholas Meyer, *De Wichbildis* (1739); and Zoepfl's exhaustive account in vol. iii. of his *Alterthümer des deutschen Reichs*. For the Roland legend generally consult Léon Gautier's *Epopées Françaises*, iii., and *Chanson de Roland*, edd. 1870 and 1881. Besides these, see the various romances of the Charlemagne cycle edited for the series of Anciens Poetes de France, the various volumes of *Romania*, and the late editions of the several poems alluded to in the foregoing article. For the relationship of the Roland legend to the Italian poets see the works of P. Rajna. (T. A. A.)

ROLLER, a very beautiful bird so called from its way of occasionally rolling or turning over in its flight,[4] somewhat after the fashion of a Tumbler-Pigeon. It is the *Coracias garrulus* of ornithology, and is widely though not very numerously spread over Europe and Western Asia in summer, breeding so far to the northward as the middle of Sweden, but retiring to winter in Africa. It occurs almost every year in some part or other of the British Islands, from Cornwall to the Shetlands, while it has visited Ireland several times, and is even recorded from St. Kilda. But it is only as a wanderer that it comes hither, since there is no evidence of its having ever attempted to breed in Great Britain; and indeed its conspicuous appearance—for it is nearly as big as a Daw and very brightly coloured—would forbid its being ever allowed to escape the gun of the always ready murderers of stray birds. Except the back, scapulars, and tertials, which are bright reddish-brown, the plumage of both sexes is almost entirely blue—of various shades, from pale turquoise to dark ultramarine—tinted in parts with green. The bird seems to be purely insectivorous. The genus *Coracias*, for a long while placed by systematists among the Crows, has really no affinity whatever to them, and is now properly considered to belong to the heterogeneous group of Birds in this work called *Picariæ* (ORNITHOLOGY, vol. xviii. p. 41), in which it forms the type of the Family *Coraciidæ*; and its alliance to the Bee-eaters, *Meropidæ*, and KING-FISHERS (vol. xiv. p. 81), *Alcedinidæ*, is very evident. Some eight other species of the genus have been recognized, one of which, *C. leucocephalus* or *C. abyssinus*, is said to have occurred in Scotland. India has two species, *C. indicus* and *C. affinis*, of which thousands upon thousands are annually destroyed to supply the demand for gaudy feathers to bedizen ladies' dresses. One species, *C. temmincki*, seems to be peculiar to Celebes and the neighbouring islands, but otherwise the rest are natives of the Ethiopian or Indian Regions. Allied to *Coracias* is the genus *Eurystomus* with some half dozen species, of similar distribution, but one of them, *E. pacificus*, has a wider range, for it inhabits Australia and reaches Tasmania. Madagascar has four or five very remarkable forms which have often been considered to belong to the Family *Coraciidæ*; and, according to Professor A. Milne-Edwards, no doubt should exist on that point. Yet if any may be entertained it is in regard to one of them, *Leptosomus discolor*, which on account of its zygodactylous feet some authorities place among the *Cuculidæ*, while others have considered it the type of a distinct Family *Leptosomatidæ*. The genera *Brachypteracias* and *Atelornis* present fewer structural differences from the Rollers, and perhaps may be rightly placed with them; but the species of the latter have long tarsi, and are believed to be of terrestrial habit, which Rollers generally certainly are not. These very curious and in some respects very interesting forms, which are peculiar to Madagascar, are admirably described and illustrated by a series of twenty plates in the great work of MM. Grandidier and A. Milne-Edwards on that island (*Oiseaux*, pp. 223-250), while the whole Family *Coraciidæ* is the subject of a monograph by Mr Dresser, as a companion volume to his monograph on the *Meropidæ*. (A. N.)

ROLLER MILL. See FLOUR, vol. ix. pp. 345, 346

ROLLIN, CHARLES (1661-1741), was born at Paris on 30th January 1661. He was the son of a tradesman, but distinguished himself at school, and at the age of twenty-two was made a master in the Collége du Plessis. He was successively promoted to various other posts of the same kind. In 1694 he was rector of the university of Paris. He held that post for two years instead of one, and was then appointed principal of the Collége de Beauvais. He was of Jansenist principles, and in the later years of his life was for this cause deprived of his appointments and disqualified for the rectorship, to which in 1719 he had been re-elected. It is said that the same reason prevented his election to the French Academy, though he was a member of the Academy of Inscriptions. He was concerned in the affair of the deacon Paris, and shortly before his death (14th December 1741) protested publicly against the acceptance of the bull Unigenitus.

Rollin's literary work dates chiefly from the later years of his life, when he had been forbidden to teach. His once famous *Ancient History* (Paris, 1730-38) and the less generally read *Roman History* which followed it were avowed compilations, and compilations which were not only far from critical but even somewhat inaccurate. But they have had the merit not merely of instructing but of interesting generation after generation almost to the present day. A more original and really important work, though less generally known out of France, was his *Traité des Études* (Paris, 1726-31). It contains a summary of what was even then a reformed and innovating system of education, including a more frequent and extensive use of the vulgar tongue and discarding the mediæval traditions that had lingered in France. It had very considerable influence. Rollin's style is good and his personal character was irreproachable.

ROLLING MILL. See IRON, vol. xiii. p. 328 *sq.*

ROLLO, ROLF, or ROU, Scandinavian rover, born *c.* 860, died 932. He made himself independent of Harold of Norway, visited Scotland, England, and Flanders in pirating expeditions, and about 912 established himself on the Seine and laid the foundation of the duchy of NORMANDY (see vol. xvii. p. 539).

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[1] Figured in Gautier's *Chanson*, ed. 1881, p. 38.

[2] Figured in Vétault's *Hist. de Charlemagne*, pp. 74, 545.

[3] Poeta Saxo, ap. Jaffé, 64-68; see Grimm's *Teut. Myth.* (Stallybrass), i. 119.

[4] Gesner in 1555 said that the bird was thus called, and for this reason, near Strasburg, but the name seems not to be generally used in Germany, where the bird is commonly called *Rake*, apparently from its harsh note. The French have kept the name *Rollier*. It is a curious fact that the Roller, notwithstanding its occurrence in the Levant, cannot be identified with any species mentioned by Aristotle.

ROLLOCK, ROBERT (1555-1599), the first principal of the university of Edinburgh, was the son of David Rollock of Powis near Stirling, and was born in 1555. He received his early education at the school of Stirling from Thomas Buchanan, a nephew of George Buchanan, and after graduating at St Andrews became regent of philosophy there in 1580. In 1583 he was appointed by the Edinburgh town council sole "regent" of the "town's college" ("Academia Jacobi Sexti"), and three years later he received from the same source the title of "principal or first master," and also, with consent of the presbytery, professor of theology. From 1587 he also preached regularly to large audiences every Sunday morning at 7 A.M., and ultimately, yielding to urgent entreaties, he accepted "the full burden of one of the eight ministers of the city." He took a prominent part in the somewhat troubled church politics of the day, and distinguished himself among his compeers by gentleness and tact, as well as ability. In 1593 he was appointed, along with some others, by parliament to confer with the popish lords, and in 1597 it was through his mediation with the king that the ministers of Edinburgh, banished in consequence of a "tumult" in December 1596, were permitted to return. For his eminent services he was chosen moderator of the General Assembly held at Dundee in May 1597. His death took place at Edinburgh on 8th February 1599.

Rollock published in Latin a commentary on the *Epistle to the Ephesians* (1590), a similar work on *Daniel* (1591), a *Logical Analysis of the Epistle to the Romans* (1594), *Questions and Answers on the Covenant of God* (1596), a treatise *On Effectual Calling* (1597), and commentaries on *Thessalonians* (1598), fifteen selected Psalms (1599), and the *Gospel of St John* (1599). Soon after his death eleven *Sermons* were published from notes taken by his students, and his *Select Works* by the Wodrow Society in 1849.

ROLLS, MASTER OF THE, is the third member of the Supreme Court of Judicature in England, the lord chancellor, president of the Chancery Division, being the first and the lord chief justice, president of the Queen's Bench Division, being the second. At first he was the principal clerk of the Chancery and as such had charge of the records of the court, especially of the register of original writs and of all patents and grants under the great seal. Until the end of the 15th century he was called either the clerk or the keeper of the rolls, and he is still formally designated as the master or keeper of the rolls. The earliest mention of him as master of the rolls is in 11 Hen. VII. c. 18; and in 11 Hen. VII. c. 24 he is again described as clerk of the rolls, showing that his official designation still remained unsettled. About the same period, however, the chief clerks of the Chancery came to be called masters in Chancery and the clerk, master, or keeper of the rolls was always the first among them whichever name they bore. In course of time, from causes which are not very easy to trace, his original functions as keeper of the records passed away from him and he gradually assumed a jurisdiction in the Court of Chancery second only to that of the lord chancellor himself. In the beginning he only heard causes in conjunction with the other masters in Chancery and his decrees were invalid until they had been approved and signed by the lord chancellor. But later on he heard causes without assistance and his decrees held good until they were reversed on petition either to the lord chancellor or afterwards to the lords justices of appeal (15 and 16 Vict. c. 83). Before any judge with the formal title of vice-chancellor was appointed the master of the rolls was often spoken of as vice-chancellor. By 1 and 2 Vict. c. 94 the custody of the records was restored to him, and he is chairman of the State Papers and Historical Manuscripts Commissions. Under 38 and 39 Vict. c. 77 and 39 and 40 Vict. c. 59 he now always sits with the lords justices in the Court of Appeal, whose decisions can be questioned only in the House of Lords. The master of the rolls was formerly eligible to a seat in the House of Commons,—a privilege enjoyed by no other member of the judicial bench, but he was deprived of it by the Supreme Court of Judicature Act of 1873 (36 and 37 Vict. c. 66), which provides that all judges of the High Court of Justice and the Court of Appeal shall be incapable of being elected to or sitting in the House of Commons. The master of the rolls is always sworn of the privy council.

ROMAN CATHOLIC CHURCH, the name generally given to that very numerous body of Christians who acknowledge the pope, or bishop of Rome, as head of their church. This name also signifies that the Roman Catholic Church is "Roman in its centre and catholic in its circumference." The number of Catholics throughout the world is variously estimated, some statisticians placing it as low as 152,000,000, others at 213,518,000, and others at 218,000,000. The author of the *Katholischer Missions-Atlas* (Rev. O. Werner, S.J.), largely furnished with Propaganda returns, distributes them as follows:—in Europe, 150,684,050; in Asia, 8,311,800; in Africa, 2,656,205; in both Americas, 51,422,566; in Australia and adjacent islands, 443,442; total, 213,518,063. But he considers that this calculation gives less than the whole number of Catholics throughout the world, and adds nearly a million more, making the total 214,370,000. Dr Hugo Franz Brachelli, superior of the Austrian Statistical Department, in *Die Staaten Europa's* for 1884, gives the number of Catholics in Europe as 155,900,000, distributed mainly as follows:—

Austria-Hungary	20,229,825
Prussia and German States	16,229,493
Great Britain and Ireland	6,000,000
France	35,387,703
Italy	26,658,679
Russia	8,500,000
Scandinavia: Sweden (1870), Norway (1875), Denmark (1880)	4,075
Netherlands	1,439,137
Luxemburg	207,782
Belgium (pop. 5,519,844)	5,501,844
Liechtenstein, Monaco, &c., almost entirely.	
Spain and Portugal (pop. 21,164,380)	21,148,880
Greece and Montenegro, over	124,000
Turkey	218,254
Bosnia and Herzegovina	209,391

The supreme pontiff, who traces his succession from St Peter (see POPEDOM), is regarded by Catholics as "vicar of Christ, head of the bishops, and supreme governor of the whole Catholic Church, of whom the whole world is the territory or diocese." He is also patriarch of the West, bishop of Rome and its district, and temporal prince over the states of the church known as the Pontifical States,—though the exercise of the last prerogative has been in abeyance since the events of 1859 and 1870. The pope has a primacy or supremacy, not only of honour but of power, authority, and immediate jurisdiction, over the universal church. When he is canonically elected, and has given his consent to the election, he possesses, without any other confirmation, authority over the whole church, even though at his election he may not have been either bishop, priest, deacon, or subdeacon, but a simple layman. In the early ages of the church subdeacons were occasionally elected, deacons more frequently, and bishops rarely. In the 11th century Gregory VII., previously known as the deacon Hildebrand, was ordained priest after his election and consecrated bishop later. The first pope invested with the episcopal dignity prior to his election to the pontificate was Formosus, bishop of Porto, elected

891. From the end of the 13th century it was the ordinary custom to choose the pope from the bishops; and from 1592 to 1775 only three were elected who had not been bishops previously. Clement XIV., Pius V., and Gregory XVI. were simple priests when elected to the papacy. The cardinals, to whom the election of the pontiff is reserved, generally select one of their own body for this important position. The privilege of consecrating the pope is reserved to the cardinal bishop of Ostia. From the moment of election the pope may perform all acts appertaining to his jurisdiction, such as granting indulgences, issuing censures, giving dispensations, canonizing saints, instituting bishops, creating cardinals, and suchlike. The powers inherent in the priesthood and episcopate, such as the remission of sins, the administration of the sacraments of confirmation, holy orders, &c., he cannot exercise unless he be ordained and consecrated. Hence the office of sovereign pontiff is a dignity not of order but of jurisdiction. His pronouncements are regarded as infallible when he defines a doctrine regarding faith and morals to be held by the whole church.

The office of pope is elective (see CONCLAVE), and lasts during the life of the occupant, although he may renounce his dignity. When the election has taken place the fact is made known by the cardinal dean. Many ceremonies follow, such as coronation and taking possession of the cathedral church of Rome, St John Lateran. This latter ceremony is not strictly necessary, for after his coronation the pope enjoys the papal power in all its plenitude; but its object is his enthronization as bishop of the city and diocese of Rome and patriarch of the West. The cardinals are the princes and senators of the church, counsellors of the pontiff, co-operators with him, and vicars in the functions of the pontificate (see CARDINAL). To Pope Evaristus, fifth successor of St Peter, is attributed the creation of the first *titles* or parishes of Rome, the occupants of which were afterwards known as cardinals. At the beginning of the 3d century twenty-five of these titles existed. In the course of time they were increased to fifty and afterwards to seventy. In the *Gerarchia Cattolica* the titles are thus divided: suburban sees (cardinal bishops), 6; titular churches (cardinal priests), 52; and diaconates (cardinal deacons), 16; making a total of 74. The cardinalate, in the sense at present attached to it, is different from what it was in earlier ages, being now the highest dignity after the papacy. The greater part of the administration of the church—the chief subject of this article—is directed by the cardinals who are members of congregations, which correspond, in a certain measure, to the political ministries in modern states. These congregations are established in Rome by the sovereign pontiff, and their objects are to inquire into, discuss, and decide the important affairs of the whole church and of the temporal dominions of the holy see. The cardinals are assisted by consultors or prelates, by distinguished ecclesiastics secular and regular, and by other officials appointed by the pope.

The head of every congregation is a cardinal prefect, though some congregations have the pope as prefect, *e.g.*, the holy office, the apostolic visit, and the consistory. The secretary is ordinarily a prelate; in the holy office he is a cardinal. The acts, decrees, rescripts, and letters issued in the name of a congregation are subscribed generally by the prefect, and always by the secretary. These two officials chiefly regulate the affairs of the congregation and submit to the pope, at periodical audiences, the matters which require his approval. The following are the more important congregations:—inquisition, consistorial, apostolic visit, bishops and regulars, council, residence of bishops, state of regulars, ecclesiastical immunities, propaganda fide, propaganda fide for Oriental affairs, commission for correction of books of the Oriental Church, index, sacred rites, ceremonial, regular discipline, indulgences and relics, examination of bishops, *fabbrica* of St Peter's, extraordinary ecclesiastical affairs and studies. The congregation of the *Holy Roman Inquisition* or *Holy Office* (see INQUISITION) occupies the first place in regard to the quality of the matters of which it treats, as well as from its antiquity. Its object is the extirpation of heresies. It was formally established by Innocent III. (1198-1216), on the suggestion of St Dominic. The following class of cases falls within its judgment:—crimes of heresy and heretical blasphemy, simultaneous polygamy, robbery of the sacred particles accompanied by insult offered to the same, solicitations *ad turpia* with abuse of sacramental confession, affected sanctity, contempt of sacred images, divination and sorcery, retention and reading of heretical books, &c. This congregation also proceeds against any one who, having been baptized, returns to paganism; against any one who celebrates mass or hears confessions, not being a priest; against false witnesses who depose in causes of faith, &c. Its authority extends, in matters of faith, over every person of whatsoever grade, condition, or dignity, whether bishops, magistrates, or communities, and no local or personal privilege exempts from its jurisdiction. Bishops, according to the council of Trent, being subject to the pope only, the Inquisition may institute inquiries, but may not pronounce sentence, this being reserved to the pontiff. *Consistorial*, instituted by Sixtus V., 1587, considers and judges on matters appertaining to the erection of new metropolitan or cathedral churches, or their limits; instances of bishops who desire to resign their churches; matters relating to chapters and the confirmation or exclusion of subjects elected by them to metropolitan, episcopal, or monastic dignities; the examination of coadjutors; presentations or nominations of bishops made by sovereign princes and republics; concession of rights to the pallium; retention of dignities and major benefices incompatible with episcopal rights, and suchlike. The *Apostolic Visit* insists on the observance of that decree of the council of Trent which enjoins, as a duty, that every bishop shall visit in person or by means of a delegate the churches, pious institutions, &c., in his diocese. *Bishops and Regulars*: this congregation has to do chiefly with the government of monasteries and with complaints from the inmates of these against bishops. It examines new institutions and their constitution; the founding of new monasteries for both sexes, and the removal of subjects from one monastery to another; questions regarding the alienation of the ecclesiastical property of regulars; differences between ordinaries, parish priests, and regulars; and a variety of questions of a similar nature. The *Council*: the fathers of the council of Trent, anticipating that doubts might arise concerning the interpretation of the doctrines and decrees published therein, besought Pius IV. to provide in the most fitting manner for such contingencies. This the pontiff did in approving and solemnly confirming the council in the bull *Benedictus Deus* (1563), interdicting, under severe penalties, any person whatsoever, secular or ecclesiastic, from publishing commentaries, glosses, &c., or any interpretation whatsoever, upon the decrees of the council of Trent, it being enacted that all controversies, questions, and doubts should be submitted to the congregation of the council. The object of this congregation, therefore, is the interpretation of these doctrines and decrees. The congregation of *Residence of Bishops* may be considered as auxiliary to that of the council. It treats of the questions which concern the bishops' obligation to reside in their own dioceses,—a most important matter treated of in the council of Trent. Even in 1352 Innocent VI. ordered, under pain of excommunication, that bishops and other beneficiaries having care of souls should reside in their respective dioceses. Innocent X. forbade cardinals to depart from Rome or its district—that is, a radius of 40 miles—without licence from the pope. The *State of Regulars* was instituted for enforcing on religious orders and congregations the observance of their special rules and constitutions. *Ecclesiastical Immunities* treats of controversies concerning the liberty and independence of ecclesiastical jurisdiction and its violations, and prescribes that the immunities due to churches be respected. This congregation receives appeals of causes which in the first instance were brought before the episcopal courts. The various concordats entered into between Governments and the holy see have diminished the number of causes which come under the judgment of this congregation. For *Propaganda Fide*, see PROPAGANDA. *Propaganda Fide for Oriental Affairs*, which provides for the affairs of the Eastern Church, was created by Pius IX. in a brief dated 6th January 1862. It depends upon the cardinal prefect of Propaganda, but has its own secretary, consultors, and officials. The *Commission for the Correction of Books of the Oriental Church* took its origin from a report made by Philip IV. of Spain to Urban VIII. in 1631, to the effect that the United Greeks inhabiting the Spanish dominions, especially Sicily, complained that schismatics had printed an *Euchologium*, or liturgy of the mass, filled with errors, and he begged the pontiff to provide a remedy for the evil and its consequences. The correction of the *Euchologium* was decreed, and a special congregation—now called commission—composed of five cardinals, assisted by bishops and ecclesiastics of the Oriental Church, was appointed to correct the books of the Oriental Church, and to publish a correct *Euchologium*. The office of the congregation of the *Index* is to examine printed books and works contrary to faith or morals, and to compile an index or list, which is published at intervals, of the works the reading of which is prohibited. The method now followed in the examination and condemnation of books, especially by Catholic authors, was fixed by Benedict XIV. A consultor examines the suspected work, and reports at a meeting of the congregation what it contains contrary to faith, good morals, ecclesiastical jurisdiction, &c. An examination of these passages is made, and it is determined by vote—the cardinals having the decisive vote—whether the book shall be prohibited or corrected. The congregation of *Sacred Rites* was instituted by Sixtus V. in 1587, in order that in all the churches of Rome and the world, and in the pontifical chapel, in masses, divine offices, and everything else regarding divine worship, the ancient ceremonies may be rigorously followed; that if any primitive rite have fallen into disuse it may be restored to its ancient splendour or reformed; that the pontificals, rituals, ceremonials, and all books of sacred rites may be emended and renewed; and that the divine offices of the saints may be examined. Particular attention is likewise given by this congregation to all things concerning the canonization of saints, the celebration of their feasts, so that all may be done in an orderly manner, correctly, and according to the traditions of the fathers. Hence this congregation decides controversies on all these and on cognate matters. Its most serious work consists in processes for the beatification and canonization of the servants of God, the honours paid to saints, and the recognition of martyrdoms suffered for the Catholic faith. Its first cause in this line was that of the twenty-three minor observants martyred in Japan in the pontificate of Urban VIII. One of the rules established by this pope for the recognition of saints enjoins that, except by licence of the congregation, no one can proceed to any act of canonization, beatification, or declaration of martyrdom until fifty years after the death of the subject. The congregation of *Ceremonial* investigates and watches over the exact fulfilment of the sacred liturgy, and regulates and decides questions and doubts regarding formalities, pre-eminence amongst cardinals, prelates, and others, as well as certain sacred ceremonies in pontifical functions.

The work of the church in the world is directed immediately by the bishops, who receive their jurisdiction from the pope. The power inherent in the episcopal character and order is received from God directly and immediately. When established in a diocese by the pope, the bishop, in virtue of his title, receives the power of governing and of taking cognizance of all spiritual causes which regard his flock, whether laymen or ecclesiastics, with the exception of what is specially reserved to the head of the church, and he possesses and exercises these prerogatives under the jurisdiction of and in dependence on the pope. The bishops in the Catholic Church at the present time are (*Gerarchia Cattolica*, March 1885) thus divided: (*a*) patriarchal sees, of the Latin rite, 7; of the Oriental rite, 5; (*b*) archiepiscopal sees, of the Latin rite, immediately subject to the holy see, 14; with ecclesiastical provinces, 137; Oriental rite, with ecclesiastical provinces, 3; subject to patriarchates, 21; (*c*) episcopal sees, Latin rite, immediately subject to the holy see, 86; suffragans in ecclesiastical provinces, 579; Oriental rite, immediately subject to the holy see, 2; suffragans in ecclesiastical provinces, 8; subject to patriarchates, 41; (*d*) sees *nullius diœceseos*, 17. The titles dependent on the sacred congregation of Propaganda are—apostolic delegations, 7; vicariates apostolic, 123; prefectures apostolic, 35. The total of these hierarchical titles amounts to 1085, and, including the 74 cardinalitial titles, to 1159. The vacant titles of all kinds amount to 107, and thus the whole hierarchy of the Catholic Church in March 1885 reached the total of 1266. Priests, placed in the second degree of the ecclesiastical hierarchy, who are generally divided into parish priests and curates or assistants, are immediately under the direction of the bishops and administer directly to the people. Their primary office is the offering of the sacrifice of the mass. They also preach, bless, and administer baptism, penance, communion, and extreme unction. Their functions are numerous and important, and they constitute the working force of the church in its direct relations with its members throughout the world. Priests of religious orders exercise like functions, save those properly parochial.

The Oriental churches in communion with the holy see, holding the same belief and the same principle of authority as the Latin Church, have their own special rites, discipline, and liturgical language. These are chiefly the Greek, Melchite, Bulgarian, Ruthenian, Maronite, Syro-Chaldaic, Coptic, Armenian, and Roumanian rites. The Greek Oriental rite is admitted by the pure Greeks, the Slavs (in the Slav language), the Melchites of Syria (in Arabic), the Roumanians (in the Roumanian tongue), and the Georgians (in their own language). The Georgian Greek rite has no hierarchy, and many Georgians in Russia have passed to the Latin or Armenian rites. The Greek and Slav languages are approved by the church as ritual languages; Arabic is only tolerated.

Greeks in Constantinople.—These are found at present in Constantinople, in the mission of Malgara in Thrace, and consist of about sixty families, having one bishop and about ten priests. In this rite marriage is permitted to clerics previous to the reception of sacred orders; but there is a tendency to abolish the practice. In Greece nearly 30,000 Greeks have followed the Latin rite, and these have seven bishops and about a hundred priests. The mass of St Basil is celebrated by the Greeks ten times a year,—on the three vigils of Christmas, the Epiphany, Easter, Holy Thursday, the Feast of St Basil, and the first five Sundays of Lent. After St Basil, St John Chrysostom abbreviated this mass and gave it the form which has existed down to the present time amongst all the Orientals who follow the Greek rite.

Melchites.—The Melchites (see MELCHITES) have the Greek rite in the Arab language. They are found scattered throughout Syria, Palestine, and Egypt, and have one patriarch and ten bishops ruling over from 70,000 to 80,000 souls. Their clergy are, for the most part, regular, following the rule of St Basil, and are divided into three congregations,—that of San Salvatore near Saida (Sidon) in Lebanon, with about 300 persons who mostly have the care of souls: the second, of St John the Baptist, is at Scieur in Lebanon, with thirty members; and the third is the congregation of Aleppo, at St George in Lebanon, with forty members between priests and brothers. A small group of secular clergy is attached to the patriarchate. Besides these there are about forty secular married priests throughout the dioceses. The patriarchal residence is Damascus, which has two bishops-vicars,—one in Damascus, the other in Egypt. The ten dioceses are Tyre, Hauran, Saida or Sidon, Ptolemais, Beyrout, Zakle, Baalbec, Emessa, Aleppo, and Tripoli. Thus there are twelve bishops in all.

Bulgarians.—The United Bulgarians have the same Greek rite, with the mass in the Slav language. Their origin dates from 1860, when many prelates and people passed over to the Catholic Church. At present (1885) their numbers are somewhat diminished, amounting to about 9000 souls. They have one archbishop, who resides in Constantinople, a vicar-apostolic for Thrace, who resides in Adrianople, and another vicar-apostolic for Macedonia, who resides in Salonica. The Turkish Government officially recognizes them as Catholics. They are spread amongst the villages in Turkey and especially in Macedonia. Besides these there are in the diocese of Philippopolis about 15,000 Bulgarian Catholics who have embraced the Latin rite. These are administered by a vicar-apostolic of the order of Capuchins.

Ruthenians.—The Ruthenians attribute their conversion to Christianity to St Methodius (860) and his brother St Cyril. The Ruthenian rite is Greek in the vicinity of Greece and Latin in the countries of western Europe. The Slav is the language used in both rites. The Ruthenians are numerous in eastern and western Galicia, in Poland, and in Hungary. In Russia they have two dioceses. In Galicia they number about 2,600,000 with 2000 priests; in Hungary the two dioceses of Eperies and Munkacs count half a million of Catholics. In Galicia they have one metropolitan (Lemberg) and two bishops, in Hungary two bishops, and in Crisio one, with about 200 priests in these three dioceses. They have a Greek Ruthenian college at Rome and another in Vienna.

Maronites.—The greater number of the MARONITES (*q.v.*) are in Lebanon, where the patriarch resides; others are in Syria, in Egypt, and in Cyprus. The patriarchal title is Antioch; the archbishops are those of Aleppo, Archis, Berito, Damascus, Tyre and Sidon, and Tripoli; the bishops of Cyprus, Heliopolis, and Gibail and Botri. The Maronites of Alexandria are administered by a procurator of the patriarch. The population of these dioceses is nearly 400,000. The number of regular priests is about 1200, of secular priests about 600. In Mount Lebanon there are seventy-five convents of men and women. Five colleges or seminaries depend upon the patriarch and four others on the archbishops. In these seminaries the clerics learn Arabic, Syriac, Latin, French, and Italian. The language used in the mass and in the offices of the church is Syriac, that spoken by the people is Arabic.

Syro-Chaldeans.—The Oriental Syrians are called, ecclesiastically, Chaldeans. This name comprises, not only the inhabitants of Chaldea, but also those of Assyria, Mesopotamia, and a part of Persia. To distinguish them from those having other rites equally Syrian, they were exclusively termed Chaldeans by Pope Eugenius IV. (1431-1447). Previous to the council of Florence (1438) they were called Orientals or Syro-Orientals. The Catholic Chaldeans have a patriarch who for a long period has had his residence at Mosul (Mesopotamia), and has the title of patriarch of Babylonia with archiepiscopal jurisdiction over the city of Baghdad. There are five archdioceses—Amida or Diarbekir in Mesopotamia, Seert in Assyria, Salmas and Adorbigana in Persia, Kerkuk (Carcha) in Parthic Assyria, and Amadia in Kurdistan. The dioceses are Mardin and Gezira in Mesopotamia, Zaku in Assyria-Media, Sena in Persia, Bassorah on the Persian Gulf, and Acri and Zebari in the mountains of Kurdistan. The number of secular clergy in the patriarchate, archdioceses, and dioceses approximates 200. There is a congregation of Antonian monks, having the title of S. Hormisdas, who have an abbot-general, five houses or convents, forty priests, and a hundred monks. The other religious houses bear the names of Mother of God, St George, St Abraham, and St James. The largest number of Catholics is in the diocese of Mosul with Baghdad, 25,000. In all there are over 90,000 Catholics. The language of the mass and church office is Syro-Chaldaic.

Copts.—The Coptic rite prevails throughout all Egypt. At one time there was a liturgy of Lower and another of Upper Egypt. In the former the Memphitic dialect was in use and the Theban dialect in the latter. But as the patriarchs of Alexandria were Greeks they, followed by several churches in Egypt, changed the liturgy into the Greek language; and after the schism in the 5th century the liturgy became Coptic, as the patriarchs were Copts. There are three liturgies in use at present—that of St Basil, that of St Gregory Nazianzen, and that of St Mark, rearranged by St Cyril of Alexandria. The Theban dialect is no longer used; but the Memphitic still prevails, and in it the offices of the church are recited. The Catholic population is only about 6000, with twenty-two priests, one bishop, and a vicar-apostolic, whose residence is at Cairo.

Armenians.—The Armenians (see ARMENIAN CHURCH) regard St Gregory the Illuminator as their apostle. Pope Benedict XIV. instituted the patriarchate of Cilicia in 1742, and Pius VIII. in 1830 instituted the Armenian Catholic primacy in Constantinople. In 1867 Pius IX. united Cilicia with the primacy of Constantinople, so that the patriarch now bears the title of Cilicia and has his residence in Constantinople. Turkey, Russia, Asia Minor, Armenia (Greater and Lesser), Mesopotamia, Syria, and Egypt have Armenian Catholics, who altogether number 100,000 at the present time (1885). There are ten archbishops and bishops and over 350 priests. They also possess religious orders, the Mechitarists of Venice and of Vienna, and have an Armenian college at Rome and an Armenian seminary at Bzommar in Mount Lebanon. The liturgical language is literary Armenian, and they have a special rite and liturgy. The people speak vulgar Armenian and Turkish. There is an institute of Armenian sisters of the Immaculate Conception at Constantinople to attend to the education of young girls, especially those newly converted.

Roumanians.—As early as the council of Florence the Roumanian metropolitan of Moldavia subscribed the decree of union; but the time had not yet come for an actual union with Rome. In 1700, under the metropolitan Theophilus and his successor Athanasius I., the great national synod of Alba Julia (Fogaras) was held, in which the bishop, the archpriests, and all the clergy of the Roumanian Church of Transylvania "freely and spontaneously by the impulse of God" concluded a union with the Roman Catholic Church. This declaration was signed by the metropolitan, by fifty-four archpriests (*protopapas*), and by 1561 priests. Historians say that 200,000 families were united to Rome on that day. Some afterwards again fell away, but there is at present a great movement prevailing amongst these towards union. The United Catholics are chiefly in Transylvania and Hungary and number about a million and a half, with from 1500 to 1600 priests. In 1854 Pius IX. erected into an ecclesiastical province the United Roumanian Church with an archbishopric, Alba Julia (Fogaras), and three bishoprics. To the diocese of Grosswardein in Hungary was added that of Lugos in the Banat and that of Armenopolis (Samos-Ujvar), which constitute a flourishing ecclesiastical province. For the education of the clergy four places for students were given by Pius IX. in the Greek college at Rome, and they have sixteen places in the central seminary of Budapest. They have two seminaries, one in the metropolitan diocese with fifty and another at Armenopolis with sixty students. In the diocese of Armenopolis the number of souls is 647,666, with 486 parishes and a monastery. In the archdiocese of Alba Julia the number is 361,000, with 729 parishes and 706 priests. At Grosswardein and Lugos the number of Catholics is less. The rite in use is the Greek, but the language is the Roumanian. This is the only rite which employs the vulgar tongue. (P. L. C.)

English Law relating to Roman Catholics.

The history of the old penal laws against Roman Catholics in the United Kingdom has been sketched in the articles ENGLAND and IRELAND.[1] The principal English Acts directed against "popish recusants"[2] will be found in the list given in the Acts repealing them (7 and 8 Vict. c. 102; 9 and 10 Vict. c. 59). The principal Scottish Act was 1700, c. 3; the principal Irish Act, 2 Anne c. 3. Numerous decisions illustrating the practical operation of the old law in Ireland are collected in Howard's *Cases on the Popery Laws*, 1775. The Roman Catholic Emancipation Act, 1829 (10 Geo. IV. c. 7), although it gave Roman Catholic citizens in the main complete civil and religious liberty, at the same time left them under certain disabilities, trifling in comparison with those under which they laboured before 1829. Nor did the Act affect in any way the long series of old statutes directed against the assumption of authority by the Roman see in England. The earliest of these which is still law is the Statute of Provisors of 1351 (25 Edw. III. st. 4). Most of what has been already stated under Nonconformity (*q.v.*) as to the legal position of nonconformity may be applied to the Roman Catholic faith. The effect of 2 and 3 Will. IV. c. 115 is to place Roman Catholic schools, places of worship and education, and charities, and the property held therewith, under the laws applying to Protestant nonconformists. The Toleration Act does not apply to Roman Catholics, but legislation of a similar kind, especially the Relief Act of 1791 (31 Geo. III. c. 32), exempts the priest from parochial offices, such as those of churchwarden and constable, and from serving in the militia or on a jury, and enables all Roman Catholics scrupling the oaths of office to exercise the office of churchwarden and some other offices by deputy. The priest is, unlike the nonconformist minister, regarded as being in holy orders. He cannot, therefore, sit in the House of Commons, but there is nothing to prevent a peer who is a priest from sitting and voting in the House of Lords. If a priest becomes a convert to the Church of England he need not be re-ordained. The remaining law affecting Roman Catholics may be classed under the following five heads.

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[1] See also Stephen's *History of the Criminal Law*, vol. ii. p. 483; Anstey, *The Law affecting Roman Catholics*, 1842.

[2] A recusant signified a person who refused to duly attend his parish church.

(1) *Office.* There are certain offices still closed to Roman Catholics. By the Act of Settlement a Papist or the husband or wife of a Papist cannot be king or queen. The Act of 1829 provides that nothing therein contained is to enable a Roman Catholic to hold the office of guardian and justice of the United Kingdom, or of regent of the United Kingdom; of lord chancellor, lord keeper, or lord commissioner of the great seal of Great Britain or Ireland or lord lieutenant of Ireland; of high commissioner to the General Assembly of the Church of Scotland, or of any office in the Church of England or Scotland, the ecclesiastical courts, cathedral foundations, and certain colleges. The disability in the case of the lord chancellor of Ireland was removed by statute in 1867, with necessary limitations as to ecclesiastical patronage, and the office has been held twice since that date by the late Lord O'Hagan. The Act of 1829 preserved the liability of Roman Catholics to take certain oaths of office, but these have been modified by later legislation (see 29 and 30 Vict. c. 19; 30 and 31 Vict. c. 75; 31 and 32 Vict. c. 72). Legislation has been in the direction of omitting words which might be supposed to give offence to Roman Catholics. (2) *Title.* The Act of 1829 forbids the assumption by any person, other than the person authorized by law, of the name, style, or title of an archbishop, bishop, or dean of the Church of England. The Ecclesiastical Titles Act, 1851, went further and forbade the assumption by an unauthorized person of a title from any place in the United Kingdom, whether or not such place were the seat of an archbishopric, bishopric, or deanery. This Act was, however, repealed in 1867, but the provisions of the Act of 1829 are still in force. (3) *Religious Orders.* It was enacted by the Act of 1829 that "every Jesuit and every member of any other religious order, community, or society of the Church of Rome bound by monastic or religious vows" was, within six months after the commencement of the Act, to deliver to the clerk of the peace of the county in which he should reside a notice or statement in the form given to the schedule to the Act, and that every Jesuit or member of such religious order coming into the realm after the commencement of the Act should be guilty of a misdemeanour and should be banished from the United Kingdom for life (with an exception in favour of natural-born subjects duly registered). A secretary of state, being a Protestant, was empowered to grant licences to Jesuits, &c., to come into the United Kingdom and remain there for a period not exceeding six months. An account of these licences was to be laid annually before parliament. The admission of any person as a regular ecclesiastic by any such Jesuit, &c., was made a misdemeanour, and the person so admitted was to be banished for life. Nothing in the Act was to extend to religious orders of females. These provisions exist *in posse* only, and have, it is believed, never been put into force. (4) *Superstitious Uses.* Gifts to superstitious uses are void both at common law and by statute. It is not easy to determine what gifts are to be regarded as gifts to superstitious uses. Like contracts contrary to public policy, they depend to a great extent for their illegality upon the discretion of the court in the particular case. The Act of 23 Hen. VIII. c. 10 makes void any assurance of lands to the use (to have obits perpetual) or the continual service of a priest for ever or for threescore or fourscore years. The Act of 1 Edw. VI. c. 14 (specially directed to the suppression of chantries) vests in the crown all money paid by corporations and all lands appointed to the finding or maintenance of any priest or any anniversary or obit or other like thing, or of any light or lamp in any church or chapel maintained within five years before 1547. The Act may still be of value in the construction of old grants, and in affording examples of what the legislature regarded as superstitious uses. Gifts which the courts have held void on the analogy of those mentioned in the Acts of Henry VIII. and Edward VI. are a devise for the good of the soul of the testator, a bequest to certain Roman Catholic priests that the testator may have the benefit of their prayers and masses, a bequest in trust to apply a fund to circulate a book teaching the supremacy of the pope in matters of faith, a bequest to maintain a taper for evermore before the image of Our Lady. The court may compel discovery of a secret trust for superstitious uses. Since 2 and 3 Will. IV. c. 115 gifts for the propagation of the Roman Catholic faith are not void as made to superstitious uses. It should be noticed that the doctrine of superstitious uses is not confined to the Roman Catholic religion, though the question has generally arisen in the case of gifts made by persons of that religion. The Roman Catholic Charities Act, 1860, enables the court to separate a lawful charitable trust from any part of the estate subject to any trust or provision deemed to be superstitious. It also provides that in the absence of any written document the usage of twenty years is to be conclusive evidence of the application of charitable trusts. (5) *Patronage.* A Roman Catholic cannot present to a benefice, prebend, or other ecclesiastical living, or collate or nominate to any free school, hospital, or donative (3 Jac. I. c. 5). Such patronage is by the Act vested in the universities, Oxford taking the city of London and twenty-five counties in England and Wales, mostly south of the Trent, Cambridge the remaining twenty-seven. The principle is affirmed in subsequent Acts (1 Will. and Mary, sess. 1, c. 26; 12 Anne, st. 2, c. 14; 11 Geo. II. c. 17). If the right of presentation to an ecclesiastical benefice belongs to any office under the crown, and that office is held by a Roman Catholic, the archbishop of Canterbury exercises the right for the time being (10 Geo. IV. c. 7, s. 17). No Roman Catholic may advise the crown as to the exercise of its ecclesiastical patronage (*ib.*, s. 18). A Roman Catholic, if a member of a lay corporation, cannot vote in any ecclesiastical appointment (*ib.*, s. 15). Grants and devises of advowsons, &c., by Roman Catholics are void, unless for valuable consideration to a Protestant purchaser (11 Geo. II. c. 17, s. 5). Where a *quare impedit* is pending before any court, the court may compel the patron to take an oath that there is no secret trust for the benefit of a Roman Catholic. See Quare Impedit. (J. Wt.)

ROMANCE

ROMANCE[1] in its widest sense includes the entire literature of fiction, as well as the early narrations in which fact and legend were blended in historical form, before the simple minds of the people had acquired a clear conception of their distinctness. There are, however, certain ill-defined limitations in the analysis of fiction which enable us to assign distinct places to the legend, the ballad, the epic, the fable, the tale, the romance, and the novel. As usual in all attempts at precise classification, we find that the lines of demarcation cannot be drawn with rigid exactness, and that many works may be referred to more than one division. But the general conception of romance is the one which will here be followed, and which roughly divides the subject into (i.) *Romances of Chivalry*—chiefly their prose forms—and (ii.) th *Romances of Love and Adventure*, which follow them.

Romance, as a distinct branch of the literature of fiction, belongs essentially to the Middle Ages and to Europe. The romance of chivalry, as it is called, prevailed during the four centuries of knighthood, and there can be little doubt that the institutions of chivalry were considerably influenced by the works of the early romancers. The establishment of the orders of St John and the Temple was based upon an exalted conception of duty and devotion, which the hard test of experience soon modified, and which would have perished utterly but for the embodiment of its ideal in the Round Table romances. The characters of Galaad and the original Perceval represent types of unattainable perfection, and were therefore models which, although commanding reverence, failed to excite as deep an interest as did the second Perceval, Sir Lancelot, Sir Tristan, and Sir Gawain. In these the noblest qualities were blemished by human frailties, and, as a necessary consequence, the knights miscarried a little below the summit of perfect achievement. Walter Map cannot be sufficiently eulogized for the tact and skill with which he drew the two first-named personages. Galaad is brought upon the stage for but a very short time, and is then dismissed in a blaze of saintly glory, while Perceval, although adapted from the French writer's purer knight of that name, is allowed a much larger space upon the canvas, at the cost of a few minor sins which suffice to ensure his failure and to prove him a man. The other knights are brave, generous, self-sacrificing, and devout, but the indispensable virtue of chastity is absent from their lives, and they are foredoomed to misfortune. The perfect ideal, however, underlies the description of all their acts and motives, and the reader or hearer was never allowed to forget it amid the more powerful attractions of the story.

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[1] In the 9th century the Romana or Romance language made its first appearance in writing. For many centuries, however, it was only used to embody the tales and ballads of each country in which one or other form of the speech was vernacular, so that the word "romance" became finally appropriated to the compositions which were the staple literature of the *Lingua Romana* or *Romance*.

Classical romances.

The real prototype of the chivalric romance was the ancient epic: the Greek and Latin poems upon the winning of the Golden Fleece, the siege of Troy, the wanderings of Ulysses and of Æneas, furnish the truest parallel to the mediæval romances of knighthood. The tales which are usually dignified with the name of "classical romances" have really no claim to that rank; they were produced in the age of decadence and correspond much more closely to the mediæval *fabliau* and the 17th-century novel than to the romance proper. As a matter of course every nation had its legends and popular tales, co-existent with literary works of greater importance; but the Greeks at least, and the Romans following their example, never condescended during their ages of intellectual vigour to put such figments into written form, so that even the famous Milesian tales are now quite lost. It was not until the Greeks became a widely dispersed, a subject and deteriorated race, and not till the strength and manhood of Rome were buried in the slough of imperial corruption, that sophists and rhetoricians began to construct those artificial tales which we call Greek and Latin romances. They form, however, an epoch, as the earliest prose works of imagination in a European language, and cannot therefore remain unnoticed here. They were succeeded in time by Christian narratives, usually woven into the lives of saints or used as illustrations in the sermons of great preachers; these latter formed a transition to the semi-religious story of the Grail, a bowl or goblet confounded with the chalice used at the Last Supper, with the cup used to collect the precious blood of our Lord, and symbolically with the Holy Sepulchre itself. The achievers of the Grail-quest, or kings of the Grail, were typified in the Knights Templars and the Knights of St John; thus the true school of romance arose in intimate connexion with the changes in European life and manners which were brought about by the crusades.

The *chansons de geste*, which constituted a poetical introduction to the romances of chivalry in France, were followed by the *fabliaux*, metrical novelettes which furnished material to the Italian writers of prose tales in the 14th and 15th centuries,—a form of composition which was not acclimatized elsewhere than in Italy till the 16th century, and which then became the remote prototype of the modern novel. The older and nobler knighthood blossomed in France for the last time in Bayard, in England in Sir Philip Sidney; but the genuine literature of chivalric romance may be said to have come to an end with the 15th century. The knightly romances produced in the 16th century were belated and artificial examples of their class; and, although the effects of the conquest of Granada and the discovery of America did not wholly put an end to the lingering romantic spirit in Spain, it hardly survived them for half a century. Hence the inferior character of most of the *libros de caballerias*, which chiefly date from the 16th century. Out of them grew the fictions known as 16th and 17th century romance in Spain, France, and England,—monstrous and uninviting examples of perverted ingenuity, utterly dissonant from the literature of pure romance as we conceive it in the chivalrous fictions of the 12th, 13th, and 14th centuries. A more practical and utilitarian spirit set in with the latter half of the 17th century, in which readers found themselves out of sympathy with the imaginative and mysterious atmosphere of romance. Accordingly the modern novel arose, a form of composition in which the manners and customs of everyday life were more or less faithfully depicted, and which has remained in undiminished popularity to the present time.

The subject will be dealt with in the following order:—I. Greek and Latin romance, under the subdivisions—(*a*) classical and post-classical prose fictions and (*b*) pseudo-classical works. II. Mediæval romance, embracing—(*a*) the Arthurian cycle, (*b*) the Charlemagne cycle, (*c*) the Spanish cycle, (*d*) Teutonic and Anglo-Danish, and (*e*) unaffiliated. III. Modern romance to the 17th century.

I.—GREEK AND LATIN ROMANCE.

(*a*) *Classical and Post-Classical Prose Fictions.*

Prose

Although the distance in manner is immense between the *Ass* of Lucian and the *Amadis de Gaula*, and again between the latter and *Ivanhoe* or *Eugénie Grandet*, there are few varieties of modern fiction which are not faintly shadowed forth in the literatures of Greece and Rome (including in this denomination the post-classical periods of Italy and Byzantium): fables and tales, historical, philosophical, and religious novels, love-stories and narratives of adventure, marvellous voyages, collections of fictitious letters—all forms are represented. As even the Andaman Islander and the Bushman have their stories, it is reasonable to suppose that the Greek, who attained a high state of civilization at an extremely remote period, had long been familiar with this method of intellectual gratification. Artistic form was first given to the higher class of such narrations by the Ionians of the Asiatic colonies, when they sang the deeds of gods and heroes in epic poetry and put together the story of Troy now current under the name of Homer. From the Attic Greeks belonging to the same stock came the drama in its highest development,—a fresh step in the representation of events in oral shape. Greek romance is a double misnomer. First, the word "romance" is wrongly applied to the tales we shall shortly discuss; and secondly, we have no right to call anything in art or literature Greek unless it was produced before the time of Alexander the Great, either in Hellas or Ionia or Sicily, or, say, between 800 and 300 B.C. After the defeat of the Greeks at Chæronea, Macedonia became the ruling centre, and the free political life of the Greek cities passed away. The conquests of Alexander, a Græco-Albanian monarch, spread Greek civilization throughout the known world, but crushed Greece proper out of existence. This civilization (see GREECE, vol. xi. p. 136 *sq.*), influencing peoples foreign to the Greek race, is designated Hellenistic as opposed to the Hellenic, and the chief note of Hellenistic literature is that of imitation. The original springs of Hellenic poetry were dried up, and from the 3d century B.C. the newly affiliated peoples, whose centre was Alexandria, expressed their fancies in novels rather than in epics.

When, about the 1st century of the Christian era, verse gave place in general favour to rhetorical prose the greater ease of the style lent itself to more detailed narratives than the eclogue and love-poem; and the sophist who might formerly have devoted his attention to poetry became in the decadence of Greek literature a writer of novels. From this period to the 10th century were published the works it is now proposed to analyse. The Greek novel being a late, and it must be confessed an inferior, kind of prose, it would be well if one could trace its rise, progress, and development. This is, however, impossible here; it is sufficient to refer in passing to the fables of primitive invention, the tales inserted by historians, the *Atlantis* of Plato, the *Cyropædia* of Xenophon, the forged histories of Alexander, the fictitious lives of eminent men, the fabulous voyages,[1] and the apocryphal sacred books of Christians and Jews, as supplying in turn material for building up the highly artificial novel which we find first represented by Iamblichus. One element may, however, be spoken of specially, although it is rather a forerunner of the *tale* as distinct from the *novel* or *romance*. The Ionic Greeks, living under an Asiatic sky and corrupted by Oriental luxury, were the first to cultivate to any extent that kind of literature which, without demanding any intellectual labour, tickles the fancy by voluptuous pictures told in a brief and witty manner. Miletus was especially famous for such tales; hence they were usually known as Milesian (Μιλησιακά). What was their exact shape it is difficult to say, as they have entirely perished, leaving only the reputation of the universal favour they enjoyed. Perhaps the story of the Ephesian matron told by Petronius in the *Satiræ*, and (though less likely) that of Cupid and Psyche in the *Asinus* of Apuleius, are more closely allied to them than anything we now possess. They must be considered as a natural growth of the imagination, although some may have been contributed by Orientals or Egyptians; and, while forming a portion of the materials upon which the later Hellenistic novel was constructed, they differed widely from it in form and matter. Ovid cannot be considered as a person easily shocked, yet in two passages of the *Tristia* he says—

> "Junxit Aristides Milesia crimina secum" (*Trist.*, ii. 413).
> "Vertit Aristiden Sisenna, nec obfuit illi
> Historiæ turpes inseruisse jocos" (*ib.*, 443-444).

Plutarch (*Crassus*, 32) refers to the fact of a copy of this very translation by L. Cornelius Sisenna (a contemporary of Sulla) having been found in the baggage of a Roman officer, which gave occasion for Surenas to animadvert upon the Romans carrying with them infamous books during war time. This testimony gives sufficient indication of the nature of the Milesian tales. They must have been short and witty anecdotes, turning chiefly upon the subject of love in its grosser form, and may be regarded as the prototypes of the Italian *novelle* and the Provençal and French *fabliaux*. All that remains to us consists of the names of a few writers and some imitations and translations. The best-known writer whose fame has reached us is Aristides of Miletus, though we are ignorant of his life and even of the age in which he lived. A more recent author of the same class was Clodius Albinus, the rival of Septimius Severus. We also hear of Ephesian, Cyprian, and Sybaritic tales, the last almost as famous as those of Miletus. Aristophanes (as well as Ovid) specially refers to them. Yet after all they exercised but little influence upon the Hellenistic novel beyond perhaps furnishing the more indecent incidents. The lost Ἐρωτικά of Clearchus of Soli, a pupil of Aristotle, may have been more closely connected with that branch of our subject. The love-stories (Περὶ ἐρωτικῶν παθημάτων) of Parthenius of Nicæa are also different. They consist of thirty-six brief tales ending in an unfortunate manner, and were dedicated to Cornelius Gallus as forming subjects for poetical treatment. The author carefully indicates the sources whence he took them, thus giving a special value to his collection. He informs us that some were derived from "the Milesian adventures" of Hegesippus, and also mentions Naxian, Pallenian, Lydian, Trojan, and Bithynian tales. Like Parthenius, Conon was of the Augustan age, and compiled a collection of fifty narratives (Διηγήσεις) of heroic times, relating chiefly to the foundation of colonies. They are analysed by Photius. Cervantes has used one of them in *Don Quixote*.

The first we hear of the Greek or Hellenistic novel is in the time of Trajan (*c.* 110), when Iamblichus, a Syrian by descent and a freeman, born and educated at Babylon, wrote in Greek his *Babylonica*, which is known from Suidas, Photius, and a scholium discovered by Henry Estienne on an ancient MS. of the latter writer. A complete codex existed in 1671; and a considerable fragment has been reprinted by Mai (*Nova Coll. Script. Vet.*, ii. 349, &c.). Suidas states that the *Babylonica* consisted of thirty-nine books, but Photius, who gives a full abstract (*Bibliotheca*, cod. 94), only mentions seventeen. The story is that of Sinonis and Rhodanes, married lovers, persecuted by Garmus, king of Babylon, who is fascinated by Sinonis. They fly, and are pursued by the royal eunuchs, who give them no peace through many adventurous scenes. A remarkable resemblance between the fugitives and another couple, Euphrates and Mesopotamia, is the chief subject of the plot. We now meet, incorporated in the works of writers whose dignity might be supposed above the suspicion of story-telling, short tales of a didactic nature, such as those given by Plutarch under the title "On the Virtues of Women." Dion Chrysostom, the most eminent of the rhetoricians and sophists, has also left among his orations a short novel called *The Hunter*. The narrator is supposed to have been wrecked on the shores of Eubœa and meets a hunter who tells him his history. Two married couples (the hunter and his wife being one) were living in friendly solitude, when one day a stranger came, and asking for money received all the recluses were able to give in the shape of two deerskins. The hunter goes to the city with the traveller, and his first impressions are happily told. He is frightened by the bustle and excitement, and debates with an idler upon the comparative advantages of town and country life. The return home is very delicately drawn. Lucian of Samosata, one of the chief essay-writers of the post-Christian age, has left two romances, *Lucius or the Ass* and the *True History*, both of which have been briefly analysed in the article LUCIAN (vol. xv. p. 43). The former was considered by Photius (cod. 129) to have been taken from a fable by Lucius of Patræ and to have thus had a common origin with the *Asinus* of Apuleius; others consider Lucian himself to have been the original inventor of the story. The *True History* has been drawn on by Rabelais, Cyrano de Bergerac, Swift, and the author of *Baron Munchausen*. Like the productions of more modern satirists, it loses much of its point and meaning when the allusions upon which the chief interest is based can no longer be understood. Rather of the nature of the fictitious voyage was *The Wonders beyond Thule* of Antonius Diogenes, only known from the account given by Photius

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[1] Strabo considered all those who had written about India down to his time as mere fictionists, and at their head he placed Daimachus and Megasthenes. From the analysis furnished by Diodorus Siculus (ii. 55-60) of the *Fortunate Island* of Iambulus we are led to believe that the writer, who lived before the 1st century, intended the work as a kind of social utopia similar to the *Atlantis*,—full of marvels and surprises like all the other imaginary voyages.

(cod. 166). who was of opinion that he belonged to a remote age, shortly after Alexander, and that he served as model to all subsequent writers of romance, including Lucius. A preliminary letter to a friend, Faustinus, indicates by the Latin name a much later origin. The heroes visit the Celts and the Aquitanians, both unknown to the Greeks at an early period. Certain paragraphs of the life of Pythagoras by Iamblichus are nearly identical with passages in Diogenes, who in his turn has similar correspondence with parts of Nicomachus Gerasenus, who lived under Tiberius. The natural inference is that all three writers copied from the same source. Modern authorities place Diogenes at the beginning of the 3d century. The recitals of their travels given by the Arcadian Dinias, the Phœnician Dercyllis, and her brother Mantinias are such as would be imagined by persons who had never left their native hamlet. The itinerary of the routes followed by the different personages is extremely confused. By Thule the writer probably understood Iceland or Norway, deriving his information from Pytheas.

The Latin *Apollonius of Tyre* is undoubtedly derived from a lost Greek original, and therefore claims a place here, as representing one of the earliest love-stories we can assign to that literature. It may date from the 3d or 4th century, and was perhaps translated into Latin verse in the 5th century. What we now possess (beyond the Anglo-Saxon version mentioned below) is a second Latin prose translation made in the 12th or 13th century. The first mention of the work is in a list of books belonging to Wando, abbot of Fontanelle (742), in the diocese of Rouen. The story runs that Antiochus, king of Syria, entertaining an undue affection for his daughter Tarsia, keeps off suitors by an unsolvable riddle. But Apollonius, king of Tyre, discovers the answer, is obliged to fly, and (as well as Tarsia) undergoes many trials from pirates and other persecutors. An abridgment is included in the *Gesta Romanorum* An ancient Anglo-Saxon translation was printed by Thorpe in 1834. Gower derived his adaptation in the *Confessio Amantis* (bk. viii.) from the rhymed redaction of Godfrey of Viterbo (1185) This formed the foundation of Shakespeare's Pericles (1609). The earliest English version (1510) is made from the French *Appollyn, Roy de Thire.*

The author of the *Cyropædia* has already been alluded to. Suidas mentions other writers of fictions of the name of Xenophon,—a native of Antioch, who wrote *Babylonica* like Iamblichus; a native of Cyprus, who composed a similar book under the title of *Cypriaca*; and Xenophon of Ephesus, of whom alone we possess anything. This last is the author of the romance *Ephesiaca, or the Loves of Anthia and Abrocomas*, of which the Monte Cassino MS. (first published in 1726) is the only one extant. His age is unknown: by Locella, one of his editors, he is placed in the time of the Antonines; Peerlkamp, another editor, considers him to be the oldest of the romancers writing in Greek, and that similar writers imitate him closely. Some go so far as to regard him as an imitator of Achilles Tatius and of Heliodorus, and bring him down to the 5th or 6th century. The story runs that Anthia and Abrocomas are married, and, being forbidden by an oracle to travel, of course do so, and are captured by pirates, who take them to Tyre, where Manto, daughter of the chief, falls in love with Abrocomas. Repelled by him, she marries Mœris and accuses Abrocomas of an attempt to violate her. Mœris in his turn pays improper attentions to Anthia. The great beauty of the hero and heroine causes them many trials at the hands of pirates, brigands, and other stock ornaments of the Greek novel. The local names of the tales of Iamblichus and Xenophon were probably suggested by the Μιλησιακά collected by the earlier writers Dionysius and Aristides of Miletus. This is the weakest of the class we have under review: its only merit lies in a simple and natural style. By far the best of the romances is the *Æthiopica* of **HELIODORUS** of Emesa (*q.v.*). From its first appearance and throughout the whole Byzantine period this work enjoyed a reputation which it has not entirely lost. Within recent times three Frenchmen of mark have praised it,—Amyot, who translated it; Racine, with whom it was a favourite; and Boileau, who compared it with the *Télémaque* of Fénelon. It influenced considerably the French romance-writers of the 17th century, D'Urfé, Gomberville, and Mademoiselle de Scudéry. The dénoûment is imitated in the *Pastor Fido* of Guarini; Tasso drew from it the early life of Clorinda in *Gerusalemme Liberata*; and Raphael painted scenes from it. It was first brought to light in modern times in a MS. from the library of Matthias Corvinus, found at the sack of Buda (Ofen) in 1526, and printed at Basel in 1534. Other codices have since been discovered. The title is taken from the fact that the action of the beginning and end of the story takes place in Æthiopia. The daughter of Persine, wife of Hydaspes, king of Æthiopia, was born white through the effect of the sight of a marble statue upon the queen during pregnancy. Fearing an accusation of adultery, the mother gives the babe to the care of Sisimithras, a gymnosophist, who carries her to Egypt and places her in charge of Charicles, a Pythian priest. The child is taken to Delphi, and made a priestess of Apollo under the name of Chariclea. Theagenes, a noble Thessalian, comes to Delphi and the two fall in love with each other. He carries off the priestess with the help of Calasiris, an Egyptian, employed by Persine to seek for her daughter. Then follow many perils from sea-rovers and others, but the chief personages ultimately meet at Meroe at the very moment when Chariclea is about to be sacrificed to the gods by her own father. Her birth is made known, and the lovers are happily married. The rapid succession of events, the variety of the characters, the graphic descriptions of manners and of natural scenery, the simplicity and elegance of the style, give the *Æthiopica* great charm. Its chaste tone compares favourably with many of the other works of the same class.

Perhaps the most widely known is the delightful pastoral of *Daphnis and Chloe* (or Λεσβιακά), generally attributed to Longus, a Greek sophist, who is supposed to have lived in the 4th or the early part of the 5th century. Longus shows traces of an imitation of the *Æthiopica* of Heliodorus, with whom he may be placed in the first rank of such writers. His work formed the model of the *Sireine* of Honoré d'Urfé, the *Diana* of Montemayor, the *Aminta* of Tasso, and the *Gentle Shepherd* of Allan Ramsay, and has been translated into every European language. The translation of Amyot, afterwards revised by P. L. Courier, has made it extremely popular in France, where the subject has frequently been made use of by Gérard and other painters. The celebrated *Paul et Virginie* is an echo of the same story. Daphnis and Chloe, two children found by shepherds, grow up together, nourishing a mutual love which neither suspects. The development of this simple passion forms the chief interest, and there are few incidents. Chloe is carried off by the inevitable pirate, and ultimately regains her family. A few rivals alarm the peace of mind of Daphnis; but the two lovers are recognized by their parents, and return to a married and happy life in the country. The picture of rural felicity and the innocent affection of the children make the charm of a book which comes nearer perhaps in spirit to the modern novel than any other of its class. Unfortunately there are details here and there which shock modern ideas of decent propriety. Achilles Tatius or Statius, an Alexandrian rhetorician of the latter half of the 5th or beginning of the 6th century, wrote *The Adventures of Leucippe and Cleitophon*, upon the model of Heliodorus; though an ingenious story, it does not reach the standard of the work it imitates. Like his predecessor, Achilles uses the marvellous with discretion, but the accumulation of difficulties is very tedious. Leucippe and Cleitophon fall in love and fly to escape parental anger. They suffer shipwreck, are seized by brigands, and separated. Cleitophon first believes that Leucippe is dead, then finds her, to lose her once more. and again to meet her, a slave, at the very time he is going to marry her mistress, Melitta, a rich Ephesian widow. It so happens that the husband of the latter is not dead but returns to persecute with his love and jealousy both Leucippe and Cleitophon. The descriptions are the best part, the incidents being either tiresome or repulsive and the character of the hero pitiable. Most of the book is written with taste and judgment, but the digressions are too frequent.

Achilles Tatius is the last of these authors who can be said to have the slightest merit. Of the romances which followed his one of the least bad is perhaps *Chæreas and Callirhoe*, by one who called himself Chariton of Aphrodisias, placed by various authorities between the 5th and the 9th century. Here the two lovers are already married, and as usual are of superhuman beauty. Unfortunately Chæreas possesses a somewhat irritable temper, and on a jealous suspicion gives his lovely wife a terrible kick in the stomach. She is considered dead and is carried to her grave. But during the night brigands carry her away to Ionia, where her purchaser, Dionysius, falls in love with her. The wife remains faithful to her husband, but, as she is *enceinte*, consents to marry Dionysius in order that her child may have a father. Meanwhile Chæreas, having learned the ravishment of the supposed corpse, starts in pursuit of his wife. He also is captured by pirates and taken to Caria. The two finally come together, when Callirhoe forsakes Dionysius and her son and returns to Sicily with her first husband.

Equally frigid was *The Loves of Hysmine and Hysminias* by Eustathius or Eumathius, probably a Byzantine, who is placed by Wolf as late as the 12th century, but who may have lived six hundred years earlier. Only a few more remain to be mentioned. Philip of Amphipolis wrote Ῥοδιακά (specially referred to by Suidas for its obscenity), Θασιακά, and other works, all lost. Severus of Alexandria, a man of fortune with a large library, living in the latter part of the 5th century, has left a few short stories after the style of Parthenius. Photius (cod. 130) also preserves the titles of some works by a certain Damascius, such as *Incredible Fictions*, *Tales of Demons*, *Marvellous Stories of Appearances from the Dead*, &c. The same authority tells us (cod. 188) of a writer of the name of Alexander who compiled a book of marvels. The credit of having written the worst of the Greek romances may be claimed either by Theodorus Prodromus, a monk of the early part of the 12th century, for his metrical history, in nine books, of *Rhodanthe and Dosicles*, or by Nicetas Eugenianus, who lived somewhat later, for his iambic poem *History of the Lives of Drusilla and Charicles*, imitated from the former work. Constantinus Manasses (also 12th century) composed a poetical romance on the loves of *Aristander and Callisthia*, fragments of which were first printed by Villoison (*Anecdota Græca*, 1781).

Under BARLAAM AND JOSAPHAT (vol. iii. p. 375) will be found the origin and development of the story by St John of Damascus, which belongs rather to religious apologues than to romances. Its origin is entirely Eastern, from India. The early Christians eagerly seized upon fiction as affording them a vehicle for spreading their views. Their contributions to our subject have a strong family likeness, and usually either close with a martyrdom or are written in praise of a monastic life. To the former class belong the *Clementine Recognitions* (2d century), *Paul and Thekla* (3d century), and *Cyprian and Justina*, which contains the germs of the episode of Faust and Gretchen. The ascetic novels include *Xenophon and his Sons*, *Euphrosyne*, *Zosimus and Mary*, *Thais*, &c. Christian imaginary travels are represented by the *Voyage of Macarius to Paradise* and comic tales by *Agape*, *Irene*, and *Chionia*.

Besides the forged letters attributed to men of mark, we have from the Greek sophists collections of fictitious letters serving the same purpose as the epistolary novels of Rousseau and Richardson. The best known of those writers were Alciphron, Aristænetus, and Theophylactus Simocatta. Alciphron, the most eminent, of whom we possess 116 *Letters* in three books, lived in the 3d or 4th century. Many of the letters are written by courtezans and supply curious information on contemporary life and manners. The fifty *Erotic Epistles* of Aristænetus form a much less entertaining series than those of Alciphron. Theophylactus Simocatta, an Egyptian by birth, died at Constantinople about the year 640. He wrote eighty-five *Letters*, divided into moral, rustic, and amatory. They are little else than brief moral treatises mingled with stories.

Review of Greek romance.

The review of the *origines* of the Greek novel shows that it arose with the decay of old Greek literature and carried on a feeble existence down to the 12th century. Two facts make themselves apparent. First, the romance (or novel) proper came late into the field, where it remained in a secondary place; and secondly, it invariably turned upon a hackneyed circle of incidents and never attained anything of the highly artistic development reached by modern examples. The sameness observable in Greek romance arises from the fact that it was the product of literary decrepitude and impotence. The writers were incapable of rivalling the glories of the old Hellenic literature, and they endeavoured to supply originality with reminiscences more or less disguised. The literary and social surroundings in which these authors passed their lives gave them few fresh subjects for investigation, and the characters they describe are mere names. Human nature and the human heart have little meaning for them; but, as with the Western writers of fiction who closely follow them in point of date, incident is crowded upon incident to the verge of satiety, in order that the attention of the reader may never flag.

Roman romance.

The contributions of Roman literature are limited to productions by two writers, Petronius and Apuleius and one story by Martianus Capella, of more recent date and less typical nature. In the comic romance of PETRONIUS ARBITER (*q.v.*), the tale of the matron of Ephesus first appears among Western popular fictions. This was undoubtedly one of the Ephesian tales already referred to. We find it reproduced in the *Seven Wise Masters*, in the French *fabliaux*, and in Brantôme. It is also to be found in the Chinese. The opening words of the *Golden Ass* of Apuleius indicate that his romance and the *Ass* of Lucian were both inspired from the same source, perhaps through the medium of Lucius of Patræ mentioned by Photius. Lucian seems to have reproduced the story in a condensed form; the Latin writer paraphrased and embellished it with other tales, among which the best known is that of Cupid and Psyche,—an antique gem in an unworthy setting. The hero, punished for his curiosity by being turned into an ass, passes through adventures similar in kind to those depicted in the Greek romance. The story ends with a fine description of the mysteries of Isis, into which the hero is initiated and through which he becomes purified. The first two books of the cyclopædia of the 5th century, the *Satyrica* of Martianus Capella, known as *De Nuptiis Philologiæ et Mercurii*, form a kind of philosophico-allegorical romance in prose mingled with verse. Mercury, wishing to marry, goes, accompanied by Virtue, to Apollo on Parnassus and finds him occupied in taking from four urns the elements of all things. Apollo proposes that Mercury should marry Philology, but the consent of Jupiter must be asked. Jove hesitates and assembles a council of the gods to decide the question. The request is granted and Philosophy transcribes a decree permitting mortals of superior merit to be admitted among the gods. The second book is devoted to the marriage. At first Philology has fears as to its advisability, and the Muses form a chorus by whom she is admonished. She is visited by Prudence, Justice, Temperance, and the three Graces. At last the bride goes to Mercury's house and all set out for the palace of Jupiter, who receives them surrounded by the gods and many deified mortals.

Of these three works the last does not comply with all our conditions, and of the first two Apuleius is after all merely a translator. The *Satiræ* of Petronius is thus the sole genuine representative of Latin prose romance. When compared with the Greek compositions it will be found to offer a remarkable variation. In the *Satiræ* we at once come in contact with contemporary scenery and habits; the characters have well-marked individuality; and the book is full of life. It must not, however, be considered merely as a novel; its chief object was to satirize the manners of the time. The same tendency to draw a strongly marked picture of the vices and follies of the hour appears also in the *Asinus*. In the qualities of vigour, interest, and originality of form and substance Apuleius and Petronius are far beyond their Greek rivals.

The texts of the *Scriptores Erotici Græci* have been edited by C. W. Mitscherlich (Zweibrucken, 1792-94, 3 vols. in four parts); by F. Passow (Leipsic, 1824-33, 2 vols. 8vo); in Didot's collection, the most complete (Paris, 1856, la. 8vo); and by R. Hercher (Leipsic, 1858-59, 2 vols. 12mo). The texts of many of the fictitious historians and biographers are given in *Fragmenta Historicorum Græcorum* (Paris, 1841-51, 4 vols. la. 8vo), and *Scriptores de Rebus Alexand. M.* (*ib.*, 1846, 8vo). Photius (*Bibliotheca*, Berlin, 1824, 2 vols. 4to) has analysed a great many writings now lost. Early biographical information (not always trustworthy) is supplied by Suidas, and latterly and more perfectly by Fabricius (*Biblioth. Græca*). Translations into French are contained in *Bibliothèque des romans grecs, tr. en françois* (Paris, 1797, 12 vols. 18mo); *Collection de romans grecs, tr. avec des notes par Courier, Larcher, &c., précédée d'un essai sur les romans grecs par M. Villemain* (Paris, 1822, 12 vols. 18mo, unfinished); *Romans grecs, tr. en fran. par Ch. Zevort, précédés d'une introduction sur le roman chez les grecs* (Paris, 1856, 2 vols. sm. 8vo). In Italian we have *Erotici greci* (Florence, 1814-17, 6 vols. 8vo), and in English, *Greek Romances*, by C. Smith (1855, sm. 8vo). The general authorities are referred to under GREECE (vol. xi. p. 147). The following are special treatises on the subject:—J. C. F. Manso, "Ueber den griech. Roman," in his *Verm. Schriften* (Leipsic, 1801); F. Jacobs, "Conjecturæ de locis nonnullis Achillis Tatii," &c., in Wolf's *Litt. Analecten* (Berlin, 1820); Wiedemann, "Der gr. Roman," in *Arb. der kurländ. Ges.*, 1848, hft. 3; R. Hercher, "Zur Litt. d. gr. Erotiker," in *Jahrb. f. class. Phil.*, 1858, vol. lxxvii.; O. Jahn. "Eine antike Dorfgeschichte," in *Aus d. Alterthumsw.*; H. Peter, "Der Roman bei den Griechen," in *Neue Schweiz.*, 1866; A. Nicolai, *Ueber Entstehung u. Wesen d. gr. Romans* (Berlin, 1867, 8vo); B. Erdmannsdörffer, "Das Zeitalter der Novelle in Hellas," in *Preus. Jahrb.*, vol. xxv.; C. Hartung, "Die byzantinische Novelle," in *Archiv f. d. Stud. d. n. Spr.*, 1872; H. Usener, "Zur Gesch. des gr. Romans," in *Rhein. Mus.*, 1873, vol. xxviii. (N. F.); E. Rohde, "Ueber gr. Novellendichtung," in *Verhandl. d. deutschen Philologen*, 1875; Id., *Der gr. Roman u. seine Vorläufer* (Leipsic, 1876, 8vo); J. Wimmer, "Der gr. Roman," in *Blätter f. d. bayer. Gymn.*, 1877); "Greek Romances," in *For. Quar. Rev.*, Nov. 1829; "Early Greek Romances," in *Blackwood's Mag.*, July 1843; S. Baring Gould, "Early Christian Greek Romances," in *Contemp. Rev.*, Oct. 1877; Chardon de la Rochette, "Notice sur les romans grecs," in *Mélanges* (Paris, 1812, vol. ii.); Struve, "Romans et nouvelles chez les grecs," in *Journal gén. de l'Instr. Publ.*, 13th Aug., 17th Sept., 1835; V. Chauvin. *Les romanciers grecs et latins* 1864, sm. 8vo); A. Chassang, *Hist. du roman dans l'antiq. grec. et lat.* (1862, sm. 8vo); P. D. Huet, *De orig. fab. rom.* (Hague, 1682); P. Psoiaudi, *De Libris Eroticis Antiquorum* (Leipsic, 1803, 8vo); H. Paldamus, *Römische Erotik* (Greifswald, 1833, 8vo).

(b) *Pseudo-Classical Works.*

The literature of the Middle Ages recognized three great epic cycles, distinctly defined by Jean Bodel (13th century) in his *Chanson des Saisnes* (*i.e.*, Saxons):

> "Ne sont que troi materes, a nul home entendant—
> De France, de Bretaigne, et de Rome la Grant;
> Et de ces troi materes n'i a nule semblant."

Under "Rome la Grant" were comprehended the stories of Troy and the Trojans, Æneas, Alexander the Great, Julius Cæsar, Judas Maccabæus, &c., from Latin sources,—that is to say, the whole ancient world seen through the language of Rome.

The romances derived from antiquity may be arranged in three classes—(1) those which were believed to be direct reproductions, such as *Eneas*, *Thebes*, *César*, and the *Roman de Troie*, whose authors acknowledged indebtedness, after their fashion, to Virgil, Statius, Dares Phrygius, Dictys Cretensis, &c.; (2) those based upon ancient histories not previously versified,—for example, the legend of Alexander from Quintus Curtius and the Pseudo-Callisthenes; (3) those which merely reproduce the names of antiquity and nothing else, such as *Athis et Profilias*, *Ypomédon*, and *Protésilaus*.

1. The chief of the first class was the *Roman de Troie*, which exercised greater influence in its day and for centuries after its appearance than any other work of the same order. Just as the *chansons de geste* of the 10th century were the direct ancestors of the prose romances which afterwards spread throughout Europe, so, even before the novels of Heliodorus and Achilles Tatius, there were quasi-histories which reproduced in prose, with more or less exactness, the narratives of epic poetry. Among these nothing has ever equalled in vitality the tale of the two sieges and capture of Troy, and the subsequent destinies of the Trojan and Greek heroes. "It would require a large volume," says Grote (*History of Greece*, i. p. 386), "to convey any tolerable idea of the vast extent and expansion of this interesting fable, first handled by so many poets, epic, lyric, and tragic, with their endless additions, transformations, and contradictions, then purged and recast by historical inquirers, who, under colour of setting aside the exaggeration of the poets, introduced a new vein of prosaic invention." Long previous to the Ἡρωικός of Philostratus (2d century) the Trojan War had been the subject of many a prose fiction dignified with the title of history; but to remodel the whole story almost in the shape of annals, and to give a minute personal description of the persons and characters of the principal actors, were ideas which belonged to an artificial stage of literature. This task was commenced by PHILOSTRATUS (*q.v.*), whose Ἡρωικός bears ample traces of having been compiled from a number of current figments. Philostratus, however, only pictures several characters and a few isolated scenes. His method was subsequently followed in a more complete fashion by two anonymous writers, who either borrowed from him or from a more ancient source common to all three. A spurious history, professing to give the chief incidents of the siege, and said to have been written by Dictys of Crete, a follower of Idomeneus, was known as early as the time of Ælian, and has been largely quoted by the Byzantine chroniclers This was translated into Latin prose at an early period under the title of *Dictyos Cretensis de Bello Trojano libri VI.* With Dictys is always associated Dares, a pseudo-historian of more recent date. Old Greek writers mention an account of the destruction of the city earlier than the Homeric poems, and also in

the time of Ælian this Iliad of Dares, priest of Hephæstus at Troy, was believed to exist. Nothing has since been heard of it; but an unknown Latin writer living between 400 and 600 took advantage of the tradition to compile what he styled *Daretis Phrygii de Excidio Trojæ Historia*. It is in prose, and professes to be translated from an old Greek manuscript. Of the two works that of Dares is the later, and is inferior to Dictys. The matter-of-fact form of narration recalls the poem of Quintus Smyrnæus. Both compilations lack literary merit; the gods and everything supernatural are suppressed; even the heroes are degraded. The long success, however, of the two works distinguishes them above all apocryphal writings, and they occupy an important position in literary history on account of the impetus they gave to the diffusion of the Troy legend throughout western Europe. The Byzantine writers from the 7th to the 12th century exalted Dictys as a first-class authority, with whom Homer was only to be contrasted as an inventor of fables. Western people preferred Dares, because his history was shorter, and because, favouring the Trojans, he flattered the vanity of those who believed that people to have been their ancestors. Many MSS. of both writers were contained in old libraries; and they were translated into nearly every language and turned into verse. In 1272 a monk of Corbie translated "sans rime *L'Estoire de Troiens et de Troie* [de Dares] du Latin en Roumans mot à mot" because the *Roman de Troie* (to be mentioned lower down) was too long. Geoffrey of Waterford put Dares into French prose; and the British Museum possesses three Welsh MS. translations of the same author,—works indeed of a much later period.

We know that the taste for Greek letters was never entirely lost in western Europe. Eginhard tells how Charlemagne understood Greek and how he encouraged the study. Alcuin states, with pardonable pride, that the library at York contained "Græcia vel quidquid transmisit clara Latinis," which may, however, simply refer to Latin translations. Under any circumstances, however, this knowledge must have been confined to a few. It was through Latin that the Middle Ages knew the ancient world, and in that language read the Pseudo-Dares and Dictys, the *Fables* of Æsop, and the *Iliad* of Homer.[1] Through these translations came many of the traces of Greek literature which occur in the fabliaux and romances. How numerous these traces were in the Arthurian cycle will be pointed out. The tale of the Dog of Montargis, familiar to readers of *Milles et Amys* (Carolingian cycle), is derived from Plutarch. Cerberus may be found in the *Chanson d'Antioche*; the story of Tarquin in the *chanson de geste Moniage Guillaume*; the judgment of Paris in *Foulkes de Candie*; and Cupid and Psyche in the romance of *Partenopex of Blois*.

For a thousand years the myth of descent from the dispersed heroes of the conquered Trojan race was a sacred literary tradition throughout western Europe, of which a possible survival still remains in the popular phrase which speaks of a generous and courageous fellow as a Trojan. The classical traditions of extensive colonization subsequent to the Trojan War were adopted by Western nations at a very early date. The first Franco-Latin chroniclers considered it a patriotic duty to trace their history to the same origin as that of Rome, as told by the Latin poets of the Augustan era; and in the middle of the 7th century Fredegarius Scholasticus (*Rer. Gall. Script.*, ii. 461) relates how one party of the Trojans settled between the Rhine, the Danube, and the sea. In a charter of Dagobert occurs the statement, "ex nobilissimo et antiquo Trojanorum reliquiarum sanguine nati." The fact is repeated by chroniclers and panegyrical writers, who also considered the *History of Troy* by Dares to be the first of national books. Succeeding kings imitated their predecessors in giving official sanction to their legendary origin: Charles the Bald, in a charter, uses almost the same words as Dagobert—"ex præclaro et antiquo Trojanorum sanguine nati." In England a similar tradition had been early formulated, as appears from the Pseudo-Nennius (put together between the 7th and 9th centuries) and Geoffrey of Monmouth. Otto Frisingensis (12th century) and other German chroniclers repeat the myth, and the apocryphal hypothesis is echoed in Scandinavian sagas.

In the 11th century the tale of Troy became the theme of Neo-Latin verse. About 1050 a monk named Bernard wrote *De Excidio Trojæ*, and in the middle of the 12th century Simon Chèvre d'Or followed with another poem on the fall of the city and the adventures of Æneas, blending the Homeric and Virgilian records. We now come to a work on the same subject in a modern language, which in its own day and for centuries afterwards exercised an extraordinary influence throughout Europe. Benoît de Sainte-More, the Anglo-Norman trouvère who wrote in verse *Chroniques des Ducs de Normandie*, composed in England, under the eyes of Henry II., about the year 1184 a poem in 30,000 lines entitled *Roman de Troie*. It forms a true Trojan cycle and embraces the entire heroic history of Hellas. The introduction relates the story of the Argonauts, and the last 2680 verses are devoted to the return of the Greek chiefs and the wanderings of Ulysses. With no fear of chronological discrepancy before his eyes, Benoît reproduces the manners of his own times, and builds up a complete museum of the 12th century,—its arts, costumes, manufactures, architecture, arms, and even religious terms. Women are repeatedly introduced in unwarranted situations; they are spectators of all combats. The idea of personal beauty is different from that of the old Greeks; by Benoît good-humour, as well as health and strength, is held to be one of its chief characteristics. The love-pictures are another addition of the modern writer. We find traces of the *Odyssey* of Homer and the trilogy of Æschylus[2] as well as of Ovid and Virgil. The author speaks enthusiastically of Homer, but his chief source of information was the pseudo-annals of Dictys and Dares, more especially the latter, augmented by his own imagination and the spirit of the age. It is to Benoît alone that the honour of poetic invention is due, and in spite of its obligation for a groundwork to Dictys and Dares we may justly consider the *Roman de Troie* as an original work. From this source subsequent writers drew their notions of Troy, mostly without naming their authority and generally without even knowing his name. This is the *chef d'œuvre* of the pseudo-classical cycle of romances: it shows the most lofty conception, and in it poetical imagination has the freest and most lively play. The *Roman de Troie* was extremely popular. When Benoît, by reason of his lengthiness, failed to please, the Latin version of Guido revived general interest. The story passed through every country of Europe, first in verse and then as a prose fiction, and portions of it furnished matter for the genius of Boccaccio, Chaucer, and Shakespeare.

Benoît's *Roman de Troie*.

The first work inspired by the success of the *Roman de Troie* was the *De bello Trojano* of Joseph of Exeter, in six books, a genuine poem of no little merit, written soon after Benoît's work or about the years 1187-88. It was directly drawn from the pseudo-annalists, but the influence of Benoit was considerable. Another was the *Troilus* of Albert of Stade (1249), a version of Dares, in verse, brought back to all its severity and affected realism. But these Latin works can only be associated indirectly with Benoit, who had closer imitators in Germany at an early period. Herbort von Fritslar reproduced the French text in his *Lied von Troye* (early 13th century), as did also Konrad von Würtzburg (d. 1287) in his *Buch von Troye* of 40,000 verses. To the like source may be traced a poem of 30,000 verses on the same subject by Wolfram von Eschenbach, still unpublished. The Low Countries were not behind Germany. A dozen *chansons de geste* were translated into Flemish towards the middle of the 13th century; and Jacob von Maerlant, an illustrious poet, reproduced Benoît, and did not omit to acknowledge the authorship. The fame of the romance travelled to the north, and in various forms the Norse or Icelandic *Trojumanna Saga* acquired a distinctly local colour.

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[1] The name of Homer never ceased to be held in honour; but he is invariably placed in company with the Latin poets. Few of those who praised him had read him except in the Latin redaction in 1100 verses which passed under the name of Pindar. It supplied the chief incidents of the *Iliad* with tolerable exactness and was taught in schools.

[2] The Middle Ages had their Latin Oresteia, see *Orestis Tragœdia, carmen epicum sæculo post Christum natum sexto compositum*, ed. S. Schenkl, Prague, 1867, 8vo.

In Italy Guido delle Colonne, a Sicilian, commenced in 1270 and finished in 1287 a prose *Historia Trojana*. Although Guido knew some Greek, he did not translate Dictys and Dares, as some MSS. affirm, but reproduced the *Roman de Troie* of Benoît, and so closely as to copy the errors of the latter and to give the name of Peleus to Pelias, Jason's uncle. As the debt was entirely unacknowledged, Benoît at last came to be considered the imitator of Guido. The original is generally abridged, and the vivacity and poetry of the Anglo-Norman trouvère disappear in a dry version. The immense popularity of Guido's work is shown by the large number of existing MSS. The French Bibliothèque Nationale possesses eighteen codices of Guido to thirteen of Benoît, while at the British Museum the proportion is ten to two. Guido's *History* was translated into German about 1392 by Hans Mair of Nördlingen. Two Italian translations, by Antonio Cessi (1324) and by Bellebuoni (1333), are still preserved in MS. at Florence. The book passed the seas, and in the 14th and the commencement of the 15th century four versions appeared in England and Scotland. The best known is the *Troy Book* of Lydgate, who had both French and Latin texts before him. An earlier and anonymous rendering exists at Oxford. There is the *Gest Historiale of the Destruction of Troy* (Early Eng. Text Soc., 1869), also an earlier Scottish version by Barbour. The invention of printing gave fresh impetus to the spread of Guido's work. The first book printed in English was a translation by Caxton from the French of Raoul Lefèvre, issued by the foreign press of Caxton about 1474. Lefèvre's own version appeared from the same press about the same time and was the first book printed in the French language. There were also translations into Italian, Spanish, High German, Low Saxon, Dutch, and Danish; Guido had even a Flemish and a Bohemian dress. But not one of these translators even suspected that the writer was only a feeble representative of an old trouvère.

Thus far we have only considered works more or less closely imitated from the original. Boccaccio, passing by the earlier tales, took one original incident from Benoît, the love of Troilus and the treachery of Briseida, and composed *Filostrato*, a touching story. This was borrowed by Chaucer about 1360 for his *Boke of Troilus and Cresside*, and also by Shakespeare for his *Troilus and Cressida* (1609). One reason why the Round Table stories of the 12th and 13th centuries had a never-ceasing charm for readers of the two following centuries was that they were constantly being re-edited to suit the changing taste. The *Roman de Troie* experienced the same fate. By the 13th century it was translated into prose and worked up in those enormous compilations, such as the *Mer des Histoires*, &c., in which the Middle Ages studied antiquity. It reappeared in the religious dramas called Mysteries. Jacques Millet, who produced *La Destruction de Troie la Grande* between 1452 and 1454, merely added vulgar realism to the original. Writers of chap-books borrowed the story, which is again found on the stage in Antoine de Montchrestien's tragedy of *Hector* (1603)—a last echo of the influence of Benoit.

Although the *Troie* reveals the greatest power of imagination, and was the most influential and important, of these adaptations of ancient classical stories, it was not the earliest of them. It was preceded by a *Roman d'Eneas*, written, like the *Roman de Troie*, by an Anglo Norman at the court of Henry II., a contemporary of Giraldus Cambrensis and John of Salisbury. There is, indeed, every reason to believe that the author was Benoit de Sainte-More himself. The work is a tolerably close reproduction of the *Æneid*, some passages being faithfully translated and others elaborated. But the religious character of Virgil's work is wanting, as well as the spirit of Roman greatness shadowed forth in the ancient epic. Long extracts from the *Eneas* have been published by M. Pey (Paris, 1856), but it has not yet been printed in full. Soon after its appearance it was translated with great fidelity into German by Heinrich von Veldeke. The *Roman de Thebes* is an imitation of the *Thebais* of Statius, with the same general characteristics as the *Eneas*. In each case the trouvère found a Latin model on which to superimpose an elaborate structure of his own. In each case also the original is abridged, while all polish is effaced, and the pagan marvels replaced by others more familiar to contemporary readers. The change is specially visible in matters of religion. Lydgate translated the *Thebes*, and Chaucer used the romance in his *Canterbury Tales*. It was composed after the *Troie* by another pen than that of Benoit. Lucan's *Pharsalia* was the last of the great Roman epics to be appropriated. *Li Romanz de Julius Cesar* by Jacques de Forez, of which only one MS. exists, dated 1280, is from this source. It adheres to Lucan's text with more fidelity than the other adaptations; but the general intention is changed. While the classic poem ends in the middle of the 10th book, Jacques de Forez conducts Cæsar back to Rome. These romances—*Eneas*, *Thebes*, and *J. Cesar*—are mere translations, and are, indeed, our first renderings of Virgil, Statius, and Lucan in modern dialects. But the trouvères rearranged and transformed their originals. Fairies, magic, and enchanters, the novel position of women, the sentiments of Christianity, and the spirit of chivalry are strangely at variance with the stories familiar to us in the language of imperial Rome. The influence of new ideas derived from the crusades and the East is plainly visible. Some of the marvels are found in William of Malmesbury, which indicates that they were of popular acceptation

Secondary reproductions.

It is a remarkable fact that, while the *origines* of the pseudo-classical romances are earlier than any of the others, the prose recompositions are of later construction than almost all those we are about to consider. The *Recueil des Histoires de Troyes*, *Hercule*, *Jason*, *Œdipus*, *Alexandre*, *Virgilies*, &c., belong to the second half of the 15th century. They have little interest and intrinsic merit, but their immediate originals exercised an extraordinary influence on the literature of the Middle Ages, an influence which appears even in the romances of other cycles and in those composed in prose at an earlier date than those we are now discussing.

Recueil des Histoires de Troyes was "composé par vénérable homme Raoul le Feure prestre chappellain de mon tres redoubté seigneur monseigneur le duc Phelippe de Bourgoingne en l'an de grace 1464," but probably printed in 1474 by Caxton or Colard Mansion at Bruges. It is in three books, of which the first deals with the story of Jupiter and Saturn, the origin of the Trojans, the feats of Perseus, and the first achievements of Hercules; the second book is wholly taken up with the "prouesses du fort Herculez"; the third, "traictant de la generalle destruction de Troyes qui vint a l'ocasion du ravissement de dame Helaine," is little else than a translation of that portion of Guido delle Colonne which relates to Priam and his sons. Two MSS. of the *Recueil* in the Bibliothèque Nationale wrongly attribute the work to Guillaume Fillastre, a voluminous author, and predecessor of Lefèvre as secretary to the duke. Another codex in the same library, *Histoire ancienne de Thebes et de Troyes*, is partly taken from Orosius. The Bibliothèque Nationale possesses an unpublished *Histoire des Troyens et des Thebains jusqu'a la mort de Turnus, d'apres Orose, Ovide et Raoul Lefebre* (early 16th century), and the British Museum a Latin history of Troy dated 1403.

Hercules.—The end of the first and the whole of the second book of the *Recueil* are reproduced in *Les prouesses et vaillances du preux Hercule* (Paris, 1500), with the addition of a prologue and the genealogy of the champion. The character and adventures of Hercules were of a nature to attract the fancy of a romancist. His labours are represented as having been performed in honour of a Bœotian princess; Pluto is a king dwelling in a dismal castle; the

Fates are duennas watching Proserpine; the entrance to Pluto's castle is watched by the giant Cerberus. Hercules conquers Spain and takes Merida from Geryon. The book is translated into English as *Hercules of Grecce* (n.d.). The marquis de Villena took from the same source his prose *Libro de los Trabajos de Hercules* (Zamora, 1498), and Fernandez de Heredia wrote *Trabajos de Hercules* (1682), also in prose. *Le Fatiche d'Ercole* (1475) is a romance in poetic prose by Pietro Bassi, and the *Dodici Travagli di Ercole* (1544), a poem by J. Perillos.

Jason.—Les fais et prouesses du noble et vaillant chevalier Jason was composed in the middle of the 15th century by Lefèvre on the basis of Benoît, and presented to Philip of Burgundy, founder of the order of the Toison d'Or. Jason is shown as a foremost figure in tournaments, overthrowing all competitors at one held by the king of Bœotia to celebrate the knighting of his son Hercules. The two become staunch friends and attend the marriage ceremony of Hippodamia. Centaurs interrupt and are exterminated by Jason. He performs other knightly exploits, and on his return is maliciously sent by his uncle Peleus (Pelias) on the Argonautic expedition. The narrative of the journey to Lemnos and Colchos, the love of Medea, and the episode of the Golden Fleece follows the classical traditions. When Jason returns to the country of the Myrmidons, Medea by enchantment restores the old king to youth and brings about the death of Peleus. For this last good deed Medea is banished, with Jason's consent, and is carried off by four dragons. She soars long over Greece before she is able to find her lover; at length she discovers that he is going to wed the princess of Corinth. She descends amid thunder and lightning, kills the two children she bore to Jason, and allows her attendant dragons to destroy with fire Corinth and all its inhabitants. She then inveigles the old Egeus, king of Athens, into marriage, but is banished upon suspicion of attempting to poison her new son-in-law Theseus. Meeting with Jason, who had escaped the burning of Corinth, she becomes reconciled to him, and, abjuring magic, on the death of Eson becomes a good wife and queen. The manners and sentiments of the 15th century are made to harmonize with the classical legends after the fashion of the Italian pre-Raphaelite painters, who equipped Jewish warriors with knightly lance and armour. The story is well told; the digressions are few; and there are many touches of domestic life and natural sympathy. The first edition is believed to have been printed at Bruges in 1474; the type is the same as that used in the first edition of the *Recueil*. Caxton translated the book at the command of the duchess of Burgundy. A Dutch translation appeared at Haarlem in 1495. M. Paulin Paris doubts whether the romance was written by Lefèvre, whose authorship is distinctly asserted by Caxton. Montfaucon refers to a MS. by Guido delle Colonne, *Historia Medeæ et Jasonis* (unpublished). There is a *Histoire de la Thoison d'Or* (1516) by Guillaume Fillastre, written about 1440-50.

Œdipus.—A kind of introduction to the *Recueil* is *Le Roman d'Œdipus, Fils de Layus* (n.d.), written in the 15th century by an unknown pen. The story follows the fable told by the Greek poets, adapted, of course, to the taste and habits of later times. The sphinx is drawn as a giant of great subtlety and ferocity.

Histories of Alexander.

2. The wonders revealed through the Asiatic expedition of Alexander gave rise to a remarkable development of the marvellous in historical composition. The histories of Onesicritus, Aristobulus, and Clitarchus, themselves members of the expedition, were so full of unheard-of things that they soon fell into disrepute. Callisthenes, another companion of Alexander, also wrote an account, which is lost, but his name remains connected with a spurious work in which were crystallized all the fabulous tales of the conqueror. The life of Alexander had every quality to appeal to the imagination. His marvellous career, his genius as a soldier and ruler, the beauty of his person, his early death, were subjects for legend almost in his own day; and a cloud of mythical story soon floated round his memory. Quintus Curtius, who drew from some of these suspicious sources, is a more critical authority, though he allowed rhetorical fancy to embellish his narration. It is a great fall from the Latin historian to the Pseudo-Callisthenes. The work we possess under the latter title represents the second stage of the Alexander myth. Some of the MSS. attribute it to Aristotle, Ptolemy, and Æsop, as well as to Callisthenes,—all with equal verisimilitude. To reconstruct the true from the spurious work is an impossible task after the increased vogue given to the latter by the re-opening of the East to Europe by the Romans, when all the traditions became remoulded in the form they now possess. Among the histories separate from Pseudo-Callisthenes and subsequent to Quintus Curtius is an *Itinerarium Alexandri*, in Latin, but of Greek origin, which is little else than an amplification of the apocryphal letter of Alexander to Aristotle. It is dedicated to Constans, son of the emperor Constantine. Similarities between the *Itinerarium* and the Latin version of Pseudo-Callisthenes prove that the stories were current in the 4th century, and may have emanated from the same source; but, while the *Itinerarium* is inferior in authority to Quintus Curtius, it is less a collection of mere fables than is Callisthenes. The Greek text of the latter is supposed to have been written in Alexandria at the commencement of the third century, and to have been translated into Latin by Julius Valerius before 340. The translation was abridged in Latin some time before the 9th century. Much of the work is a running travesty of the true history of the conqueror. The first book deals with his birth and early exploits. The trace of Alexandrian influence is to be found in the pretence that his actual father was Nectanebus, a fugitive king of Egypt. The latter was a great magician, able, by operating upon waxen figures of the armies and ships of his enemies, to obtain complete power over their real actions. He was obliged, however, to fly to Pella, where he established himself as a doctor and was visited by Queen Olympias to get advice upon her continued sterility. He promised that Jupiter Ammon should perform the cure in the shape of a dragon. To make quite sure Nectanebus himself took the place of the animal, and nine months afterwards Philip became the father of the future Alexander. At first there was some unpleasantness, but a reappearance of the dragon convinced everybody that the infant really was the son of a god, so that the putative father could no longer object. Alexander was small and somewhat deformed, but of great courage and intelligence. He was educated under the supervision of Nectanebus, who at last died through a fall into a pit, into which he had been playfully pushed by his royal pupil. The second book continues the various conquests, and the third contains the victory over Porus, the relations with the Brahmans, the letter to Aristotle on the wonders of India, the histories of Candaces and the Amazons, the letter to Olympias on the marvels of Further Asia, and lastly the account of Alexander's death in Babylon.

Callisthenes was translated into Syriac and Armenian in the 5th century. A second Latin abridgment is known as *Historia de Præliis*. The letter from Alexander to Aristotle on the marvels of India, the correspondence between the king and the wise Brahman Dindimus, and *De Gentibus Indiæ*, ascribed to Palladius, are different parts of the same legend. The myth had a wider circulation than any of the others we have yet dealt with, and the East contributed its share as well as the West. Persians and Arabs told the deeds of Iskander; and Firdousi made use of the story in the *Shah-Namah*. Another early Persian poet, Nizami, made the story specially his own. The crusaders brought back fresh developments; Gog and Magog (partly Arab and partly Greek) and some Jewish stories were then added. In the 11th century Simeon Seth, protovestiarius at the Byzantine court, translated the fabulous history from the Persian back into Greek. In the following century was built up the *Geste d'Alexandre* by the successive labours of Lambert le Cort, Alexandre Bernai, Jehan le Nevelais, Gautier de Cambrai, Pierre de Saint-Cloud, Brisebarre, &c. Alexander becomes then a knightly king, surrounded by his twelve paladins. Bernai says that the foundation was Latin (? Valerius or some other Latin version of Pseudo-Callisthenes):

> "Un clerc de Casteldun, Lambert li Cors l'escrit,
> Qui del Latin le traist, et en Roman le mit."

The same origin is to be sought for the Alexander myths found in *Renart le Bestourné* and the *Speculum Historiale* of Vincentius Bellovacensis. Quintus Curtius was largely used for the *Alexandreis* (*c.* 1176-1202) of Gaultier de Châtillon.[1] It was the theme of poetry in all European languages: six or seven German poets dealt with the subject, and it may be read in English, Spanish, Danish, Swedish, Icelandic, Flemish, and Bohemian.

Towards the close of the 15th century an anonymous writer worked up the subject into a prose romance, *L'histoire du noble et vaillant roy Alixandre le Grant* (1506), in which the *Historia de Prælis* is followed with tolerable exactness. After an account of the ancient history of Macedonia and of the intrigue of Nectanebus we are told how Philip dies, and how Alexander subdues Rome and receives tribute from all European nations. He then makes his Persian expedition, the Indian campaign gives occasion to descriptions of all kinds of wonders. The conqueror visits a cannibal kingdom and finds many marvels in the palace of Porus, among them a vine with golden branches, emerald leaves, and fruit of other precious stones. In one country he meets with women, who, after burial in the winter, become alive again in the spring full of youth and beauty. Having reached the ends of the earth and conquered all nations, he aspires to the dominion of the air. He obtains a magic glass cage, yoked with eight griffins, flies through the clouds, and, thanks to enchanters knowing the language of birds, gets information as to their manners and customs, and ultimately receives their submission. The excessive heat of the upper regions compels him to descend, and he next visits the bottom of the sea in a kind of diving-bell. The fish crowd round him and pay homage. Alexander returns to Babylon, is crowned with much pomp, and mass is celebrated. He dies by poison soon afterwards.

The *Vœux du Paon* and *Restor du Paon* are *chansons de geste* attached to the Alexander cycle, to which also belongs *Florimont*, a poem by Aimé de Varennes, said to have been written in 1188. Florimont was a son of the duke of Albania and father of Philip of Macedon by the heiress of the latter country. This poem gave rise to two prose romances—*La conqueste de Grece faicte par Philippe de Madien*, by Perrinet du Pin, first printed in 1527, and *Histoire du roi Florimond* (1528).

Romances with merely classical names.

3. We now come to the third order of romances included in the cycle of "Rome la Grant," or those which merely reproduce the names of antiquity. The enchanter Virgil is the most famous of those who have given rise to prose works, and what passes under his name is less a romance than a collection of popular tales, many of Eastern derivation. Among romances in verse we have *Eraclès*, *Anseys de Carthage*, *Cléomadès*, *Athis et Profilias*, *Protésilaus*, and *Ypomédon*. The first part of *Athis et Profilias*, by Alexandre de Bernai (latter part of 12th century), is adapted from the tale of the two merchants in the *Disciplina Clericalis* of Pedro Alfonso, and is the source of Boccaccio's "Tito e Gisippo" (*Decam.*, x. 8). In *Ypomédon*, written by Hue of Rotelande about 1185, most of the characters are named from the *Thebais*. As early as the year 1210 we find a rhymed translation of Ovid's *Metamorphoses* in German by Albrecht von Halberstadt. From Ovid is taken the story of Pyramus and Thisbe in Chaucer's *Legend of Good Women*, which is the subject of a prose work in Italian, *Piramo e Tisbe* (Milan, s.a.). The episode of Orpheus and Eurydice furnished the plot of the poetical *Histoire d'Orphée* of Guillaume de Machault (d. 1370) and the English *Sir Orphes*. The tale of Theseus was handled by Boccaccio and supplied the title and names to the prose romance *Histoire du chevalier Theseus de Coulogne* (1534). The Bible as well as the classics was laid under contribution. Gaultier de Belleperche wrote a metrical *Roman de Judas Machabée* about the year 1240, of which a prose reproduction is *Les chroniques du prince Judas Machabeus, l'un des neufs preux, et aussi de ses quatres frères* (Paris, 1514).

The Enchanter Virgil.—After turning the heroes of antiquity into knights-errant, it was a simple task to transform ancient poets and philosophers into necromancers, and Virgil and Aristotle became popularly famous, not for poetry and science, but for their supposed knowledge of the black art. One of the earliest references to the magical skill of Virgil[2] occurs in a letter of the chancellor Conrad (1194), reproduced by Arnold of Lubeck in the continuation of the *Chronicon Slavorum* of Helmold. John of Salisbury alludes to the brazen fly fabricated by Virgil; Helinand (d. 1227), speaks of similar marvels in a work from which Vincentius Bellovacensis has borrowed; and Gervase of Tilbury, in his *Otia Imperialia* (1212), and Alexander Neckham (d. 1217), in *De Natura Rerum*, have reproduced these traditions, with additions. German and French poets did not overlook this accessory to their répertoire. The *Roman de Cléomades* of Adenez (12th century) and the *Image du Monde*, an encyclopedic poem of Gauthier de Metz (13th century), contain numerous references to the prodigies of the enchanter. Reynard the Fox informs King Lion that he had from the wise Virgil a quantity of valuable receipts. He also plays a considerable part in the popular folk-tale *The Seven Wise Masters*, and appears in the *Gesta Romanorum* and that curious guidebook for pilgrims, the *Mirabilia Romæ*. He is to be found in Gower's *Confessio Amantis* and in Lydgate's *Bochas*. A Spanish romance, *Vergilios*, is included by E. de Ochoa in his *Tesoro* (Paris, 1838), and Juan Ruiz, archpriest of Hita (d. 1351), has also written a poem on the subject. Many of the tales of magic throughout Europe were referred to Virgil, and gradually developed into a completely new life, strangely different from that of the real hero. They were collected in French under the title of *Les Faitz Merveilleux de Virgille* (*c.* 1499), a quarto chapbook of ten pages, which became extremely popular, and was printed, with more or less additional matter, in all languages. We are told how Virgil beguiled the devil at a very early age, in the same fashion as the fisherman used the jinn in the *Arabian Nights* when he got him to re-enter Solomon's casket. Another reproduction of a widely spread tale was that of the lady who kept Virgil suspended in a basket. To revenge the affront the magician extinguished all the fires in the city, and no one could rekindle them without subjecting the lady to an ordeal highly offensive to her modesty. Virgil made for the emperor a castle in which he could see and hear everything done or said in Rome, an ever-blooming orchard, statues to preserve the safety of the city, and a lamp to supply light to it. He abducted the soldan's daughter, and built for her the city of Naples upon a secure foundation of eggs. At last, having performed many extraordinary things, he knew that his time was come. In order to escape the common lot he placed all his treasures in a castle defended by images unceasingly wielding iron flails, and directed his confidential servant to hew him in pieces, which he was to salt and place in a barrel in the cellar, under which a lamp was to be kept burning. The servant was assured that after seven days his master would revive a young man. The directions were carried out; but the emperor, missing his medicine-man, forced the servant to divulge the secret and to quiet the whirling flails. The emperor and his retinue entered the castle and at last found the mangled corpse. In his wrath he slew the servant, whereupon a little naked child ran thrice round the barrel, crying, "Cursed be the hour that ye ever came here," and vanished.

Literature.—On the subject generally, see A. Chassang, *Histoire du roman dans l'antiquité*, 1862; P. Paris, *Les MSS. François de la Bibl. du Roi*, Paris, 1835-48, 7 vols.; H. L. D. Ward, *Cat. of Romances in the Dep. of MSS., British Museum*, 1883; E. Du Meril, Preface to *Flore et Blancheflor*, 1856; Egger, *Hellenisme en France*, 1869. The Troy legend is dealt with in the elaborate work of A. Joly, *Benoit de Sainte-More et le Roman de Troie*, 1870-71, 2 vols.; G. Korting *Der altfranz. Roman de Troie*, 1883; F. Settegast, *Benoit de Ste-More*, Breslau 1876; Frommann, *Herbort v. Fritzlar u. Benoit de Ste-More*, Stuttgart, 1857; B. Jackel, *Dares Phrygius u. Benoit de Ste-More*, Breslau, 1875; E. Juste, *Sur l'origine des poemes attrib. à Homère et sur les cycles épiques de l'antiq. et du Moyen-Âge*, Brussels, 1849; J. A. Fuchs, *De varietate fabularum Troianarum quæstiones*, Cologne, 1830; H. Dunger, *Die Sage vom trojan. Kriege*, Leipsic 1869; G. Korting, *Dictys u. Dares*, Halle, 1874; H. Dunger, *Dictys-Septimius*, Dresden, 1878; L. Havet, "Sur la date du Dictys de Septimius" (*Rev. de Philol.*, 1878), F. Meister, "Zur Ephem. belli Troiani von Dictys" (*Philologus*, 1879) T. Mommsen, "Zu Dictys" (*Hermes*, 1876); E. Rohde, "Zu Dictys Cretensis" (*Philologus*, 1873); R. Barth, *Guido de Columna*, Leipsic, 1877; A. Mussafia, "Sulle versione Italiane della Storia Troiana" (*Sitz. d. k. Akad. Wien*, 1871, vol. lxvii.), and "Ueber d. Span. Versionen" (*ib.*, 1871, vol. lxix.); Pey, *Essai sur le roman d'Eneas*, 1856. The Alexander legend is treated by J. Zacher, *Pseudo-Callisthenes*, Halle, 1867; J. Berger de Xivrey, "Sur Pseudo-Callisthenes" (*Notices et Extraits*, xiii., 1838); A. Westermann, *De Callisthene*, 1838-42, 4 parts E. Talbot, *Sur la légende d'Alexandre dans les romans français*, 1850; Florian

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[1] The author of the much-quoted line, "Incidis in Scyllam cupiens vitare Charybdim." The twelve-syllabic verse known as alexandrine is supposed to have taken its name from being first used in the French *Geste d'Alexandre*.

[2] The Irish apostle to Carinthia, St Virgilius, bishop of Salzburg (d. 784), who held original views on the subject of antipodes, may have been the real eponym of the legend. Naples was a centre for pseudo-Virgilian stories.

Frocheur, "Histoire romanesque d'Alexandre" (*Messager des Sc. Hist.*, Ghent, 1847); H. Michelant, Introduction to *Li Romans d'Alixandre*, Stuttgart, 1846; J. Maehly, "Zur Alexandersage" ([illegible]), [illegible], *Die Alexandersage*, Hersfeld, 1872; W. Wackernagel, "Zur Alexandersage" (*Z. f. deutsche Phil.*, i., 1869); [illegible] P. de Goebels, [illegible] *écrits orientaux*, Warsaw, [illegible]; F. Spiegel, *Die Alexandersage bei den Orientalen*, Leipsic, 1851; L. Donath, *Die Alexandersage in Talmud und Midrasch*, Fulda, 1873. For the Virgil myth see D. Comparetti, *Virgilio nel Medio Evo*, Leghorn, 1872, 2 vols.; W. J. Thoms, *Early English Prose Romances*, 1858, vol. ii.; G. Brunet, *Les faits merveilleux de Virgile*, Geneva, 1867; E. Du Méril, "Virgile l'enchanteur" (*Mélanges Arch.*, 1850); Gervase of Tilbury, *Otia Imperialia*, ed. Liebrecht, 1856; P. Schwubbe, [illegible]; J. G. T. Graesse, *Beiträge zur Lit. u. Sage des Mittelalters*, 1850; [illegible] "Gedicht und Zauberer Virgil" ([illegible]); F. Liebrecht, "Der Zauberer Virgilius" ([illegible], 1865); K. L. Roth, "Ueber den Zauberer Virgilius" (*Germania*, iv., 1859); W. Vietor, "Der Ursprung der Virgilsage" (*Zeit. f. rom. Phil.*, i., 1877). For Ovid see K. Bartsch, *Albrecht v. Halberstadt und Ovid im Mittelalter*, Quedlinburg, 1861.

II.—MEDIÆVAL ROMANCE

(*a*) *Arthurian Cycle.*

The oldest and certainly the most important of the cycles of mediæval romance is that which passes under the name of King Arthur, or of the Round Table. The names, characters, and actions of its heroes have permeated modern literature throughout Europe; yet so little do we know concerning the *origines* and the first authors of the tales which form the body of Arthurian romance that there are few subjects in literary history more obscure and undefined. It can only be said with assurance that from about the year 1150 several poems[1] were composed by minstrels (a class of men recruited from all ranks of society) upon incidents and personages familiar to readers of what is called the *Morte Arthur*, a compilation of the second half of the 13th century. The *Morte Arthur* was not originally so called, and it was not a direct compilation from the ballads of the 12th century, but seems rather to have been a mere unskilful reduction into a single *corpus* of some five or six prose romances which had already grown out of the poems, and each of which professed to relate the adventures of nearly the same set of heroes. The first appearance of these stories in prose compositions is here our chief concern; and it is, unfortunately, likewise our chief difficulty. The sources of information upon the subject are defective and vitiated to a singular degree; and the light thrown by the investigations of recent writers is frequently of the nature of cross-lights. The following attempt at constructing a brief literary history of the Arthurian romances is not offered as a complete analysis of the work which has been done, but as a summary of facts and probabilities.

The Roman conquests in Spain, Gaul, and Britain imposed upon a large portion of the conquered peoples the necessity of using the Latin language, which thereby became, and for centuries remained, the medium of educated intercourse and the language of the towns and the centres of government in those countries. In common speech, naturally, it became depraved in course of time, and the pure *lingua Latina* of the high officials and the clergy existed side by side with the corrupt *lingua Romana* of the Romanized people. The latter was, however, ignored by polite literature, and probably never appeared in a written form till it was used for political purposes on the occasion of the celebrated partition of Charlemagne's empire among his grandsons. We may say that the literature f romance begins with popular poetry of the 10th or 1th century; but, as its subject-matter was derived to ome extent from the more respectable *lingua Latina*, we must go back a few centuries earlier to find the *origines*. When the people of Rome became acquainted with the ivilization and literature of Greece they framed a fabulous history to connect themselves with the superior race, and the *Æneid* exhibits that pseudo-tradition in its most permanent and powerful embodiment. A similar desire affected the Romanized Britons, and we may confidently assume that before the end of the 3d century a poetical form had been given to the story of the Trojan Brutus who founded the kingdom of Britain, blended with something of the real traditions of the Celtic race. No such form survives at present, but we may discern its traces and results in Nennius (sec. viii.-x.), Geoffrey of Monmouth (d. 1154), and in all the subsequent chronicles.

In the 11th century the Anglo-Saxons of England had their old Germanic stories of Beowulf, Sigfrid, and the Nibelungen; the Britons of the west enjoyed their Celtic and Britanno-Celtic myths; the Saxonized Britons of Wiltshire and elsewhere combined the legends of both the others; and the best educated men amongst the clergy had an acquaintance with Virgil, Ovid, and Statius. Here was a rich material for the imagination, and the invasion of the Normans brought a fructifying element. In France, Roman, Franco-German, Celto-Breton, and Scandinavian traditions were already intermingled; and the reintroduction into Saxonized England, from the south, of Celtic myths nearly identical with those which the Anglo-Normans found in Wales before the end of the 11th century gave to the latter a fresh life and a distinct predominance over all the other traditions of the composite people. Hence arose the British cycle of romance, accepted partly as history, partly as fiction by the new people of Norman England. Bretons, Britons, Normans and French, the Saxonized Britons, the Franco-Gallicized Scandinavians, and the Dano-Saxons all found a common basis of amalgamation, and it is no mere metaphor to say that the publication of Geoffrey of Monmouth's fabulous chronicle formed a momentous era in the history of England.

When the Saxons entered Britain in the 5th century they found in the middle and the south a Romanized kingdom ruled by a monarch with a British or Cymric name. The vernacular tongue of Britain was then and for centuries afterwards much nearer in form to the Gaelic of Ireland and of western and northern Scotland, the Pictish of Scotland, and the Gaulish of France than the Cymric of Wales is now or was then. It was a long time before the Saxon conquests extended so far as to leave the Cymry or Welsh the sole distinct people of the original inhabitants of the country. In the meantime there had been conflicts with the Pictish kings of the north, the Gaelic or Cambro-Gaelic kings of Strathclyde, and the princes of North and South Wales. Amongst their opposers the most successful and the most memorable was a prince or chief of Strathclyde, who is called by Nennius "Arthur dux bellorum," by the English "King Arthur," by the Welsh "the Emperor Arthur." After the departure of the Romans there were several independent monarchies or principalities in the island—that of the Romanized Britons occupying the centre, south, and south-east of the country; two Cymric principalities in Wales (North and South); the Cambro-Gaelic kingdom of Strathclyde, extending from the Clyde to Chester; the unmixed Gaels in the north-west of Scotland; the Pictish kingdom in the north-east; and a Scandinavian population between the Firth of Forth and Norwich. It is now settled by scholars that the Pictish speech was a dialect, like Gallic, Gaelic, and Cymric, of the common Celtic language; and in the early centuries of the Christian era the radical unity of all these tongues had not yet been effaced by the action of local varieties of pronunciation and arbitrary rules of orthography; consequently there was no such sentiment of national or racial distinction between the divisions of the Celtic race as is nowadays produced by political frontiers. The real Arthur, whoever he was, has been claimed by the

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[1] *Chansons de geste*, or ballads of knightly adventure, produced by andering minstrels called in northern France and England *trouvères*, n southern France, Spain, and northern Italy *trobadors* (troubadours), Germany *minnesänger*, and intended for recitation with more or less usical accompaniment

Welsh as their own man, a champion of the beaten Celts retiring westward to the mountain-fastnesses before the victorious Saxons. They have lost sight of the fact that there were always Cymry in Wales, who must have regarded their brothers in Loegria (England) much in the same way as they did those of Strathclyde, namely, as kinsmen and allies sometimes, as fair game for attack and plunder more frequently. The struggle between the Celtic and Germanic race was a long one, and it can only have been after the power of the Romanized Britons of Loegria and of the men of Strathclyde was broken, in the battles to which we may attach the name of Arthur, that the tide of war reached Wales along with the British fugitives who crowded thither and to Brittany; hence the appearance of Roman names among the British warriors. It may be surmised that Arthur is not a name but a title given to a Strathclyde warrior, corresponding to the Latin *imperator*.[1]

The traces of Roman occupation and of Roman culture were not wholly effaced for many centuries in the west of England, and, besides the Latin quasi-historical writings attributed to Gildas and Nennius, there must have been something like a British Livy and a British Virgil in existence between the time of Constantine and that of the pseudo-classical compositions of Geoffrey of Monmouth and Joseph of Exeter. It is quite certain that the work we call by the name of Nennius did not furnish all the subject-matter of Geoffrey's *Historia*, and the mysterious old volume which his friend William of Wallingford brought to him from Brittany about 1130 must have contained poetic legends as well as prose pseudo-history. Another mysterious volume is the "Latin book" in the monastery at Salisbury, to which the romancists of 1160-1220 professed to have resorted for their narratives. In Geoffrey's *Historia*, compiled, as he says, from William of Wallingford's book, we find three elements blended—(1) the epic of Brutus (which must have been written in Britain before 300); (2) a record of British kings down to the Saxon invasion (probably a corrupt version of the same real history that appears distorted and truncated in Nennius); (3) the lives of Arthur, Guenhumara, and Merlin (old British popular legends, wrought into union with a later Cymric tradition in which the British or Gadelic Arth-vaur, Art-vor, or Ard-tur had been converted into a Welsh king Arthur).

The Round Table romances had their starting-point in Geoffrey's *Historia*, first published in 1138-39, revised and republished in its present form in 1147.[2] Yet there is no mention in Geoffrey of Lancelot and Tristan, two heroes of much greater importance in the romances than Arthur himself. It does not seem to have been observed before that there is a curious set of resemblances between the personages of the romances and those of the Homeric siege of Troy. The names of Arthur and Uter suggest Atrides (Menelaus and Agamemnon rolled into one); Mark, again, is Menelaus; Guenhumara and Yseult are like Helen, Guenhumara also resembling Chryseis and Briseis; Lancelot and Tristan are like Achilles and Paris. Lancelot becomes for a time the enemy of his king (Arthur = Atrides) and stands aloof from him; he is unsuccessful in his quest of the Grail, as Achilles dies before Troy is taken; his son Galaad, like the Achilleid Neoptolemus, achieves the father's unfinished task. Lancelot (*lanc-e-loc* = child of the lake) is brought up in concealment by the Lady of the Lake, just as Thetis (the goddess of the sea) brings up her son Achilles, disguised as a girl, in obscurity. Chiron, to whose care the young Achilles is at first entrusted by Thetis, resembles Merlin, the friend or lover of the Lady of the Lake, in his half divine, half human nature.[3] Again, not only does Galaad by his name remind us of the hero of the *Achilleidos* (it must have been as usual to give this genitive name to the poem of Statius as that of *Eneydos* to Virgil's), but there are other curious similitudes. The name of King Perles or Pelles, by whose daughter Lancelot becomes the father of Galaad, is suggestive of, or may have been suggested by, the Græco-Latin appellation of Achilles, Pelides son of Peleus. One of the meanings that has been suggested for the name of Lancelot is *l'ancelot* = the serving man, in reference to one of the incidents of his story. Although a different origin is hinted at above, it would not be inappropriate to designate Achilles in his female disguise at Delos *l'ancillet* (= the male damsel, in attendance on Deidamia). As in the old Greek poems we have Atrides and Pelides contesting for Briseis, and the minor Atrides, Menelaus, similarly contending with Paris the ravisher of Helen, so in the romances we find Guenhumara the object of mutual strife between her lover Lancelot and her husband Arthur, son of Uter Pendragon, and Yseult the cause of war between King Mark and Tristan. Again, a resemblance is to be found in the incidents of fabulous birth between Arthur and Hercules, Arthur and Alexander the Great.

These observations are not intended to contradict the claims of the Cymric people to have furnished the romances with much of their material; for it would be difficult to resist the evidence of such names as Tristan and Yseult, which indicate sufficiently their British or Breton origin, and even Lancelot might have been, as first suggested above, a Welsh or British translation of an epithet which would apply to Achilles in connexion with the following words from Statius.[4] Thetis says (as the Lady of the Lake might have said of Lancelot)—

> 'Sæpe ipsa (nefas!) sub inania natum
> Tartara et ad Stygios iterum fero mergere fontes;"

while her son's guardian, Chiron, is named in the same place "Carpathius vates," which at once reminds us of the "Caledonius vates" (Merlin) of Geoffrey of Monmouth. At the same time the name of Guenhumara (Guinevere) makes one think of Thetis, the white-footed lady of the sea. As the name Guenhumara certainly preceded in date all the Anglo-French romances and is undoubtedly an old one, we may as well say at once that the intention is here to suggest an hypothesis that Britain produced Latin poets during the time of the Roman occupation, who wrote works not only on the fable of a British descent from the Trojans through Brutus, a fabled kinsman of Æneas, but also on the various subjects of classic mythology, the stories of Thebes, Troy, the Golden Fleece, and Alexander.[5] This hypothesis, which requires to be associated with the corollary that British translations or adaptations were formed when the Roman influence began to wane, would account for the curious circumstance that some of the Greek and Oriental fictions are found in Anglo-Saxon versions of much greater antiquity than any that have survived in the other vernaculars of Europe. Direct transference of such works from classical codices can hardly be presumed to have been the custom of a rough and semi-barbarous nation of Teutonic invaders; the medium must have been the existence of Brito-Latin and British poems among the conquered people.

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[1] The name Arthur is found for the first time in Nennius (where the hero is said not to be a king but only *dux bellorum*). He explains it as meaning either the "dreadful bear" or the "iron hammer." Now, although the former may refer equally well to Cymric and to Gaelic, *i.e.*, *arth-vaur* or *art-vor*, the alternative sense is better sought in Gaelic, *ord*, a hammer, being a known word in that language, while there is no trace of it in Cymric. The second syllable of *ord-dur* is common to both languages, equivalent to the Latin *durus*, and has assumed in Welsh the meaning of "steel." It probably also meant "iron." This observation shows that Nennius did not know whether the name was a Gaelic or a Cymric one, and the mere uncertainty is in itself an argument that Arthur was distinctly not Cambrian. If it were permissible to seek a purely Gaelic etymology for Arthur we should find it in *ard-tur* = *altus dux*, high chief or generalissimo. In the two early authorities Gildas and Bede the British champion of the 5th century is named Ambrosius Aurelius, a man of Roman family.

[2] His poem on the *Life and Prophecies of Merlin* was a separate work, published in 1136-37 and again in 1149.

[3] The names of several beings of this mixed nature in the early romances begin with the same word, mer, merbl, or mel, as Merlin, Melusine, Melior, Melion.

[4] Hugh of Rutland's poem of *Ipomedon* (written in 1185) evinces by the names of its personages such an acquaintance with the *Thebais* of Statius as the maker of the *Lancelot* seems to have had with the *Achilleis* of the same poet. He usually calls his King Arthur Atreus.

[5] Yguerne, the name of Arthur's mother, was perhaps akin in its original British sense (although in Cymric it means "the true" or "the

The success of Geoffrey of Monmouth's *Historia* and of his *Merlin* brought indignant comment from some of the Anglo-Norman historians, but it inflamed the minds of other writers already excited by the extraordinary events of the period. The result was the genesis of modern fiction. Within a few years after Geoffrey's publication the Norman Wace translated the *Historia Britonum* into French verse (1155), making some additions; and in his work entitled *Roman de Brut* we find the words—

> "King Ertur made the Round Table
> Of which Bretons tell many a fable"—

from which we may infer that the Round Table stories, which led to the construction of the French romances, were derived directly from Brittany, just as Geoffrey declares his *Historia* to have been. Wace, as a Jersey man, could have made no confusion between the Waleis of Cambria and the Bretun of Armorica.

Recapitulating what has been already said, we may chronologically tabulate the first elements of Arthurian story thus—I. *Arthur*, *Guinevere*, *Merlin* (in Geoffrey), 1136-49; II. the *Round Table* (as shown by Wace), before 1155; III. *Lancelot*; IV. the *Grail*; and V. *Tristan*.

Gast's *Tristan* and Map's *Lancelot*.

The original *Tristan* was earlier than the *Lancelot*, and was presumably a French poem (or prose work?), written about 1160 by Luc de Gast, a trouvère of English birth who lived near Salisbury, and is said to have had access to the book of stories referred to in a previous paragraph. The poem (?) and the book have perished, and the Tristan story was written under the name of *Le Bret* (= the Breton), to distinguish it from *Le Brut* (= the Briton) of Wace, at a later date, with so much additional matter that it must be placed after the *Lancelot*. Walter Map (*q.v.*) of Hereford, who died archdeacon of Oxford in the year 1210, was a man of Welsh origin or kindred. In 1185 Hue de Rotelande of Credenhill near Hereford wrote a French romantic poem, in which the names of the characters are all derived from the *Thebais* of Statius, but the incidents are wholly imaginative or derived from other sources. In it he speaks, in deprecation of any blame for his falsification of the truth of history, of Walter Map as being quite as great a romancer as himself. In connexion with statements frequently repeated in the early MSS. of the romances, this remark suffices to prove that before 1185 Walter Map had already published his *Lancelot*. We may fairly put the date before 1175, say about 1170; and it would be probably correct to assume that the *Lancelot* was a French poem (or prose work?) composed while the author was still young (1165-70). It has perished, like Luc de Gast's *Tristan*, and we can only conjecture that it had some similar connexion with the *Achilles* of Statius to that of Hue de Rotelande's poem with the *Thebais*. It was, however, reduced to or rewritten in prose and amplified before 1200 in the form in which we now find it in several old MSS. (none earlier than the 13th century). It is certain that Rustighello or Rusticien of Pisa was employed about 1270-75 to unify or harmonize in a single compilation the scattered Arthurian romances, and it is considered probable that the result was the French prose original of the existing *Morte Arthur*. But it is also certain that there exist prose Arthurian romances in MSS. at least as old as 1270, and that they were copies of yet older ones. Rusticien's work must have been simply one of compression and combination. We know from the MSS. of two different prose translations of a totally different romantic chronicle (the Pseudo-Turpin's *Chronicle of Charlemagne*), written in and about 1200, that metrical narrative was losing credit and that French prose composition had already set in. This statement, which refers to the French kingdom, is likely to be yet more applicable to England, where metrical success would naturally be more difficult to achieve than in the true home of French speech. As prose was current in France before 1200, it is not rash to assume that it had an earlier and less limited currency in England. Reckoning thus we may assume that the *Lancelot* and the *Tristan* were written in prose before 1190.

Early Round Table and Grail stories.

The Round Table and the Grail are so closely connected that it is difficult to regard them as having had each a separate origin. The mention of the former by Wace proves the existence of stories of a Round Table current before 1155. The Round Table as it appears in the current texts of the romances is simply an important portion of the furniture of the narratives: it does not represent a cycle of incidents or even a number of special episodes. One might suppose from the form of Wace's phrase that the word was with him, as it is now, a general epithet to designate Arthurian stories, rather than merely the name of a material object, as it is in the romances. But we cannot assume the fact for lack of specific information. The first and also the chief instance which we have of the appearance of the Round Table (beyond Wace's allusion) is in the existing *Lancelot*, which we may refer to about 1190. In the epilogue of the *Tristan*, Hélie de Borron speaks of Luc de Gast's original work on that hero as the first of "les grans livres de la tauble roonde." There is no reason to imagine that this phrase was written after the year 1200; and it indicates sufficiently that several books were collectively styled "Romances of the Round Table" between 1155 and the end of the century. One of these books was *Joseph of Arimathea, or the History of the Holy Graal*, written about 1170-80 by Robert de Borron or Robert of Bouron, a trouvère born near Meaux. This narrative seems to have taken at least two forms before it was incorporated in the prose *Lancelot*, and the alterations were so numerous and important that some writers consider the *Grand Graal* to have been a rewriting effected in collaboration by Walter Map and Robert de Borron. The earlier portion of the *History of the Graal* was but lightly treated on its incorporation in the *Lancelot*, and the form in which we have it in the separate romance of the *Graal* is of more modern compilation. The later portion of the Grail story—namely, the *Queste du Graal*, which was utilized by Map (or his recompiler) in the *Lancelot*—differs from that of the French writer in making Galaad the achiever, while Perceval was the hero of the quest in Robert de Borron's work and its recompilations, as well as in the separate prose romance of *Perceval* and the separate *Histoire du Graal*. We may conclude that the older works (the original *Lancelot*, *Merlin*, and *Tristan*) had nothing of the Grail in them, and that the publication in French of the *Tristan* by Luc de Gast and the *Lancelot* by Walter Map (produced in this succession between 1160 and 1180) were accidentally contemporaneous with Robert de Borron's poem (or prose work) on the grail (= chalice) or cup of Christ's passion and the table of the Last Supper, based upon an old legend (connected in some way with the

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faithful") to "Alcmena," and may have meant "manly," "robust." Arthur proves his fitness for kingship by the performance of wonderful feats like the labours of Hercules.

ancient popular *Gospel of Nicodemus*), according to which Joseph of Arimathea brought Christianity to Britain in the time of Vespasian. Then Robert de Borron continued his story in another work which represented the quest or rediscovery of the Grail in Avalon, Brittany, or Britain, by Perceval, the grand-nephew of Joseph of Arimathea; and Walter Map appropriated so much of De Borron's *Histoire* and *Queste* as suited him, working it up in a continuation of his story on Arthur, Guinevere, and Lancelot, whilst adding to and altering the incidents of the narrative very considerably. Finally, Hélie de Borron (about 1190) rewrote the *Tristan* in something like its existent form, weaving it by enlargement into connexion with the other tales, and probably soon after 1200 united for the first time in one enormous and unharmonized corpus the full set of Arthurian stories. One reason why we cannot assign this first combination to a later date (as those do who hold the work of Rusticien of Pisa to have been something more than a mere compression) is that the *Guiron*, written by Hélie de Borron (probably soon after 1200), is not incorporated in the *Morte Arthur*, which it would assuredly have been if Rusticien (about 1270-75) had been employed to unite a number of detached stories rather than to re-edit an already existing compilation. Of Hélie de Borron we only know that he was a relative of Robert; that he was the virtual author of the *Bret* or *Tristan*, in which he incorporated the substance of tales written by Luc de Gast and Gasse li Blont; that he also wrote *Palamedes* in two parts (*Meliadus* and *Guiron le Courtois*); and that his work was done at the request of a king of England, alleged to have been Henry II. or Henry III. Of the other early writers of Arthurian stories the chief were the trouvère Chrestien de Troyes (about 1180-90), who composed a poem upon an episode of Map's Lancelot story, and another upon the *Perceval* (in which he may have combined Robert de Borron and Map), and Guyot de Provins (about 1190-95), who wrote a romance of *Perceval*, now lost, and only known through the German translation of Wolfram von Eschenbach (about 1205). As for the Welsh stories in the *Mabinogion* and the Welsh *Seint Greal*, there is really no evidence to show their anteriority to the English *Morte Arthur*, except the fact that two of the tales (*Geraint* and the *Lady of the Fountain*) are of similar substance to the poems of Chrestien de Troyes, *Erec et Enide* and *Le Chevalier au Lyon*,—narratives of Arthurian personages but not embodied in the French prose romances. Even the Welsh chronicles which are supposed to have furnished the original text of Geoffrey of Monmouth's *Historia* have been ascertained to be merely translations from the Latin version. It is a safe conclusion to say that anything in Welsh literature corresponding with portions or incidents of the French romances was simply a translation made in the 13th or 14th century from a French original. This refers, of course, to what is now extant, for there can be little question that Breton and Cymric legend furnished the earlier romancists with names and legends in plenty. Returning to the consideration of names, it is obvious that when Lawnselot dy Lak appears in Welsh it is simply a corruption of the Franco-English Lancelot, and that the Cymric writer had no idea of its above-suggested origin in a British *lanc-e-loc* (a conjecture which is fortified by the pleonasm of *du-lak* or *del-lak*) or in a French *l'ancillet*. Consequently the original Lancelot story has left no trace in purely Welsh literature. With Perceval we may think differently; the Welsh name Peredur, under which he is known, is a sufficient warrant for supposing that portions of the Welsh tale are at least as ancient as Walter Map. The very form Pered-ur, like that of Arth-ur, is archaic, and with the latter it requires a different interpretation from that which Welsh scholars have given it. Here it may be observed that the terminal *ur*, whatever may have been its true sense, is remarkable for its frequent use in the names of Pictish princes. As for Perceval, wherever Robert de Borron got the name (see below), Walter Map, in adopting it for the hero of the story that belongs to Peredur, made the two names thenceforward identical.

Analysis of the Arthurian Romances.

I. II. *Arthur and the Round Table* had no separate romance, or else it has perished. It exists now substantially as part of *Lancelot* (III.).

I. *Merlin.*—Most of his story appears in Geoffrey of Monmouth and in Wace, from whom it was probably worked up into a French poem (or prose work) by Robert de Borron about 1160-70. The French prose composition, embracing his life and, as an appendix, his prophecies (Latin by Geoffrey), was apparently written about 1200 (by Hélie de Borron) in the form in which it exists in certain MSS., and nearly as it appears in printed books. Merlin, the son of an incubus, rescued at his birth by sudden baptism from the malignant destiny for which his diabolical parent had begotten him, is always described as a magician. He is called by the Welsh Myrddin, a form which betrays the posteriority of the existing Cambrian legends not only to the date of Geoffrey but also to the French romances; in one of the earliest incidents of his story, however, he himself gives his name as Ambrosius.[1] He is represented as living apparently at the time of the Saxon invasion of England. He was not a friend of Vortigern; this king, whom we know from English sources to have been attached more to the Saxons than to his countrymen, was represented in the old Merlin story as a usurper reigning in an interval between Moines, son of Constans, and the two brothers of Moines, Uter and Pendragon. After the successive deaths of Vortigern and Pendragon (on whose fall Uter adds his brother's name to his own) Merlin continues to be the friend and counsellor of King Uter Pendragon. In that capacity he helps the king to assume the shape of Gorlais, duke of Tintagel, and thereby to beget Arthur upon the Duchess Yguerne. (The name Pendragon and the action remind us of the fabulous birth of Alexander the Great; the name Uter, in connexion with the go-between Merlin, and the probable Celtic meaning of Yguerne remind us of Jupiter, Mercury, and Alcmena.) The result is the birth of a hero who resembles both Hercules and Alexander. He grows up and is held to be merely the son of Gorlais, in spite of the fact that he was born after Yguerne (already a widow) had married Uter Pendragon; but he proves his right to royal place after the king's death by performing some extraordinary feats. In these he has Merlin's aid, as well as in the conduct of his subsequent wars with the Gauls and the Saxons. Merlin has a lover or mistress in Viviane, the Lady of the Lake, to whom in an unlucky moment (as Samson to Delilah) he betrays a certain spell. She uses it to try her power, without having learned the converse charm, and poor Merlin vanishes into the midst of a thornbush, whence his voice can be heard; but he is seen no more. Here the romance ends,—one of the most interesting, as well as one of the best-constructed and most simply told of the Arthurian series. The name and deeds of the enchanter have found their way into most modern literatures. One of Merlin's actions was to institute a round table at Carduel, at which room was made for King Arthur and fifty of his nobles, with a vacant place for the Holy Grail. This was a ceremony to be performed once every year, and it was on the first of these occasions that Gorlais brought his wife Yguerne with him to court, and that King Arthur fell in love with her (as David with Bathsheba). This circumstance, although of later date than the original Merlin, leads us to the next romance in the cycle.

IV. 1. *The Holy Grail.*—The Grail romance began with Borron's poem (or prose narrative) on Joseph of Arimathea. An old tradition maintained that Joseph of Arimathea (confounded in some respects with the centurion at the crucifixion and with Josephus the historian) brought the gospel to Britain or to Gaul in the first century of our era. The French romance on this subject, whichever of its existent early forms in verse and prose was the earlier, relates the story thus:—Pilate allowed Joseph to take down the body of Christ from the cross, and gave Him also *son vaisseul*, by which was evidently meant the chalice of His passion, or the cup used at the Last Supper. Of all the numerous interpretations suggested for the word "grail" or "graal" the only tenable one is that of "cup," which plainly refers to the words "son vaisseul." In that cup Joseph collected the precious blood of his Saviour. He loses it when put in prison by the Jews, but it is restored to him in his cell by Christ Himself. Vespasian, son of the emperor Titus, falls ill, hears of Christ, frees Joseph from his prison, becomes a Christian, and reduces the Jews to slavery. Joseph takes leave of Vespasian, goes forth with those who had joined him and his brother-in-law Bron. After a while the adherents suffer privation for having sinned secretly, and Joseph is directed by the voice of Jesus speaking from the *vaisseul* (graal) to establish a test of righteousness and sin by means of the holy blood, calling to remembrance His own words about Judas, that "he who shall betray Me is eating and drinking with Me." The place of the rejected Judas should be filled, not at *the* table of the Last Supper, but at another table which Joseph should make in token of it,—a square one, and not until Bron's grandson (the third man of Joseph's lineage) should be fit to take it. The table was constructed, a repast prepared, one place left empty, and the Graal put upon the board, with some fish which had been caught by Bron for the occasion. Those who could find a place at the board felt a sense of satisfaction and were known to be righteous; those who could find no place were recognized as the sinners whose secret licentiousness had caused the distress among them. Then the name of *graal* was given to the *vaisseul*, because of its gracious and delightful[1] influence. A hypocrite named Moyse who attempts to sit at the table without avowing his sins is swallowed up in the earth. Alan, the son of Bron, grows up to be head of the line, and is entrusted with the knowledge of all things that Joseph could teach and a sight of the Grail. He leads his kinsmen to the far West, to the vale of Avaron or Avalon, whither the disciple Petrus or Perron precedes them with a letter given him by Joseph, after he has seen the latter transfer to Bron the custody of the *vaisseul*. The son of Alan is in due time to grow to manhood, to read Peter's letter, and again to see the Grail—a boon which is as it were to renew the covenant of the Saviour with the family and followers of Joseph of Arimathea—to expose and expel the false, and to bring celestial happiness upon all the true. The race is now settled in Britain, and Perceval, the son of Alan, is the third man who is to see the Grail, after having passed through a perilous quest. Up to this point the mystic and pious romance of the Grail was derived by Robert de Borron from sources other than those which furnished the Arthurian stories; but the new realm of fiction was open (it was about 1160-70), and the Franco-British tales coming to his knowledge must have supplied him with the incidents of his third man's quest and even the very name of Perceval. It is difficult to assign the exact proportion of give and take among the early romances; but at this point there is a new departure in which several writers took various parts.

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[1] When we remember that the Ambrosius Aurelianus of Gildas was probably the Arthur of Nennius and the romances, and that Merlin was called Ambrosius Merlinus, we are drawn to believe in the Romano-Briton origin of the stories, and to conclude that "Arthur" and "Merlin" are two explicative or distinguishing epithets attached to the older names.

Perceval. IV. 2. *Perceval.*—The original story of the knight Perceval, before he takes up the quest, is simply that of an inexperienced youth who knows nothing of arms and chivalry, but whose rustic retirement with his mother has not deteriorated the instincts of his noble birth. After some amusing incidents, in which his youthful awkwardness is playfully depicted, he exhibits so much courage and skill as to become a doughty champion, the vanquisher of bullies and the protector of ladies; and, when he reaches the court of King Arthur, knighthood is offered him. Chrestien de Troyes related the tale in verse (before 1191), but he probably had it from the (prose or poetic) narrative woven (about 1170-75) by Walter Map into his work which we call *Lancelot*. The agreement, so far, of those writers and the text of the Mabinogi of Peredur on the same subject leads to a supposition that the latter represents a Cambrian story older than Walter Map; but the introduction of the cup and the lance into it invalidates the theory that its existent Welsh form is the original. Robert de Borron continued his *Graal* by relating the quest of the holy vessel—still in the hands of Bron, le Roi Pêcheour, but hidden from all save the predestined perfect knight—pursued by Bron's grandson Perceval, the only man who, by his origin, had a right to search for and find it so as to fill the vacant place at the table. Robert de Borron must have written his story more than once, and the result was that he also introduced his hero to Arthur's court, where Merlin had founded a round table. This round table, probably an independent element in the Breton legends, must have caught Robert de Borron's fancy as lending a further symbol of trinity (being the third table) to his own conception of the third descendant of Joseph of Arimathea. In his relation of the quest Perceval (whom he in no way identifies with the rustic Perceval or Peredur mentioned above) starts from Arthur's court, and after various adventures sees his grandfather, the Grail, the lance, and the broken sword without knowing with whom he is or making inquiry. In a second attempt he is more successful. Bron reveals himself, explains all the signs (the lance is that which pierced the Saviour's side), and communicates the precious truths which Joseph of Arimathea had ordered to be told only to the third of his lineage. Then the fisher-king dies; all the enchantments of Britain pass away (we presume the reign of idolatry is meant); and Perceval is left as the custodian of the Grail. This version of the *Perceval* and the preceding *Saint Graal*, both by Robert de Borron, have only been printed of late years (the former as a supplement to the latter) from rare and little known MSS., and differ enormously from the old printed *Grail* and *Perceval*, and most of the MSS. which contain them. The introduction, however slightly, of Arthur, Merlin, and Gawain into Robert de Borron's *Perceval* simply shows that he had made acquaintance with Walter Map's *Lancelot*; yet the large use made by Map of the Frenchman's *Grail* and *Perceval* implies that they wrote contemporaneously, but that De Borron's second part preceded Map's second part. In the latter the young rustic is represented as the youngest son of King Pellinore, brought by an elder brother out of his retirement and presented for an inferior class of knighthood at Arthur's court. He then meets all the other companions of the Round Table, to whom, as well as to Arthur and Guinevere, he makes himself very dear. He becomes one of the knights who undertake the quest of the Grail, a task which is proposed for accomplishment by him who is the best knight in the world. According to the Lancelot fiction he fails because of having slightly

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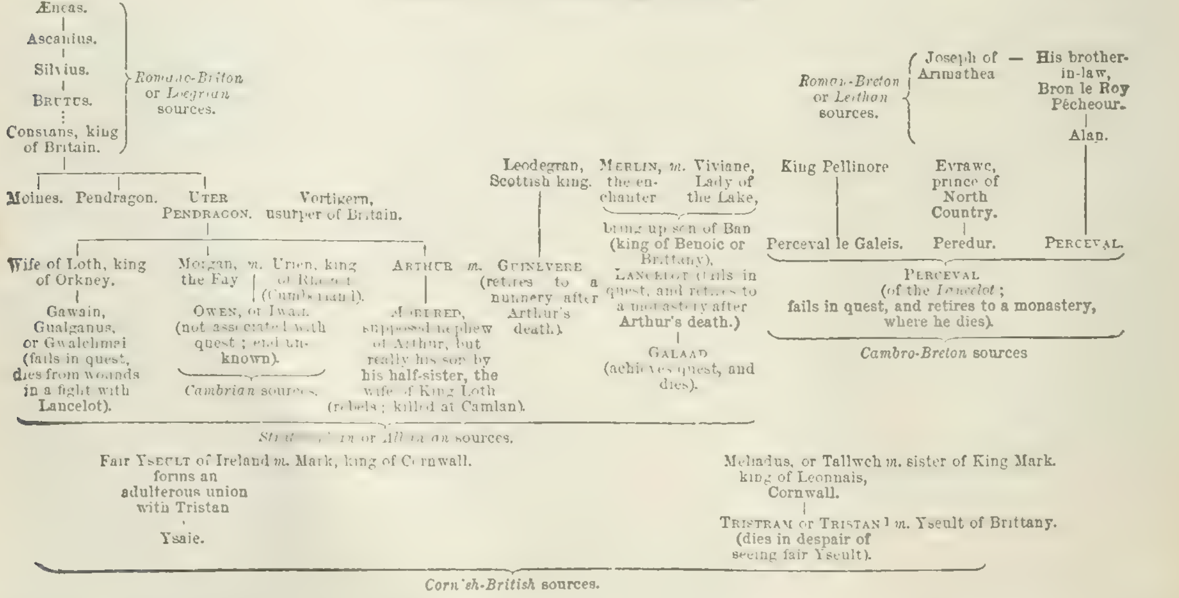
[1] This simply indicates a defective knowledge of etymology in the 12th century. Robert de Borron supposed the word came from *gratus* or *agreer*, not knowing that it was a Gallicization of the low Latin *cratella* = a cup.

PEDIGREE OF THE ROUND-TABLE HEROES.


Æneas.
Ascanius.
Silvius.
BRUTUS.
Constans, king of Britain.
Romano-Briton or Loegrian sources.
Moines.
Pendragon.
UTER PENDRAGON.
Vortigern, usurper of Britain.
Wife of Loth, king of Orkney.
Gawain, Gualganus, or Gwalchmai (fails in quest, dies from wounds in a fight with Lancelot).
Morgan, the Fay m. Urien, king of Rheged (Cumberland).
OWEN, or Iwain (not associated with quest; end unknown).
Cambrian sources.
ARTHUR m. GUINEVERE (retires to a nunnery after Arthur's death).
MORDRED, supposed nephew of Arthur, but really his son by his half-sister, the wife of King Loth (rebels; killed at Camlan).
Leodegran, Scottish king.
MERLIN, the enchanter m. Viviane, Lady of the Lake,
bring up son of Ban (king of Benoic or Brittany),
LANCELOT (fails in quest, and retires to a monastery after Arthur's death.)
GALAAD (achieves quest, and dies).
Strathclyde-Cumbrian or Albanian sources.
Roman-Breton or Leithan sources.
Joseph of Arimathea — His brother-in-law, Bron le Roy Pêcheour.
Alan.
King Pellinore
Perceval le Galeis.
Evrawc, prince of North Country.
Peredur.
PERCEVAL.
PERCEVAL (of the Lancelot; fails in quest, and retires to a monastery, where he dies).
Cambro-Breton sources
Fair YSEULT of Ireland m. Mark, king of Cornwall.
forms an adulterous union with Tristan
Ysaie.
Meliadus, or Tallwch, king of Leonnais, Cornwall. m. sister of King Mark.
TRISTRAM or TRISTAN[1] m. Yseult of Brittany. (dies in despair of seeing fair Yseult).
Cornish-British sources.

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[1] In the second Arthurian compilation Tristan is annexed to the knights of the Round Table, and joins the quest, but the original story is quite independent.

infringed a vow, and the labour is achieved by one even purer than himself among the Round Table heroes, namely, Galaad, the son of Lancelot. All this is of Map's own invention, and much of it must have been posterior to Chrestien's poem, in which (although based partly on Map and partly on Robert de Borron) Perceval remained the achiever of the quest.[1] The Borronesque view of Perceval as one of a line of successive Grail-custodians or Grail-kings impressed the imagination of Guyot de Provins, and led him to regard with contempt the pleasant episodes of Perceval's youth as told by Chrestien. In Wolfram von Eschenbach's poem there is a long succession of Grail-kings, beginning with Titurel, and ending with Partzifal (Perceval)[2]; the scene of their rule is shifted to Anjou and Spain; the story is said to draw its origin from a book found at Toledo; several Moorish and Catalan names are found in it; and finally the Grail-kings and their people are confounded with the Templars, struggling against the heathens. The romance of *Perceval le Gallois*, such as we have it since its first appearance in print in 1530, is a prose compilation derived from the poem begun by Chrestien de Troyes about 1180 and finished by Manessier about 1230.

III. *Lancelot.*—This hero, like Perceval, has furnished an addition to European nomenclature. In this romance, which there is so much evidence for ascribing to the celebrated Walter Map (see above), the substance of Geoffrey's Arthur, Guinevere, and Merlin was used as the introduction to a powerful fiction in which a new hero, Lancelot of the Lake, carries on an adulterous amour with Queen Guinevere, while at the same time he reveres and loves King Arthur and performs deeds of heroic daring under the influence of the most generous feelings. The tale, although lengthy and overladen with a crowd of adventures which have no bearing on the direct development of the plot, and notwithstanding the unpleasant nature of the chief subject, is one of extraordinary interest. The character of Lancelot remains unaltered throughout the course of the story, and is drawn with a masterly hand. Although his love is criminal, and he frequently does pious penance for his sins, yet his utter self-sacrificing devotion to the queen weakens by its exquisite fidelity the reader's sense of his treachery towards the king, whom he never ceases to regard with a feeling of the deepest affection and reverence. His faults are such that he recognizes his own incompetence to become the achiever of the quest; but he begets, upon Elaine, the daughter of King Pelles, a son Galaad, to whom the glory of winning the Grail and redeeming his father's sins is reserved. Even here the romancer takes care to show that he was not untrue to Guinevere, his senses having been deceived by a spell (used by Elaine's maid to gratify her mistress's longing), which makes him imagine that his bedfellow is the queen. Nemesis begins to work when, upon a second use of the spell, Guinevere, after having waited for him in vain, finds him in the arms of King Pelles's daughter. She reproaches him bitterly and drives him from her presence with such cruel words that he becomes insane and wanders about the woods and fields like Nebuchadnezzar. Some years elapse before he is recognized by Elaine, when chance takes him to the castle of Corbin, in which King Pelles has custody of the Grail. She cures him by means of the sacred vessel; but it is not long before he quits her again and finds his way to Camelot. Arthur and the queen and his fellow-knights are rejoiced to see the lost Lancelot again, and the usual round of tournaments begins. We now come to the episode of Galaad. On the eve of Pentecost an old man dressed in white brings a youth to Arthur's court. When all the knights are assembled at the ensuing banquet every seat is filled save that which was always left vacant for the Holy Grail, so that there is no place for young Galaad. Certain wondrous signs are pointed out by the old man which indicate that the "seat perilous" is meant to be filled by the young hero, who at once accomplishes another test which has foiled Gawain and Perceval. The Grail appears, and light and perfume fill the hall; it passes away again, and the next day the knights depart upon the quest of the holy vessel. Arthur giving way to a pathetic regret that his merry company of Round Table champions is to be broken up for ever. Galaad, the pure knight, is the only one who succeeds, and becomes king of the Holy City; then Joseph of Arimathea appears, and Galaad dies, his task accomplished. Gawain and Bors fail; Lancelot and Perceval nearly succeed, but are foiled. Bors brings back an account of Perceval's death, and Lancelot returns to court, a moody man; he and Guinevere fall back into the old sin. The queen is accused of having poisoned a knight, and is exposed to the usual ordeal. Lancelot saves her by conquering her accuser, but receives wounds which break open at the next secret meeting between them. Scandal has been busy; spies are on the watch: and, although, when the lovers are surprised, he escapes by dint of hard fighting, the stains of blood found in the queen's bed are sufficient to condemn them. She is doomed to the stake, but at the moment of execution Lancelot appears and rescues her. They fly together to his castle of Joyeuse Garde, in which he is soon besieged by King Arthur, the king's nephew Gawain, and the other faithful knights. He offers to give up the queen if no harm shall be done her: Arthur rejects the offer; and, after long fighting, news comes of a papal interdict promulgated against the kingdom so long as King Arthur refuses to take back his wife. Guinevere is then received by her husband, but Arthur is advised by Gawain to continue the war against Lancelot, whom he follows to his castle of Gannes in France. During the siege Arthur has tidings of an insurrection in Britain: his nephew Mordred has seized the throne, and the queen has fortified herself in London against the usurper. He returns, and after a series of desperate battles Mordred is killed and Arthur wounded to death. Flinging his sword away, the king disappears from mortal view and is borne by fairies to Avalon. Lancelot also returns to England, laments the king's death, pays a mournful visit to the queen, now in a nunnery, retires himself to a monastery, and dies soon afterwards in sorrow and repentance. The original *Lancelot* was the true Arthur or Round Table romance, although when first written it probably contained no mention of Perceval and Galaad. To it all the other tales and episodes gravitated, and the above analysis represents probably its final form about the year 1200. When at a later period, in the 13th century, it was abridged, and the *Bret* (Tristan) also, and both of them amalgamated in the general Arthurian work now extant in many MSS. of the 14th and 15th centuries, the compilation came into existence which was translated into English by Sir Thomas Malory under the title *Morte Arthur*. The original complete *Lancelot* may be considered as a corporate work including the five branches which had previously been separate, namely, (1) Merlin; (2) Arthur and the Round Table; (3) Arthur, Guinevere, and Lancelot; (4) Joseph of Arimathea and the Grail; the Quest of the Grail and Perceval modified into (5) the new Quest of the Grail and Galaad. A sixth element was added in the French compilation, which formed the original of the *Morte Arthur* of Sir Thomas Malory, namely, (6) the story of Tristan and Yseult.

Tristan

V. *Tristan.*—This beautiful Breton or Cornish romance was originally a work totally independent of the Arthurian, Round Table, and Grail fictions; and, if it is said by Hélie de Borron to have been left incomplete by its first author, the Anglo-Norman knight Luc or Luces, of the castle of Gast, Galt, or Gau, near Salisbury, and by Gasse li Blont (Eustace Blunt), who is spoken of as a continuator, we may presume that his statement was based upon no deficiency in the original narrative, but simply on the absence of all allusion to the Round Table. He therefore set to work to produce what he called the *Bret*, or the complete *Tristan*, by constructing a number of episodes which exhibit Tristan as one of the Round Table knights, as also having engaged in the quest, and as having been with his lady love entertained for some time at Lancelot's castle of Joyeuse Garde. The Saracen knight Palamedes, who takes an important place in the complete *Tristan*, and who is not one of the least interesting characters, seems to have been one of the additions. Whether the first author was really a knight or not, and whether he wrote in poetry or prose, it may here be said once for all that the earliest exoteric reference to the authors of the Round Table romances is that of Hélinand, who, writing close to the date of Walter Map's death (*c.* 1210), mentioned them as "quosdam proceres," a phrase which could only be used as indicating personages ranking at least as high as knights. Tristan (in the old English form, Tristram) of Lyonesse is the nephew of King Mark of Cornwall.[3] Warned by a dwarf that his nephew's existence will be pernicious to him, the king resolves to compass his death. His attempt is frustrated: the child is carried to the court of the Frank king Faramond, and there grows up towards man's estate. He wins the love of Faramond's daughter, on the discovery of which he is compelled to fly to his uncle at Tintagel, with whom a reconciliation is effected. A prince called Morhoult or the Morhoult[4] of Ireland lands in Cornwall to claim tribute of King Mark. Tristan challenges him to single combat, wounds him mortally, and compels him to reimbark in a dying condition, but is himself wounded by the poisoned lance of his adversary. Seeking afterwards a healer for his wounds, he is borne by the wind to Ireland, and well received by the king of Ireland and his daughter Yseult, who restore him to health. It is, however, observed that he is wearing the sword of Morhoult, and he is obliged to take a hasty departure. On his return to Cornwall the incidents of the complete *Tristan* begin to connect him with Arthur and the Round Table, but his victory over a knight, there said to have accused the

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[1] As Chrestien never finished his poem, and as he had two or three continuators before 1244, he may not be responsible for the Borronesque ending; but it is to be remarked that Robert de Borron and Chrestien were both from Champagne.

[2] Whatever be the meaning of the Welsh name Peredur, that of Perceval seems to be also British and to mean "possessor of the Grail." It may not have been one man's appellation but a title applicable to Bron, Alan, or the last achiever. The British words of which it seems compounded are *perchen*, a root which implies ownership or possession, and *mail* (initially inflected *vail*), a cup or chalice, so that the earliest form was perhaps *Perchenvail*.

[3] His father Meliadus and mother Isabel, as well as the preceding generations of ancestors, were probably invented by Helie de Borron, as well as the account of his premature birth in the open country.

[4] Is this a corruption of Muircheartach or Murhertach, and, if so, was it suggested by a recollection of the visit of Diarmuid MacMuircheartach to England to claim help from the Normans in 1168?

Irish king of treason before King Arthur, is probably part of the original tale. He goes with the absolved monarch to Ireland at his request, and is prayed to accompany Yseult to Cornwall, whither her father sends her as King Mark's bride. Yseult's mother delivers a philtre or love-potion to Brangian (or Bronwen), her daughter's nurse, which the latter is commissioned to give Yseult to drink on the wedding-day, in order that she may conceive a true wifely affection for her stranger husband. Brangian, however, gives it to Tristan and Yseult, who drink, unconscious of the spell that is about to influence their lives. They love each other at once and for ever. During the voyage they land on an island, where Tristan, by overcoming an enchantment, proves that he and his companion are the best knight and fairest lady in all the world. They reach Cornwall at last, and think with dread on the approach of the fatal night which is to separate them and to make King Mark aware of his bride's fault. A device, which appeared to the old romancers one of easy performance, is suggested by Brangian, who, to save her mistress's honour, takes her place on the marriage night, trusting that King Mark's carousals and the darkness will cover the fraud. The scheme is carried out satisfactorily; but the fair Yseult hires two ruffians to slay Brangian, lest the fact should ever come to light. The intending murderers, however, are smitten with pity, and simply leave their victim bound to a tree, from which position she is soon afterwards rescued. As her rescuer was Palamedes, the Saracen knight, who must be looked upon as one of the inventions of Hélie de Borron, we may venture to hope that Yseult's unwomanly cruelty formed no part of the original story. Palamedes is a magnanimous and interesting character, who loves Yseult with a purer love than Tristan, and who spends his life in a generous antagonism to his rival. The man who invented Palamedes and Guiron must have been himself a knight of the noblest type. The intrigue of the two lovers is carried on for some time, till Mark's suspicions are aroused and Tristan leaves Cornwall. Again he receives by treachery a poisoned wound; but, as he cannot return to Mark's court to obtain healing at the hands of the fair Yseult, he decides upon going to Brittany, to seek a remedy there from her cousin, the white-handed Yseult, who is equally expert in treating wounds. She cures him and falls in love with him; he marries her from gratitude. The description of the wedding night proves that he still loves the other Yseult, for he remains faithful to her in the most material point, the white-handed lady being so innocent that she is unaware of the slight cast upon her charms. He makes his wife's brother Peredur or Pheredur his confidant, and the two quit Brittany together and reach Cornwall. A fresh source of misery opens for him now, as Pheredur falls in love with fair Yseult. Tristan becomes insane and wanders away; but after some time he is brought back to the court, where Yseult restores him to reason, at the cost, however, of reawakening the jealous wrath of King Mark, who compels him to quit Cornwall, making him swear never to return. Hélie's Tristan now joins the Round Table company at King Arthur's court, and King Mark, still unsatisfied, goes thither also with the purpose of bringing about his nephew's death. The unfavourable view of Mark's character is here heightened by making him speak and act in the most ridiculous manner. Arthur reconciles the uncle and the nephew; Tristan goes back with Mark, and frees Cornwall from an invasion by the Saxons; but he fails to win favour from the king, who puts him in a dungeon. He is released by an insurrection and King Mark himself is imprisoned; Tristan flies with Yseult and is received in Joyeuse Garde by Lancelot, until King Arthur brings about a fresh reconciliation, and Yseult is restored to Mark along with his kingdom. Tristan now returns to his neglected wife, but finds that a revolt has fortunately saved him from the necessity of repaying her devotion with caresses. He goes forth to fight, and subdues the rebel count, but is sorely wounded again. The white-handed lady tends him, cures him, and becomes his wife in deed as well as in name. He quits her once more, and renews his secret intercourse with fair Yseult in Cornwall, until discovery compels him to return to Brittany. In giving his aid to the unsuccessful prosecution of an amour by his brother-in-law he is once more poisonously wounded. He comes to such a dangerous pass that at last he sends a secret messenger to fair Yseult, to bring her back with him if possible. Should she be able and willing to come the ship is to be rigged with white sails; with black, on the contrary, if the mission is unsuccessful. Tristan's anxiety comes to the knowledge of white-handed Yseult, who, seized with sudden jealousy, when the white-sailed vessel comes gaily dancing over the waves, goes to her sick husband and tells him that the sails are black. He bids her at once farewell and dies of a broken heart. Fair Yseult, on reaching land, hears of his death, makes her way to the chamber where his corpse is lying, and dies upon her dead hero's breast. Their bodies are conveyed to Cornwall, along with Tristan's sword, formerly Morhoult's, and Mark learns the story of the love-potion. Seized with pity, he has the two lovers buried not far from each other, and a wondrous tree extends its branches to overshadow their two graves.

Palamedes. Meliadus and Guiron.—This, the last romance written by any of the original writers of the Round Table stories, was composed by Hélie de Borron about 1220 at the desire of Henry III. of England (who paid him noble guerdon for his labour). He had already made Palamedes (the Saracen knight finally baptized and adopted to the Round Table) so prominent and so noble a character in his *Bret*, or romance of *Tristan*, that the king wished for another book on the subject. Since the story was to be one of knightly courtesy, its name should be *Palamedes.* As that hero takes only a minor part in the transactions of the story it is difficult to believe that he meant the name as other than a metaphor. The book is divided into two distinct tales,—one relating the adventures of Meliadus, who begat Tristan upon the adulterous queen of Scotland, and the other those of a knight whose name appears here for the first time,—Guiron le Courtois.[1] *Meliadus* is a dull and clumsy composition, chiefly remarkable for the circumstance that it alludes to the Charlemagne romances, and includes among its personages Aryhoan of Saxony, ancestor of Ogyers le Danois (Ogier the Dane). Even the account which it gives of Tristan's birth is wholly at variance with that which the writer had already given (or accepted) in the romance of *Tristan and Yseult.* As for Guiron, the beauty of his character redeems the tediousness of the narrative. From the point of view of human noble-mindedness it is the best of all the Arthurian tales, Guiron being equally free from the criminal sensuality of Lancelot and Tristan on the one hand, and distant from the superangelical purity of Galaad and Perceval on the other. Under the most trying circumstances he keeps himself chastely aloof from sin, although love is mutual between himself and his friend's wife; and, when on one occasion he reflects how near he has been to the verge of criminality, he strikes his own sword into his breast as a punishment. It is needless to say that he does not die but lives to see that same friend, Denain le Roux, carry off a maiden on whom he (Guiron) has bestowed a more justifiable affection. When, after a year's vain search, he meets his false friend and his ravished lady-love together, he fights and conquers Denain but spares his life, and goes away with the lady, still in love with her. Denain exhibits his friendship and gratitude effectually afterwards, but the story is left unfinished, Guiron and Bloye having been entrapped by treachery and lying still within the walls of a dungeon. The author refers to his *Meliadus* for an account of their liberation; but this simply shows that he intended to rewrite *Meliadus.* Fifty or sixty years later Rusticien of Pisa abridged the *Palamedes,* and inserted the incidents of the two in his compilation of Arthurian romances, now lost as a whole, although usually confounded with the *Morte Arthur.* From his compilation the printed *Meliadus* and *Guiron* were further abridged and finally printed so in separate form.

Ysaie. Arthus de Bretaigne, and Perceforest.

Ysaie le Triste, Arthus de Bretaigne, and *Perceforest* are three romances which had also considerable vogue, but, although they belong to the Arthurian cycle, they have no real connexion beyond the use of British names and the supposed kinship of the heroes with those of the old stories. Almost as much might be alleged against the *Meliadus* and the *Guiron*, but they were at least written by one of the first authors of the genuine works, and he had presumably some acquaintance with the British folk-legends. The fact that Rusticien of Pisa about 1270-75 abridged and compiled in a single great book the scattered and discordant stories of the earlier period, at the request of Prince Edward (afterwards Edward I.) of England, is universally conceded. That compilation has never been printed; it is even uncertain whether any MS. in existence represents it, for, although the English *Morte Arthur* is usually supposed to have been compendiously translated from it, we may infer with greater probability that Sir Thomas Malory used an earlier compilation, perhaps the work of Hélie de Borron. One reason to justify such a conjecture may be found in the absence of *Guiron* and *Meliadus* from the English book, which would hardly be the case if the former notion were correct, since we know that Rusticien published an abridged text of those two works. Rusticien's compilation could in fact only be recovered approximately by reuniting the texts of the various Arthurian romances as printed in French in the 15th and 16th centuries,—these abridged and inferior texts having apparently been derived or rewritten from his book, not from MSS. of the separate old romances. The *Morte Arthur* was printed by Caxton from Sir Thomas Malory's MS. translation or adaptation made in England not many years before the printer's establishment at Westminster. As an early English text and as the only existing homogeneous embodiment of the ancient Franco-British romances, it is of the highest interest, while at the same time it breathes the earnest and simple feeling which animates the originals,—differing thus *toto cœlo* from the colder, more artificial, and less interesting narratives which were invented in the 15th century, and of which the *Ysaie, Arthus de Bretaigne,* and *Perceforest* are examples. All three may be referred to the first half of that century, although it has been alleged that the second was written in the 14th. *Ysaie* forestalls to some extent the type of the 16th and 17th century French romances. It is an early instance of the use of a favourite device in later fiction, by which fairies are introduced who bestow special gifts at the birth of a hero; and amongst its chief personages is the misshapen dwarf Tronc, afterwards named Aubron—that is, Oberon—and made beautiful. He was adopted from the old French story of Huon de Bordeaux, just as the Oberon of the latter had his origin in the Elberich of the *Heldenbuch*. The original composition of *Perceforest* has been assigned without reason to the 13th century, and it is possible that some insignificant portion of the romance may have been written in the 14th; but the probability is that David Aubert was the real author of the extant work, and that he wrote it at the court of Burgundy about 1450. It would be difficult to imagine a work more absurd, heterogeneous, and wearying in its immensity than this. The very "variety" for which Dunlop praises it merely indicates the mass of multifarious and incongruous incidents, unconnected and uninteresting, of which it is full. Antiquaries, however, find it useful for the history of those knightly sports called tournaments, immense numbers of which are described in minute detail. *Arthur of Little Britain* must have been considered a very interesting romance when Lord Berners translated it into English, but we cannot discover its attractiveness. It is a dull inartistic composition, with scarcely any distinctiveness in the drawing of its personages.

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[1] Guiron appears to be the Breton or Cymric word which means "loyal," "true," or "honest," and is a fitting title for the hero.

nor Arthurian romances.

A great number of poetic and prose compositions, beginning with chansons and fabliaux in the 12th and 13th centuries, form a large portion of the literature of Arthurian romance; but in most instances they deal only with episodes, and are better described in the articles relating to the literature to which they belong than they could be, or ought to be, here. Some of them may, however, be mentioned briefly in chronological succession. In the 12th century—that is, between 1170 and 1206—Arnaud Daniel the troubadour wrote a poem, now quite lost, on Lancelot and Guinevere; Chrestien de Troyes the trouvère wrote one entitled the *Charrette, i.e.*, in reference to Lancelot's unknightly mode upon one occasion of hurrying to the rescue of Guinevere in a cart for want of a horse; this story was continued by Godefroi de Leigni. Chrestien wrote another poem on (Peredur) *Perceval*, which was continued by three other hands, in which Perceval remains the achiever of the Grail-quest. He also wrote *Erec et Enide*, a poem which contains the same substance as the Welsh story of Geraint in the *Mabinogion*, and which never appeared in any of the Arthurian romances; and the *Chevalier au Lyon*, which is similarly identical with the Lady of the Fountain in the *Mabinogion*. Owen or Ywain, the Chevalier au Lyon, is a prominent Round Table knight in the romances, but his story is not incorporated in them. Hartmann von der Aue translated Chrestien's poem into German verse before 1200; in English it appeared as *Ywain and Gawain* in the 14th century; another English poem, *Sir Gawaine and the Green Knight*, was written about 1360, as well as a Scottish *Golagrus and Gawaine*, in the 14th century. A poem, dated 1212, containing *Le Roman de Joseph d'Arimathie*, has been published by Francisque Michel, and is supposed by many to be Robert de Borron's original work. Its substance is the same as the first part of the prose *Petit Graal*, which Hucher has published as Borron's real original. About the same time, or a few years earlier, Ulrich von Zatzikhoven translated Arnaud Daniel's *Lancelot* into German verse; the lost *Perceval* in verse of Guyot de Provins and Wolfram von Eschenbach's metrical German version of it (in which he miscalls the trouvère "Kiot der Provenzal") have already been mentioned. There is an early German poem called *Wigalois*, composed by Wirnt of Grafenberg (*i.e.*, Gui, son of Gawain), evidently derived soon after 1200 from a French original, *Gui Galeis* or *Giglan*, which is lost. On Gawain himself there are two French poems by Raoul and Renault or Raoul de Beaujeu, of the 13th century; and one of Chrestien de Troyes's chansons (before 1200) celebrates Cliges, a nephew of Gawain. A French poem on Merlin dates from about 1300 There is a *Petit Tristan* or *Brun de la Montagne*, written in verse in the 14th century. The French poems of Marie de France, written in England early in the 13th century, contain lays of *Lanval* and of *Chevre-feuille* (on Tristan), which are professedly Arthurian subjects. Of the English works on the Round Table romances the chief are the metrical *History of the Grail*, translated early in the 15th century by Henry Lonelich, and published from a MS. by the Roxburghe Club, and Sir Thomas Malory's *Morte Arthur*. An English prose romance of Merlin was written about 1450, and a metrical *Arthour and Merlin* is probably fifty or sixty years older. A further *Life of Arthur* in English verse is supposed to have been composed about 1428. There is a metrical version of Renault de Beaujeu's *Giglan*, probably of the latter part of the 14th century. Two poems both entitled *Morte Arthur* exist, one written about 1390, which especially treats of King Arthur, and another belonging to the middle of the 15th century, of which the story of Lancelot is the subject-matter; and there is a Scottish *Lancelot of the Laik* in verse, which was composed late in that century. A romance of the *Seint Graal*, in verse, written about 1350, was probably a translation of Robert de Borron's *Joseph d'Arimathie*. Between 1838 and 1849 Lady Charlotte Guest printed and translated the *Mabinogion* (Children's Stories) from the Welsh MS. known as the *Llyfr Coch o Hergest*, transcribed late in the 14th century, and now preserved at Oxford, in the library of Jesus College. At first it was believed that these stories, so far as they agreed with the narratives of the printed French romances, were copies of the original legends used by Walter Map and the Borrons; but there can be little doubt that only those portions which are not found in the romances are of independent Celtic or Cambrian origin, while the remainder was derived from the French stories or poems of the 13th and 14th centuries.

BIBLIOGRAPHICAL LIST OF EARLIEST EDITIONS OF CHIEF ROUND TABLE ROMANCES.—*Parzifal und Titurel*, in German verse, 2 vols. fol., 1477. The book is a translation by Wolfram von Eschenbach, about 1205, of Guyot's lost French poem, based upon Robert de Borron's *Histoire du Graal*.

Perceval, fol., Paris, 1530. A totally distinct work from the Franco-German *Parzifal* mentioned above. Various poems in French and English of early date exist on the adventures of Perceval, but they are not to be identified with the prose romance.

Morte Arthur, fol., print. by William Caxton, 1485. Sir Thomas Malory's English translation of the second French Arthurian compilation which had been made about 1250, and united Tristan with the so-called *Lancelot*.

Lancelot du Lac, 3 parts, fol., Rouen, 1488; and Paris, A. Verard, 1494. This, the first Round Table compilation, was made about 1200, and embodied three or four tales which had previously had a separate existence. An Italian translation appeared in 3 vols. 8vo, Venice, 1558-59. A Spanish translation appears to be the *Demanda del Sancto Grial*, fol., Toledo, 1515, which may possibly be the whole *Lancelot* notwithstanding its name. A Dutch *Roman van Lancelot* of the 13th century was printed by Jonckbloet in 2 vols. 4to, 1846-49, from a MS. It may not be a translation of the French romance. The Maitland Club printed in 1839 a *Lancelot du Lac* in Scottish metre, from a MS. of the 15th century.

Tristan, fol., Rouen, 1489; and Paris, Vérard, about 1490. *Don Tristan de Leonis*, fol., Valladolid, 1501, is a Spanish translation. The Italian *I due Tristani*, 2 vols. 8vo, Venice, 1555, is a compilation of the two romances of Tristan and his son Ysaie. The two stories were united also in the late Spanish versions, if not in the first edition of 1501. A Scottish poem on *Sir Tristram* was written by Thomas Rhymer of Ercildoune in the 13th century; published by Sir Walter Scott. Various early poems on the same subject have been printed in *Tristan* by Francisque Michel, 2 vols. 12mo, 1835-37. A German poem of *Tristan und Isolde*, begun by Gottfried of Strasburg early in the 13th century, and continued by others in the same century, was published at Berlin in 1821, 4to, by Groote, and by Von der Hagen in 2 vols. 8vo, Breslau, 1822. This poem and the Scottish one are supposed to be derived from a French *Tristan* in verse by a trouvère Thomas, which is included in Michel's *Tristan*. There exist also an Icelandic *Saga af Tristam og Isond*, of the 13th century, published in Muller's *Saga-Bibliothek*, and old popular chapbooks on the same subject in German, Danish, Italian, Bohemian, and modern Greek. The oldest German edition of the popular *Tristrant* was printed in 4to at Augsburg in 1484.

Artus de Bretagne, fol. (no place), 1493; also at Lyons in 1496. An English translation was made by Lord Berners, *Arthur of Lytell Brytayne*, fol. (print. by Robert Redborne, no date, but probably about 1565).

Vie et Prophéties de Merlin, 3 vols. fol., Paris (ed. Vérard), 1498. There exist an Italian translation, *Historia di Merlino*, made by Antonio Tedeschi in 1379, fol., Venice, 1480, and a Spanish translation, *El Baladro del Sabio Merlin*, fol., Burgos, 1498. The *Lytel Treatys of the Byrth and Prophecye of Merlin*, published by Wynkyn de Worde, 4to, 1510, is a popular poem; and the *Life of Merlin*, 4to, 1641, is an original work by Thomas Heywood. The Early English Text Society has published *Merlin or the Early History of King Arthur* (8vo, 1869-77), in prose, from an English MS. of the 15th century, which was made from a French original. There exists also an *Arthour and Merlin* in verse, written about 1400. which has been printed for the Abbotsford Club, 4to, 1838. Geoffrey of Monmouth's original *De Vita et Vaticiniis Merlini*, in verse, was printed by the Roxburghe Club in 1830, 4to. His prose narrative (portion of the *Historia Britonum*) was first printed in the *Brittanniæ utriusque Regum Origo*, 4to, Paris, 1508, and afterwards better in the Heidelberg *Script. Rerum. Britann.*, fol., 1587.

Gyron le Courtoys, fol., Paris, Vérard, no date (about 1501). Two old Italian translations of the 14th or 15th century have been printed from MSS. in Italy, 8vo, Verona, 1834, and 8vo, Florence, 1835. Alamanni's *Girone el Cortese* is a poem on the subject of the romance, written for Francis I., 4to, Paris, 1548.

Histoire (et Queste) du S. Graal, fol., Paris, 1516. The Spanish *Demanda del Sancto Grial* and *Baladro de Merlin* have probably no connexion with this book, but are rather to be considered as drawn from the *Lancelot*. A French poetic *Roman du Saint-Graal* of the beginning of the 14th century has been published by Francisque Michel, 12mo, Bordeaux, 1841; and a prose one of earlier date (perhaps the remote original of the French romance printed in 1516) has been published by Hucher, 12mo, Le Mans, 1874. The Early English Text Society has printed (8vo, 1871) a 14th-century poem, *Joseph of Arimathea*, derived from the earlier French. The English verse *Seynt Graal*, by Henry Lonelich, published by the Roxburghe Club, 4to, 1863-64, must be considered as derived from the *Lancelot* rather than from the *Histoire du S. Graal*.

Ysaie le Triste, fol., Paris, 1522. For Italian and Spanish translations see *Tristan*, above.

Meliadus de Leonnoys, fol., Paris, 1528. Of this there exists an Italian translation, *I gran Fatti del gran Re Meliadus*, 2 vols. 8vo, Venice (Aldo), 1559-60.

Perceforest, 6 vols. fol., Paris, 1528.

(b) *Charlemagne and his Twelve Peers.*

The cycle of Franco-Teutonic or French romance of which the mythical history of Charles the Great forms the central design is, so far as its original literary elements are concerned, more ancient than the Franco-British cycle of Arthur and his knights. The reduction into prose of the old *chansons de geste* and of the *poëmes cycliques* which followed them was, however, of much later date than the similar conversions of Round Table poems; and the 15th-century prose romances are so mangled and altered from the character of the earlier stories in verse that without a short notice of the latter it would be impossible to get a true notion of the richness and copiousness of Frankish romance.

We know from Eginhard that the Frankish heroic ballads were reduced to writing by Charlemagne's order, and thus the first step was taken which led to the creation of similar ballads about himself and his principal warriors. His own large and catholic spirit seems to have embraced all the people within his dominions, and thus indirectly brought about the official employment of the French language in the famous compact between his grandsons in 841. He was then only twenty-eight years dead, yet his influence was still so mighty that even the Gauls and Aquitanians are declared in a 9th-century chronicle to have gloried in bearing the name of Franks. This both implies an amalgamation of the two races more complete than is usually believed, and accounts for the creation of French as well as of Frankish ballads on the life and exploits of Charlemagne in the second half of the 9th century. The number of persons who could speak only Theotisc (Teutonic language) and of those who could speak the two languages was of course constantly diminishing, and the *chanson de geste* soon displaced the *Heldengedicht* within the limits of modern France. Of all the French ballads current in the 9th and 10th centuries some have perished utterly, others survive only in later refusions; the most ancient now extant is the *Chanson de Roland*, in the modified form which was given to it soon after 1066 by a Norman called Turold. This poem contains so many references to others on Charlemagne and his *douze pairs* or *paladins* as to make it certain that such a ballad-literature existed in the 9th and 10th centuries. None of the existing *chansons de geste* represents those older forms; all are rifacimenti of the 12th and 13th centuries, and bear evidence of additions, interpolations, and arbitrary changes. In the 13th century we find the older episodical ballads rearranged in the form of "cyclic poems," and falling into three groups, which take each its name from the central personage or subject. One is the *Geste* of the king (Charlemagne, his father, and grandfather); the next is the *Geste* of Provence or of Garin de Montglane; and the third, the most heterogeneous, is the *Geste* of Doon of Mayence. Each of these is composed of many separate parts, but the first may be generally described as the entire mythical history of Charles the Great, his family, and his faithful peers; the second a separate and independent set of narratives concerning his conquest of Narbonne; the third a history of his wars with rebellious vassals and with traitors, including Ganelon, through whom the peers were defeated and slain at Roncesvalles. The number and names of the peers are variously given in nearly all the poems, but Roland and Oliver are included in all the lists, united as in a proverbial English phrase. Roland is the daring warrior, Oliver the wise one; the one is the Achilles, the other the Ulysses of the Carolingian epopee. Many of the early *chansons* give the name of Turpin, archbishop of Rheims (an actual historical contemporary of Charlemagne), as one of the *pairs*,—warrior and priest combined; and there is a chronicle bearing his name which has furnished the later romancers with a goodly proportion of their matter. This *Pseudo-Chronicle of Turpin* was written in Latin, by various hands and in various places between 1000 and 1150, being apparently constructed from the *chansons* for the purpose of forging history to suit monastic ends. It took its final and existing form between 1160 and 1180, when edited by Géoffroy de Brueil, and was for many centuries regarded as actual history. This work was not the first so-called history which embodied monastic fiction in the narrative of Charlemagne's career. A monk of St Gall wrote about 890 a chronicle *De Gestis Karoli Magni*, based partly upon oral tradition, in which certain fabulous incidents appeared for the first time, such as Pippin's fight with the lion, and the conversation about the Iron Emperor between Ottokar the Frank (better known as Ogier the Dane) and the Lombard king Desiderius, on the walls of Pavia, when Charlemagne was advancing to besiege it. Another fabulous incident of great moment in the romances is Charlemagne's suppositious journey to the Holy Land, which was related for the first time by Benedict, monk of St André, about 968, in his *Descriptio qualiter Carolus M Clavum et Coronam Domini a Constantinopli Aquisgrani attulerit.*

Historico-mythical works.

A great deal of historical truth underlies the absurdities of the *Turpin Chronicle* and the rhapsodies of the *chansons de geste*. Compare ROLAND, LEGEND OF. In fact all the older poetic literature of this cycle is based upon purely historical events and real personages; it is only at a later date that the events are multiplied or variously misapplied, and that the personages also are arbitrarily distorted and augmented, according to the fancy and local sentiments of the various writers. As for the language in which the older poems were written, the idea that they were chiefly the work of troubadours in the *langue d'oc* is now abandoned. Gaston Paris holds the curious theory that the French language (*langue d'oil*) was popularly current over the north of Italy, instancing the works of Rusticien of Pisa as an illustration, besides certain works in Italianized French which belong to this class. Such a notion cannot be accepted readily, as we know that the *langue d'oc* was the general language of southern France, western Spain, and north-west Italy. But it is possible that the French language (*langue d'oil*) may have been used as a general literary vehicle for the Charlemagne cycle of poetical fiction, and that Rusticien or Rustighello may have compiled an abridgment of the Frankish stories. Such a work, if it ever existed, has perished; and it is in the Italian language of Tuscany that we find the first prose compilation of Carolingian romance. The *Reali di Francia* (Princes of France), if it had been completed, would have occupied a corresponding position to the *Morte Arthur* of the British cycle; for, while no such popular compilation appears to have ever been made in France itself and in the French tongue (unless the late 15th-century *Fierabras* may be considered to take that rank), the *Reali* in verse and in prose was current in Italy early in the 14th century. From some peculiarities in the language it is conjectured that the author, although writing in Tuscan, was a Venetian. In France at the same period we find only the separate fictions, mostly in verse, but a few in prose. The first French prose compilation of the whole cycle was made by David Aubert in 1458 for Philip of Burgundy; but it was dead-born and has never been printed. The second, in three books, was made a few years later by Jean Bagnyon, for Henri Bolomier, canon of Lausanne; it was first printed in 1478, and is entitled in some editions *La Conqueste que fist Charlemagne es Espaignes*, and in others *Fierabras*; both titles are insufficient, having apparently been merely created to supply the lack of a general heading. The first section is a summary chronicle of the history of the Franks from Clovis to Charlemagne, the second an abridgment of the old poem of *Fierabras*, and the third an account of the Spanish expedition, taken from the *Pseudo-Turpin*. This work became very popular in and out of France, and most readers during the 16th and 17th centuries derived their entire knowledge of the Charlemagne romance from it. Although the French prose works of the cycle were for the most part very late in their construction, there were three French prose translations or adaptations of the *Turpin Chronicle* executed soon after 1200.

The names as well as the offices of the *douze pairs* varied considerably in the earlier *chansons*. The final conception appears to be that which is contained in the *Fierabras*; but the substitution of new personages for the old ones is so great that it is not possible to regard the *douze pairs* as a definite set of *dramatis personæ* on the stage. Nor indeed do any of the heroes of the printed prose romances belong to that society, however frequently its members appear in their stories. Originally it would seem that some fortuitous coincidence between the number of the apostles and the number of the captains who headed Charlemagne's evangelizing expedition into Spain had been utilized by some of the monkish legendaries, and thus the early *chansons* became affected with a mystic respect for the *douze pairs*. But each writer allowed himself the licence of excluding and including any warrior he chose in that number. The *Pseudo-Turpin* makes no reference to such a society, although it gives the names of the more celebrated knights. The full story of Roland has no prose romance to itself (see ROLAND, LEGEND OF). The story of Oliver is in similar case, unless the prose romance of *Galien*, Oliver's son, may be held to embody it. Regnault de Montauban (the chief of the four sons of Aymon), Huon of Bordeaux, Amys and Milles, Jourdain, Galien, Maugis, Mabrian, and many other heroes of the printed romances are unknown to the earliest ballad-histories of Charlemagne and his barons. Ogier the Dane seems to have grown out of two historical personages, a real Othger or Ottokar, a Frankish margrave of Charlemagne's time, and a real Olgar or Hulger, a Danish or Norse warrior who plundered Aix-la-Chapelle some seventy odd years after the Frankish Othger had accompanied Roland into Spain. Othger fought with the Lombards against Charlemagne in 773; and Amys and Milles, in the battle in which they won the crown of martyrdom, are said to have fallen by his hand. Beaten by the emperor, he became his vassal and five years later commanded the advanced guard of the army whose rear-guard was destroyed at Roncesvalles. M. Gaston Paris has admirably discussed the historical bearings and the various phases of the original *chansons de geste* in his *Histoire Poétique de Charlemagne*, but has dismissed with a brief reference all the printed prose romances we are now about to consider.

Reali di Francia. The *Reali di Francia* exists both in metrical and in prose form, and it is difficult to decide which is the earlier; the metrical version was certainly current in the 13th century, and there seems little reason to doubt that the prose story was in existence before 1300. The latter was first printed at Modena in 1491. It is a general work on the subject of Frankish romantic history, and is divided into six books, of which the subjects are as follows:—(1) Clovis and Rizier; (2) Fioravante and Rizier; (3) Ottaviano de Leone (the emperor Octavian and his sons Florent and Lion); (4) Buovo d'Autonna (Bevis of Hampton); (5) Buovo avenged by his sons Guido and Sinibaldo and King William of England; (6) birth of Charlemagne, death of Pippin and his natural sons. Thus we may conclude that it was, so far as printed under the name *Reali*, the first part of a compilation of all the Charlemagne cyclical stories. The first book of the continuation *Aspramonte*, a translation from the French poem of *Aspremont*, or rather a prose composition from an Italian version of that poem, exists in MS. The *Reali di Francia* has been drawn upon by many later writers.

Chronicle of the Pseudo-Turpin.—The early part of this work was evidently forged by some monk interested in exalting the glory of St James's shrine at Padron in Galicia (Spain), before it was transferred to Compostella. He represents St James as appearing in successive visions to Charlemagne, urging him to conquer Spain, the land in which the saint's bones are laid and of which the Saracens are masters. Charlemagne advances with a Frankish army and besieges Pamplona, which is invincible to his arms, but falls a prey to his prayers. After further exploits and the foundation of many churches, he returns home, but is brought out again very speedily by news that the Saracen king, Aigoland, has once more seized the country. This king is borrowed from the elder *chansons* relating to the war against the Lombards; but for the 12th century all Charlemagne's foes were Saracens. The topographical difficulty is made light of, and Aspremont is placed in Spain. Roland, Oliver, and Ganelon (afterwards infamous for his treachery, the hereditary result of his kinship to the family of which Doon of Mayence was the head) distinguish themselves; Aigoland is beaten and killed. Charlemagne next attacks Navarre, where his paladins enter into single combat with the heathen giant Ferracute, who vanquishes all but Roland, and is overcome by the latter by means of a stratagem. Cordova is next conquered and taken possession of, and Charlemagne retraces his steps, but remembers that he has left two other Saracen kings unsubdued—Marsilius and Baligant—in Saragossa. He sends Ganelon to claim tribute from them; they contrive to rouse the predestined spirit of traitorousness in the envoy, and he returns with a false tale, which leads the monarch to forget military precautions by dividing his army into two portions. He himself with the advanced half passes the Pyrenees in safety, but Roland, Oliver, and the rear-guard are suddenly attacked in the pass of Roncesvalles. All perish in the fight except Roland, who, mortally wounded, dies alone in the wild mountain gorge, after having flung his famous sword away, and blown such a blast upon his horn that it bursts and the sound reaches the ears of Charlemagne. The emperor returns to Roncesvalles, slays the Saracen host, recovers the body of Roland and gets it embalmed, and causes Ganelon to be torn to pieces by wild horses. After a time his health suffers and his death approaches. Turpin becomes aware of a multitude of demons who are preparing to carry off the emperor's soul on account of his sins. They are foiled, however, by St Denis, who, in return for Charlemagne's benevolence towards the church, rescues his soul and bears it to heaven.

Fierabras.—The basis of this romance was the lost poem upon the amir Balan, a Saracen leader conquered by Charlemagne in Italy; the rest of the book was put together from Turpin and other sources so as to form the one general prose romance of Charlemagne. The scene is changed from Italy to Spain in the prose romance. Fierabras, the giant, is son of Balan, and, after having sacked Rome, is met by the Frankish host; Oliver encounters and defeats him in single combat; the giant is converted and baptized by the name of Florent, and receives half his father's kingdom when his father is conquered and slain. Floripas, sister of Fierabras, marries Gui de Bourgogne, who takes the other half. The Spanish prose *Historia del Emperador Carlo Magno*, printed in 1528, is a translation; there is also a German version.

Guerin de Montglave (or properly *Garin de Montglane*).—This romance of the 15th century is based upon the 13th-century poems on Girard de Vienne and Aimeri de Narbonne of "le clerc Bertrand." It is a spirited and entertaining fiction relating the adventures of the four sons of Garin, one of the heroes of the elder Provençal cycle, and is misnamed, in so far as it contains only the story of his family, not of himself. The four sons are sent forth to seek adventures. Arnaud, the eldest, asserts his right to the dukedom of Aquitaine against a usurper who has succeeded on his uncle's death. He is treacherously persuaded to seek the hand of the princess Fregonde, daughter of the Saracen sultan of Lombardy. His traitorous kinsman, Hernault, contrives to set Arnaud and the sultan at enmity, and Arnaud is flung into a dungeon, where the daughter, ready to accept Christianity for love of him, secretly visits him. Hernault apostatizes and goes back with a promise of the sultan's help to conquer Aquitaine for himself, but turns aside from some qualm of conscience to confess his sins to a giant hermit, who happens to have been an old comrade of Garin. Thus learning the peril of Arnaud, the giant hermit Ribastre slays Hernault, and, seeking assistance from another old comrade, a converted magician named Perdigon, sallies forth to the aid of the imprisoned hero. In disguise he obtains admittance to the captive and the princess, baptizes the latter, kills the jailer, and sends Arnaud forth free to reconquer Aquitaine and to bring aid, while he and the lady hold the dungeon-tower, which is at once besieged by the sultan. After numerous fights, in which Perdigon's magic is the chief actor, Ribastre and the princess get away without having received help from Aquitaine, and on reaching that land find Arnaud a prisoner in the power of Hernault's uncle. Ribastre kills the latter; Arnaud is restored to his duchy and marries Fregonde; the sultan turns Christian; and all ends well. But the romance does not close here; it proceeds to narrate the honours which fall to the other sons, Milon de Pouille, Regnier de Gênes, and Girard de Vienne, or de Toulouse, through the favour of Charlemagne, who feels himself bound to Garin's family in consequence of the obligation attached to a rash game of chess formerly lost by him to that hero. However, when Arnaud's son has grown up, an accidental affront put upon the empress by him changes Charlemagne's friendly feeling to hate. He makes a long war upon Girard in Vienne, who is aided by his brother, and it is agreed at last to settle the affair by a duel between Roland, the emperor's nephew, and Oliver, the son of Regnier de Gênes. The two had previously become fast friends, and Roland loves Aude, Oliver's sister; consequently, although they fight with great vigour and equality of strength, they throw aside their swords in the middle of the combat and embrace one another as worthy brothers-in-arms. A fitting compromise is found between the warring parties in an agreement that they shall all unite and attack the Saracen conquerors of Spain. Then begins the famous expedition which ended at Roncesvalles.

Galien le Rhetoré.—This romance was first printed in 1500. It is partly of late composition, although sufficiently ancient to have rendered the word "rhetoré" (*i.e.*, rhetorized, or narrated in elegant prose) incomprehensible at the time of its impression. The word was supposed to mean "restored," and to indicate the restoration of chivalry by Galien. The chief substance of the story was the ancient tale of Charlemagne's journey to the East and the *Turpin Chronicle.* Hugues, emperor of Constantinople, at first receives the Frankish emperor and his peers courteously, but is informed by a spy of certain vaunting expressions to which, as is the Frankish manner, they have given utterance amongst themselves after supper. These "gabes," as they are called, are merely frolicsome braggadocio, spoken in lightheartedness, and not intended to convey any serious intention. The spy and the Greek emperor, however, take them as the threats of dangerous magicians; the Franks are seized and menaced with death if they fail to fulfil their words. Oliver is first put to the test; his speech had had reference to the Greek princess Jacqueline, and might better have befitted the lips of a Parisian *gamin* of to-day than of a young paladin. He, however, awakens a tender interest in the lady's heart, and she indulgently informs her father the next morning that the knight's boast has been fulfilled. Hugues requires that the others shall also exhibit their power, which they do to his satisfaction, partly by celestial succour and partly by the use of mother-wit. He finally dismisses them with presents. After Oliver has gone, Jacqueline becomes the mother of Galien, who grows up in time to hear of the expedition to Spain and to arrive just too late for the battle in the pass of Roncesvalles. His dying father there acknowledges him, and Galien signalizes himself in the renewed fighting in which Charlemagne takes reprisals for the loss of his peers and the treachery of Ganelon. After various deeds of valour in the West, Galien returns to the East, saves his mother from a shameful death, and resumes the imperial crown.

Milles et Amys.

Milles et Amys.—The prose romance in its existing form was written in the 15th century, and first printed by Vérard about 1503. The martyrdom of the two friends is supposed to have taken place in 774 in Charlemagne's war against the Lombards, and their story was popularly current in the 12th century. Milles was the son of Anceaume, count of Clermont, and Amis the son of the count's seneschal. Milles's parents celebrate his birth by making a pilgrimage to Jerusalem. During their adventures and captivity in the East Milles is robbed of his inheritance at home and Amys is brought up under a feigned name. They enter into the closest friendship and set out for Constantinople, where Milles discovers his captive mother acting as nurse to the Greek princess Sidoine, whom by her assistance he weds, after having taken a chief part in forcing the sultan of Acre to raise the siege of Constantinople. He becomes emperor of Byzantium, but after a while returns to France with Amys, regains possession of his estates, and makes Amys a duke. Hearing that the Saracens have again attacked Constantinople and that his Greek wife has perished in the flames, he allows himself to be seduced by Bellisant, the daughter of Charlemagne, who, however, makes an honest man of him by marriage and behaves honourably ever after. Amys also gets married. Then the two friends also go on a pilgrimage to Jerusalem, from which Amys returns stricken with leprosy. His wife refuses to receive him, but he is carefully tended by Milles in his own castle; and now the most striking episode in the story takes place. Amys learns in a dream that he can only be healed by bathing in the blood of his friend's offspring and tells Milles of it. The latter is painfully affected, but does not hesitate to strike off the heads of his two children. Amys is cured and the devotion of Milles repaid by a miracle from heaven: the children's heads are replaced upon their shoulders. Afterwards Milles and Amys set out on another pilgrimage to Santiago de Compostella. Ogier the Dane, then at war with Charlemagne, meets and treacherously slays them on their way homeward. A continuation follows, narrating the adventures of the infant children of Milles. The widow of Amys plots for their destruction, but they are zealously tended by a wise ape, which shares their fortunes until separated from them by malice and mishap. Florisset becomes a Saracen leader in Venice and Anceaume a brave warrior in the army of Charlemagne. The two brothers have a desperate encounter in the war which takes place, but are recognized by the ape (which has already brought about the punishment of the wicked widow of Amys, in a similar fashion to that of the celebrated dog of Montargis). A restoration takes place: the two young men are acknowledged the emperor's grandsons, and the ape dies of joy.

Jourdain de Blaves (or de Blaye).—The prose romance, first printed in 1520, is altered from a 15th-century poem. It is affiliated to *Milles et Amys*, the hero being the grandson of Amys. He undergoes the most varied fortunes: he throws his wife with his yet unborn child into the sea, enclosed in a box, when the vessel bearing himself and his warriors is in peril of shipwreck; he searches for her some years later, and finds her in a refuge, to which she has fled from the love of the man who fished her out of the sea, and who exposed her baby-girl at the birth; and next, when hunting in a forest, he finds his daughter running wild in company with a bitch and her young. This is a reflexion of the story of Apollonius of Tyre, and is rather a dull work.

Doon of Mayence.—Doon or Doolin of Mayence is the hero of a 14th-century poem, adapted as a prose romance in the 15th century, first printed by Vérard in 1501. He is represented as defying and almost defeating his lord the emperor, whom he treats at first with disrespect. In his earlier history he appears as a son of Gui of Mayence, who, as penance for an unintentional crime, retires to a hermitage. On his disappearance his wife is accused of murder, condemned to death, and her children banished. Doon meets his father and returns to fight as his mother's champion, conquers his enemies, and assumes his rightful possessions. He falls in love with a Saracen princess and wins her by force, with the help of Charlemagne, after the episode of his quarrel with the emperor. The lady's father has been aided by the king of Denmark; Doon, after his victory, seizes the Danish crown, which he transmits through his son Geoffrey to his grandson Ogier.

Ogier th Dane.

Ogier le Danois.—There are twelve *chansons* upon the story of this hero, dating from the 12th and 13th centuries, and based upon still older poems now lost. The trouvères Raimbert and Adenez le Roi were among the authors. The story was recomposed in prose, from the poem of the latter writer, probably in the second half of the 14th century. The fairies who preside at Ogier's birth and endow him with many gifts are a later addition to the story: one of them is Morgan la Fay, King Arthur's sister, who foretells that at the end of his career he shall go to live with her in immortal youth at Avalon. While yet a little boy he is sent as a hostage to Charlemagne and is brought up at the imperial court. When fourteen years of age he is banished to the castle of St Omer, where he falls in love with the young châtelaine, but is soon afterwards ordered out of his prison to accompany Charlemagne on an expedition to Italy against the invading Saracens. Here, for the first time, he is subjected to the hatred and envy of young Charlot, the emperor's son; but on the triumph of the Frankish arms he accompanies the monarch in his return to Paris and learns that his father is dead and that the châtelaine has borne him a son. He departs to assume the crown of Denmark, but lays it down after a few years and returns to Charlemagne. His son has grown up and is one day engaged in a game of chess with Charlot, who, having lost it, becomes irritated, and kills him with the chess-board (an incident frequently met with in old fiction). Ogier, in his fury for revenge, uses such language that he is compelled to fly, and betakes himself to the court of the Lombard king Desiderius, then at war with the emperor. It is on this occasion that the famous dialogue takes place on the walls of Pavia. Desiderius or Didier wonders, as he and Ogier look forth together, at the great number of the Frankish warriors advancing over the plain, and, as each successive body of troops, ever increasing in strength and grandeur, makes its appearance, he says, "Is this the emperor?" Ogier to each question answers, "Not yet," till at last he cries, "When thou shalt see the fields bristling with an iron harvest, and the Po and the Ticino, swollen with sea-floods, inundating the walls of the city with iron billows, then perhaps shall Karl be nigh at hand." Soon after the Iron Emperor with his mightiest host darkens the horizon, and Didier falls smitten with terror. The Lombard king is beaten; Ogier is made prisoner while sleeping, and brought to the emperor. He still refuses to be reconciled until the monarch yields Charlot to his revenge. Charlemagne at last gives way; Ogier, when just on the point of striking off the prince's head, abstains, and foregoes his vengeance. Then, returning to his old station as one of the emperor's chief paladins, he fights an invading army and slays their giant leader. He next saves the king of England's daughter Clarice from captivity, marries her, and is recognized as king of that country; but he abandons for a second time the kingly dignity and sets out for the conquest of the Holy Land. Whilst returning to France, he is shipwrecked, comes upon a diamond castle, invisible by day, and finds himself in Avalon in the company of Morgan la Fay. She puts the ring of perpetual youth on his finger, the crown of forgetfulness on his head, and he lives a life of joy for two centuries. Then the crown is taken off; he remembers his old life, and betakes himself to the new and degenerate French kingdom which has succeeded to the empire of Charlemagne. After restoring the spirit of the older knighthood, vanquishing the Norse invaders, and passing through some curious adventures in connexion with his ring, he is carried away by Morgan la Fay and disappears for ever.

Meurvin.

Meurvin.—This was a romance of late origin, first printed at Paris in 1531. Meurvin was the son of Ogier by Morgan la Fay, and is a personage of little interest, except for his connexion with the romance of the Knight of the Swan, whose ancestor he is represented to be through his son Oriant.

Four sons of Aymon.

The Four Sons of Aymon; or Regnault de Montauban and his Three Brothers.—This, one of the most popular and delightful of the romances of this cycle, was printed many times in the 15th and 16th centuries, and in later abridgments as a chap-book.

Adapted from a 13th-century poem, it has been considered as the work of Huon de Villeneuve based upon earlier *chansons*. Aymon de Dordogne, brother of Beuves d'Aigremont and of Girard de Roussillon, brings his four sons to the court of Charlemagne. They are knighted by the emperor, who makes a present of the marvellous steed Bayard to the eldest, Regnault. This is the charger pictorially represented as bearing all the four champions on his back at once. Bertholais, the nephew of Charlemagne, plays one day a game of chess with Regnault, and, losing, petulantly strikes his adversary, who smites him dead with the board. All the four sons of Aymon are compelled to fly and war is immediately declared against them as outlaws, in which their unhappy father, as the feudal vassal of Charlemagne, is obliged to take an active part. Numerous incidents of deadly peril and adventure on both sides are recorded, and Regnault displays so much daring, skill, and magnanimity as to create in the reader's mind a hatred of the ungenerous monarch who relentlessly pursues the brothers. It will be remarked how singularly the character of Charlemagne has deteriorated from the earlier type. The famous Bayard plays a notable part in the story. On one occasion, by the help of his cousin, the enchanter Maugis (son of Charlemagne's assassinated enemy Beuves), Regnault captures the emperor, Roland, Ogier, Naimes of Bavaria, and Turpin. Although they are in his power, the chivalrous knight and his brothers merely kneel to Charlemagne and beg for peace and pardon. The monarch's hatred is implacable; but Regnault nobly sets his captives free, and the war begins again. Regnault, who is lord of Montauban, a castle given him by Yvon, sovereign of Gascony, for having repelled a Saracen invasion, retires from the strife and makes a pilgrimage to Palestine. On his return he goes as a simple mason to aid in the building of Cologne cathedral, and is there slain by the treachery of his fellow-workmen.

Maugis d'Aigremont. *Maugis d'Aigremont.*—The special romance bearing this title (first printed about 1520) is not the only one in which Maugis the enchanter plays a prominent part. He is originally derived from the 13th-century poem on the four sons of Aymon, to whom he furnished material assistance in the struggle against Charlemagne. He also appears as a comrade and helper of Renaud in the *Conquest of Trebisond*, and again in the romance of *Mabrian* (1530), in which he is elected pope, and finally perishes in a cave to which Charlemagne sets fire. These are all three of late origin; and the *Conqueste de Trebisonde* (s.a., about 1520) is not even of French composition, but is adapted from the 14th-century Italian poem of *Trabisonda*. The four sons of Aymon, especially Regnault (Tasso's hero Rinaldo), and their kinsman Maugis seem to have been especially dear to the Italian imagination.

Gerard d'Euphrate. *Gerard d'Euphrate.*—This, printed in 1549, and professedly translated from a metrical Walloon original, is an absurd tale of magic, containing nothing except names to connect it with the ancient poem on Girard de Fratte, one of the vassals who warred against the emperor. Although split into two personages in course of time, Girard de Fratte (not d'Euphrate) and Girard de Roussillon seem to have been originally identical. Girard was one of the sons of Doon of Mayence, and therefore brother to Aymon. Consequently this romance may be placed in connexion with the *Four Sons of Aymon*, and also serves to link it with *Gurin de Montglane*, as it is evident that Girard de Vienne in the latter romance is only another form of the older Girard.

Huon of Bordeaux. *Huon of Bordeaux.*—This interesting story was compiled in prose in 1454, from a late form of a poem which was current towards the end of the 12th century, and which has often been attributed to the trouvère Huon de Villeneuve, but without reason. Huon, duke of Guienne, one of the paladins of Charlemagne, is on his way to Paris to pay his respects to his liege lord, when he is attacked by the malicious and envious Charlot, whom he kills in self-defence. The emperor grieves so much for his son's death that he dooms the unlucky Huon to death also, notwithstanding the intercession of all the peers and councillors. At last Huon is pardoned, but only on condition that he shall make a journey to the East and bring back from Baghdad a part of the Saracen amir's beard and four of his back teeth, after having slain one of the Saracen lords and kissed the amir's daughter before his face. These impossible tasks he is enabled to accomplish by the help of the pretty dwarf Oberon, who presents him with a magical cup and horn. A loud blast upon the latter suffices to bring Oberon and 100,000 warriors to his aid. At the most critical instant his magic powers fail him, simply because he had been guilty of deceit in announcing himself as a Mohammedan in order to gain entrance. The princess Esclarmonde has, however, fallen in love with him and succours him. He is at length brought out to fight the giant Agrapard, who has invaded Baghdad; he conquers him, and tries to persuade the amir to turn Christian. Again when he is in danger, Oberon saves him; and the teeth and beard are taken from the dead Saracen. Then begins a series of adventures full of peril and distress. Huon overcomes strong temptations practised on his chastity and the deadly straits in which he is placed by Saracen foes and treacherous kinsmen, and at last makes Esclarmonde his lawful wife and justifies himself before Charlemagne. Oberon always makes his appearance when the needs are sorest, and in fact plays the best part in the narrative. This romance has no connexion with the actual history of Charlemagne; but it is an attractive work of imagination.

Valentin et Orson.—This well-known and charming story, first printed in 1489, relates the lives of two brothers exposed in infancy, one of whom is suckled by a bear. After many adventures, they regain their rightful position and each learns his relationship. The events are supposed to take place in France in the time of Pippin. It is a composition of the 15th century.

Octavien, or *Florent et Lyon*, is a similar story, never printed in French, although written in that language, probably in the 15th century, from an episode of the *Reali di Francia*.

Beuve d'Hanstone, or, as he is called in English, Bevis of Hampton, is the subject of an old French story which was embodied in the *Reali*, and is only connected with Charlemagne by the mention of King Pippin and the hero's kinship with the sons of Aymon. As a French prose romance it was printed by Vérard about 1500. It had been printed separately in Italian at Bologna in 1480. An old English poem on Bevis was in the 15th or 16th century turned into a prose romance, and was printed about 1560.

Morgant le Géant is only a translation of Pulci's poem *Morgante Maggiore*, and *Guérin Mesquin* is similarly translated from an Italian prose recomposition of an old Italian poem. Little more than the names was derived from the old Charlemagne *chansons de geste*; and the same may be said of the famous poems of Boiardo, Berni, and Ariosto upon Roland (Orlando).

Bibliography of the first printed Prose Romances, including Texts and Translations.—*Reali di Franza*, fol., Modena, 1491. *Pseudo-Turpini chronicon*, fol., Frankfort, 1566 (forming a portion of Schard's *Rerum Germanic. IV. veteres chronographi*); *Chronique composée par Turpin*, fol., Paris, 1476 (forming part of the *Chroniques de S. Denis*; first independent edition, Paris, 1527). *Galien Rhetoré*, fol., Paris, Vérard, 1500. *Fierabras le Geant*, fol., Geneva, 1478—printed also under the title of *Conqueste du grand roy Charlemagne*, fol., Lyons, 1486; in English, *Charles the Great*, Caxton, 1485; in Spanish, 1525. *Guerin de Monglave*, fol., Paris, 1518. *Doolin de Mayence*, fol., Paris, Vérard, 1501. *Ogier le Dannois*, fol., Paris, Verard, c. 1498. *Quatre Filz Aymon*, fol., Lyons, c. 1480: in English, *The Foure Sonnes of Aymon*, fol., Caxton; in Spanish, *Reynaldos de Montalvan*, fol., Seville, 1525 (translated from an unprinted Italian version of the *Quatre Filz* and the *Trebizonde* united); *Conqueste de Trebisonde* (Regnault de Montauban), 4to, Paris, c. 1520. *Chronique de Mabrian*, fol., Paris, 1530. *Maugist d'Aygremont*, 4to, Paris, c. 1520. *Beuves d'Anthoune et la belle Josienne*, fol., Paris, Vérard, c. 1500; in English, *Syr Bevis of Hampton*, 4to, W. Copland, c. 1560. *Romant de Morvan, fils d'Oger le Dannois*, 8vo, Paris, 1531. *Gérard d'Euphrate*, fol., Paris, 1549; *Gérard de Roussillon*, Lyons, c. 1530. *Milles et Amys*, fol., Paris, Verard, c. 1503; in Italian, *Milles e Amis*, 4to, Venice, 1503; *Jourdain de Blaves*, fol., Paris, 1520. *Huon de Bordeaulx*, fol., Paris, 1516; in English, *Huon of Bordeux*, Copland, c. 1540. *Valentin et Orson*, fol., Lyons, 1489; in English, *Valentine and Orson*, 4to, ed. Copland, c. 1560; in Italian, *Valentino ed Orsone*, 8vo, Venice, 1557. *Clamades et Clermonde*, fol., Lyons, 1480; in Spanish, *Clamades y Claramonda*, 4to, Burgos, 1521. [*Octavien*:] *Florent et Lyon*, 4to, Paris, s.a.; in German, *Keyser Octavianus*, fol., Strasburg, 1535. *Morgant le Géant*, fol., Paris, 1519. *Guérin Mesquin*, 4to, 1530; in Italian, *Guerino Meschino*, fol. Padua, 1473; in Spanish *Guerino Mesquino*, Seville, 1512.

(c) *Spanish Cycle Amadis and Palmerin.*

Amadis of Gaul. Arthur had become in Britain not only a national hero of romance but also a leading figure around whom might be grouped the adventures of subordinate knights. Charlemagne filled a similar place for French writers, but had the advantage of being a more distinct historical character than Arthur. In the Iberian peninsula, where we find the next great cycle of stories, the circumstances which produced the national hero (the Cid) were still progressive, and his history was too real to melt into such romantic fiction as dealt in France and England with remote and shadowy paladins and the wonders of fairyland. Therefore, while the Cid had an ever-present reality in ballads, the earliest appearance of prose romance in Spain was in an artificial imitation of the Franco-British cycle. As it was a work of great merit, its fictitious hero became, as it were, the central figure in the stories which followed and which bore to one another a strong family likeness. Most of the chief heroes are illegitimate, like Amadis; the adventures of two brothers are told; and there is much similarity of incident and character. Many of the scenes are laid in Constantinople. *Amadis de Gaula* is the poetical sire of an extraordinary series of romances, which in the words of Cervantes[1] form an "inumerable linaje," and is itself the most interesting and remarkable of them. Although its reputation is due to the Spanish redaction of Montalvo, there was an earlier Portuguese version by Vasco de Lobeira (d. 1403), a gentleman of the court of João I.

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[1] Under AMADIS of Gaul (vol. i. p. 650) may be seen the different references in *Don Quixote* to the romance.

At the end of the 16th century a manuscript of this version was in the possession of the dukes of Aveiro at Lisbon, but since the middle of the 18th century all traces of it have been lost. There is, however, reason to believe that the earliest form of the story was in Castilian (*c.* 1250 ?), also entirely lost. In a moral poem, *El Rimado de Palacio*, written about 1400, we find Pedro Lopez de Avala speaking of having wasted his youth with

> ‘ Libros de devaneos e mentiras probadas
> *Amadis* e *Lanzarote*,”

which is sufficient to prove that *Amadis* existed about the period 1350-60. There is also a reference to Galaor, brother of Amadis, in the chronicle of Ramon Muntaner (1325-28), as well as to Tristan, Lancelot, and “other knights of the Round Table.” There are several allusions in the *Cancionero* of Baena (1440-50) to an ancient version, one especially to its being “en tres lybros.” The earliest form is likely to have been in verse. The author was well acquainted with the Arthurian legends, and we find a marked imitation of *Tristan* and especially *Lancelot*. Many of the names indicate a Celtic origin. Gaula certainly means Wales and not France, as they who insist upon a French original of the romance would lead us to believe. There still remains much that is entirely novel. In the words of M. Baret, to whom the literary history of this romance owes so much—

> “Si par la tradition primitive, l'*Amadis de Gaule* dérive de la source commune des romans de la Table Ronde, si même il a existé une version Portugaise, c'est néanmoins à l'Espagne que doit demeurer l'honneur d'avoir créé, sur un thème ancien, une composition originale, en introduisant dans un cadre emprunté la nuance particulière de sentiments et l'art nouveau qui donnent à notre roman son importance et sa valeur spéciales” (*De l'Amadis*, p. 21).

Of the primitive *Amadis*, probably in three books, which charmed the youth of Ayala nothing is known. The prose romance we now possess was written about 1465 by Garci-Ordoñez de Montalvo, governor of Medina del Campo, to whom we may assign all traces of a spirit later than the first years of the 14th century, and to whom the whole of the fourth book may be due. This book is more refined and more romantic than the others. One of the chief reasons of the popularity of this version is the happy manner in which the improvement in manners is indicated. For the first time in chivalric romances we find distinct traces of the personality of the writer. The tastes, feelings, and prejudices of Spain towards the end of the 15th century are well expressed, without loss of the high chivalry of an earlier and simple time. It was first printed at Saragossa in 1508.[1] Within the next fifty years thirteen or fourteen more editions issued from the press, and Amadis became fully established as the popular hero of Spanish romance. When the Spaniards first saw Mexico in 1519 they were reminded of the enchantments of the story.

Francis I. made acquaintance with the *Amadis* during his Spanish captivity and directed Nicolas de Herberay, seigneur of Essarts, a gentleman of Picardy, to translate it. The first four books of the original work were first printed in French in 1540. De Herberay also translated most of the continuations down to the ninth book. He died about 1552, and Boileau, Gohorry, and others continued the work. Estienne Pasquier, in his *Recherches de la France* (1611), alludes to the popularity of the French *Amadis*, “dans lequel vous pouvez cueillir toutes les belles fleurs de nostre langue Françoyse. Jamais livre ne fent embrassé avec tant de faveur que cestuy.” De Herberay gives as his reason for the translation, “pour ce qu'il est tout certain qu'il fust premier mis en nostre langue Françoyse, estant Amadis Gaulois et non Espagnol. Et qu'ainsi soit, j'en ai trouve encores quelque reste d'un vieil livre escrit a la main en langage Picard.” This contention, which cannot seriously be held, was insisted upon by M. de Tressan in his abridgment of the *Amadis de Gaul* (1779), wherein a French origin for the first three books is claimed upon the authority of certain MSS. in that language. The commencement of an Italian translation of the Amadis romances was printed at Venice in 1546, and the stories became equally popular in that language. Bernardo Tasso, while on a mission to Spain about 1535, read the *Amadis* with delight and afterwards based upon it his poem of *Amadigi di Francia* (1560). He preferred the *Amadis* to all the French romances, not even excepting *Lancelot*. Living at that time, his evidence is extremely valuable. He does not seem to have heard of Lobeira's version nor yet of the French and Portuguese pretensions. In his opinion the story was taken from some ancient British history. The romance was translated into German in 1569 and into Dutch in 1619. Graesse (*Trésor*, vii. p. 30) describes a Hebrew translation of the first four books by Jacob ben Moses Algabbai, printed at Constantinople by Eliezer ben Gerson Soncini, without date. The *Amadis* was first read in English through a version from the French by Anthony Munday (1592). Robert Southey's *Amadis of Gaul* (London, 1803, 4 vols. sm. 8vo) is an excellent translation, in which, however, there are constant signs of editorial pruning. W. S. Rose put the romance into verse from De Herberay's French text (London, 1803, sm. 8vo). Besides the *Amadigi* of Tasso, the romance gave rise to *Amadis*, a drama by Gil Vicente (1521), the Portuguese Plautus, to an opera by Lulli, represented at the Académie Royale de Musique at Paris (1684), to a poem by Wieland (1771), the forerunner of his *Oberon*, and to another by Creuzé de Lesser (1813). The translation of De Herberay had an extraordinary success. It penetrated even to the convents. The Huguenot La Noue and the Catholic Possevino protested against it in vain. The allusions to the *Amadis* and its continuations are endless; for instance,—“La gloire de Nicquée,” used for the bracket seat of a coach; the proverbial saying “envoyer chez Guillot le songeur”; “Dariolette,” the name for a confidant; “Urgande la desconnue,” a phrase with Scarron and La Fontaine; and many more. The romance even furnished Christian names to some noble families, as to the lovely Corisande, countess of Guiche. The festal pageantries in vogue at the court of Charles V. were imitated from it. A poetical title of Queen Elizabeth was “the fair Oriana.” Burton refers to the reading of the romance in his *Anatomy of Melancholy* (1621).

Sketch of the story

The period of *Los Quatro Libros del Cavallero Amadis de Gaula* is supposed to be earlier than that of Arthur or of Charlemagne. The hero is the illegitimate child of Perion, king of Gaul, and of Elisena, princess of Brittany, and is set adrift at sea in a cradle. He is picked up by a Scottish knight, who takes him to his own country; he calls him the Child of the Sea and educates him at the king's court. Having been knighted, Amadis goes to the assistance of his father Perion (the relationship being then unknown), who in the meantime had married Elisena, by whom he had a lawfully begotten son, Galaor. The second child is stolen by a giant. Amadis becomes revealed to his parents through a ring, and consoles them in their new loss. He overthrows the king of Ireland, who had invaded Gaul, and returns to England. The adventures of the two brothers Amadis and Galaor in England, France, Germany, and the East occupy the remainder of the work, which is full of combats between them and other knights, magicians, and giants. While a youth at the Scottish court Amadis met Oriana, daughter of Lisuarte, king of England, who had been sent away from home in consequence of political troubles. The vicissitudes of their love form a marked feature of the tale. At one time the hero, disguised and under the name of Beltenebros,[2] retires to a hermitage upon receiving a cruel letter from Oriana. After defeating a hundred knights by whom Lisuarte had been attacked, and some further exploits, Amadis has to leave Oriana and the English court owing to the jealous suspicions of the king. He returns to rescue the princess from the Romans, and afterwards carries on a long war with Lisuarte, who is also attacked by a second enemy, Aravigo. In this perplexity Lisuarte is generously assisted by Amadis, who slays Aravigo. Lisuarte then consents to the marriage of his daughter with Amadis on the Firm Island, whose wonders are brought to an end by Oriana entering a certain magic chamber,—a feat only to be accomplished by the fairest and most faithful of women.[1]

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[1] Until recently bibliographers considered an edition printed at Salamanca in 1519[1] as the *editio princeps*, although Clemencin and others cited one of 1510, which no one had seen. A most interesting discovery was, however, made at Ferrara in 1872 of an entirely unheard-of edition produced at Saragossa by G. Coci in 1508.

[2] From the French translation “Le beau ténébreux” comes the popular application of the phrase to taciturn and melancholy lovers. The episode, parodied by Cervantes, is derived from the romance of *Tristan*. Amadis was also known by the names of the Knight of the Sword and the Greek Knight.

The *Amadis* is one of the best of the romances and contains many passages of much beauty and even tenderness. The boyish attachment between the Child of the Sea and Oriana is well told. The princess is weak and jealous, and not altogether a pleasing character. Amadis is a fine creation and is well distinguished from his brother Galaor. Both are brave, but the elder is grave and the younger gay. Amadis is the type of a constant lover; his brother is more changeful. A modern reader may be wearied by the intolerable length of the *Amadis* and by the continual recurrence of similar adventures all ending in the same way. But these repetitions seemed no fault to readers whose tastes were easily satisfied and to whom such fictions came as an entirely new source of delight.

Continuations of the story.

The continuations are inferior to their prototype and become more full of complicated incidents and strange adventures as they proceed. The characters alter: for instance, the Urganda of the first four books is a fairy like Morgan la Fay, but subsequently she develops into an enchantress of a more Eastern and malignant nature like her rivals Zirfea and Melia. Besides his redaction of the *Amadis*, Montalvo composed about 1485 an original work, about one-third as long, giving the history of a son of the hero, called Esplandian. In order that it might share in the popularity of the father's achievements, it came forth as *Quinto Libro d'Amadis de Gaula, o las Sergas del Cavallero Esplandiano*. The curate justly decreed that "the merits of the father must not be imputed to the son" when he cast the volume on the bonfire in Don Quixote's courtyard. Although perhaps the best of the continuations, it is not equal to the original. We read that before marriage Oriana bore a child to Amadis, and in order to hide her shame the boy is sent to a distant country. While those in charge of him are passing through a forest a lioness carries him off, but a hermit meets and rebukes the animal, which subsequently suckles the young Esplandian. When he grows up the lioness continues her care and accompanies him to the chase. King Lisuarte one day witnesses this, which is the cause of Oriana recognizing her son by certain marks on his body. He is brought up at the court of Lisuarte and receives knighthood. He then begins his adventures under the title of the Black Knight (from his armour), and sails for Turkey, where most of his exploits take place. The Christians are assisted by the enchantress Urganda and the infidels by her rival Melia. Amadis, Galaor, Esplandian, and the knights being in great danger of death, Urganda saves them by putting them all to sleep on the Firm Island until Lisuarte, son of Esplandian, could obtain possession of a certain magic sword. The romance was first printed in 1510, and five editions appeared before the end of the century. This was soon followed by other similar romances, each with an illegitimate descendant of Amadis for a hero, with a son who performs exploits still more wonderful than those of his father, —a perpetual succession of heroes. At the end of the *Esplandian* Montalvo speaks of writing another book to carry on the history still further. This caused some one, believed to be Paez de Ribera, to bring out *El Sexto Libro, en que se cuentan los Grandes Hechos de Florisando*, nephew of Amadis, taken from an Italian source. This was translated into English and Italian, but not into French. The *Septimo Libro, en el qual se trata de los Grandes Hechos en armas de Lisuarte de Grecia y Perion de Gaula*, deals with the life of the son of Esplandian and Leonorina. The other character is Perion, son of Amadis and Oriana, and the type of the fickle lover, as opposed to Lisuarte, who is more like Amadis. The book commences with the voyage of Perion from England to Ireland, but a lady in a boat with a crew of four monkeys separates him from his followers. He goes to Trebizond and falls in love with Gricileria, daughter of the emperor. When Lisuarte is a prisoner in charge of the king of the Giants' Isle, Gradaffile, the daughter of the latter, escapes with him to Constantinople, where after many combats he obtains the magic sword and enables Amadis and the knights to escape from the magic sleep in the Firm Island (see *Esplandian* above). Lisuarte eventually marries Onoloria, sister of Gricileria. The work continues *Florisand* and is attributed to Feliciano de Silva. Juan Diaz, the author of *El Octavo Libro, que trata de Lisuarte de Grecia y de la Muerte del Rey Amadis*, pretended that his work was taken from the Greek. It also is a continuation of *Florisand* and was not translated.

We now come to *Libro Noveno, que es la Chronica del Principe y Cavallero de la Ardiente Espada, Amadis de Grecia*, a continuation of the seventh and not of the eighth book, and more full of marvels than any of its predecessors. Amadis of Greece, the son of Lisuarte and Onoloria, is carried off by pirates when an infant and sold to a Moorish king. He derived his name from the figure of a flaming sword upon his breast. The exploits commence, like those in the *Esplandian*, at the Forbidden Mountain, and the family history concludes, as in the same romance, with the enchantment by Zirfea of all the heroes and princesses in the Tower of the Universe in order to prevent their death at a fated moment. Feliciano de Silva is the reputed author. Stimulated by the success of his two anonymous productions, the same writer continued the series with four more parts, of which the *Coronica de los Valientes Caballeros D. Florisel de Niquea y el Fuerte Anaxartes* forms the tenth book and contains the first two parts. Genealogically the romance is a continuation of *Lisuarte* and *Amadis de Grecia*. Florisel is the son of the latter person and the princess of Niquea. In these fictions a new character is introduced, Darinel, a kind of comic shepherd, in love with the heroine Sylvia, daughter of Lisuarte and Onoloria, through whom Florisel becomes acquainted with the heroine. All three go to the relief of Anastarax, who is confined by enchantment in a fiery prison. But the achievement of the exploit is reserved for the Amazon Alastraxerea, whose adventures occupy a great portion of the tale, which culminates in the siege of Constantinople by all the potentates of western Europe in consequence of Florisel having carried off Helena princess of Apollonia. Among other new characters are the enchantress Armida and the "strong" Anaxartes, who marries young Oriana, sister of Florisel. The amount of bloodshed throughout the work is only equalled by the number of marriages. The third part of *Florisel* forms the eleventh book of *Amadis* and is known as *Chronica de Don Florisel de Niquea, en la qual se trata de D. Rogel de Grecia y el Segundo Agesilao.* Rogel is the son of Florisel and Helena, and brother of Agesilao the Second, so called to distinguish him from Agesilao of Colchos. A few years later Feliciano de Silva published the fourth part of *Don Florisel*, in two books, the second of which treats of the loves of Rogel of Greece and Archisidea, and of Agesilao and Diana, daughter of Queen Sidonia. The author in his preface implies that the work was intended as an allegorical celebration of the military and domestic virtues of Charles V.

The hero of *La Dozena Parte que tracta de los grandes Hechos en Armas del Cav. Don Silves de la Selva*, was the son of Amadis of Greece and Finistea. Born on a desert island, Don Silvio first distinguishes himself at the siege of Constantinople described in the tenth book. The Greek empresses and princesses having been carried off by enchantment, he accompanies the knights who go in search of them. The ladies are rescued, but during their absence have become mothers, among others of Spheramond, son of Rogel, and Amadis of Astre, son of Agesilao. Feliciano de Silva sometimes passes for the author, who was really Pedro de Lujan. The work is in two parts, which in French make the thirteenth and fourteenth books. *Lepolemo ó el Caballero de la Cruz* and *Leandro el Bel* are considered to make the thirteenth and fourteenth books. From a unique first edition (1521) of *Lepolemo* discovered a few years since it appears that it professed to be a translation by Alonso de Salazar. The hero was the son of the emperor Maximilian and was carried away in infancy to the East. N. Antonio speaks of a certain romance composed by a Portuguese, entitled *Penalva*, the last of the line of the original Amadis. It is supposed to have dealt with the last exploits and death of Lisuarte of Greece, but if it existed at all no printed copy has ever yet been seen. The other Spanish romances usually appended to the Amadis series are mentioned in the bibliographical list below.

In the French series more and more liberties are taken with the original as the work proceeds. As shown in the table below, the numbers of the books do not tally. The fifteenth, entirely due to Antoine Tyron, describes the feats of Sferamond (so called from a birthmark representing a globe) of Greece and Amadis d'Astre. The sixteenth to the twenty-first books continue the adventures of Sferamond and were translated from the Italian of Mambrino Rosco by Gabriel Chappuys. Duplicate versions from the Italian were made by Nicolas de Montreux of the sixteenth, by Jacques Charlot of the nineteenth, and by Jean Bovion of the twentieth books. The twenty second to the twenty-fourth books, devoted to Fulgoran, Safiraman, and Hercules d'Astre, continue and form a new conclusion of the French *Amadis*. Only one edition appeared (Paris, 1615, 3 vols. 8vo), now extremely rare. The naive and pure style of the earliest of the series degenerates into an uninteresting succession of coarse and obscene incidents. In the twenty-third book we are taken for the first time to America. *Flores de Grèce* (1552) is considered to form the twenty-fifth book. Genealogically it would be the sixth, as the hero is the second son of Esplandian. In the 16th century the French Amadis library extended to 30 vols. of various sizes. In the 17th century appeared a new work forming, as it were, the preliminary, being the history of the *Chevalier du Soleil and his Brother Rosiclair*, sons of the emperor Trebatius (Paris, 1620-25, 8 vols.),—not identical with the Spanish *Febo*. *Belianis de Grèce* (1625) forms one vol., and the *Romans des Romans* (1626-29)—containing the end of the career of the Knight of the Sun, all the Amadises, Flores, and Belianis—forms 8 vols., and finishes this long series of about 50 vols. The *Trésor de tous les Livres d'Amadis* (1559-60, frequently reprinted) is a selection of the speeches, letters, cartels, complaints, &c.; it was translated into English as *The Treasury of Amadis of France* (H. Bynneman, n.d.; about 1575).

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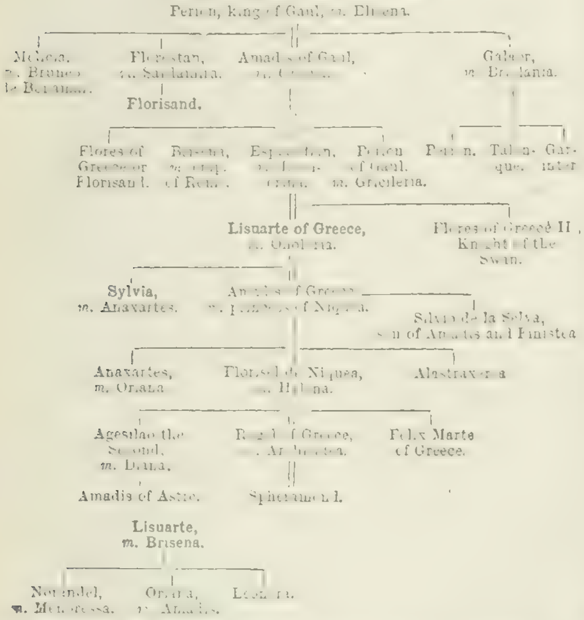
[1] This kind of incident, which is frequently to be found in the subsequent books as a test of chastity, is connected with the kindred story of the ill-fitting cloak in the Arthurian legend. Spenser uses it in the *Faerie Queene* (iii. 12) where,

> "The maske of Cupid and th' enchanted
> Chamber are displayed."

The Italian translation, which is extremely difficult to obtain complete, conforms more closely to the Spanish. The *Sferamundi* romances were first composed in that language by Mambrino Roseo. A perfect set of the German version is also very rare. Some of these volumes were translated by a Protestant, who made changes to suit his religious views, such as altering "mass" to "sermon."

Pedigree of the Amadis Heroes.


Perion, king of Gaul, m. Elisena.
Melicia, m. Bruneo de Bonamar.
Florestan, m. Sardamira.
Amadis of Gaul, m. Oriana.
Galaor, m. Briolania.
Florisand.
Flores of Greece or Florisand.
Esplandian
m. Gricilena.
Perion.
Talanque.
Garinter
Lisuarte of Greece, m. Onoloria.
Flores of Greece II., Knight of the Swan.
Sylvia, m. Anaxartes.
Amadis of Greece
Silves de la Selva, son of Amadis and Finistea
Anaxartes, m. Oriana
Florisel de Niquea, m. Helena.
Alastraxerea
Agesilao the Second, m. Diana.
Rogel of Greece
Felix Marte of Greece.
Amadis of Astre.
Spheramond.
Lisuarte, m. Brisena.
Norendel, m. Menoressa.
Oriana, m. Amadis.

Bibliographical List of First Editions of Amadis Romances.

Bk.	Spanish.	French.	Italian.	English.
1-4.	*Amadis* (Montalvo, 1508) ..	(Herberay, 1540)	(1546)	(A. Munday, 1592)
5.	*Esplandian* (Montalvo, 1510)	(Do., 1541)....	(Mambrino Roseo, [illegible])	(J. Johnson, [illegible])
6.	*Florisando* (Paez de Ribera, 1510)	Not translated..	(1550)	(F. Kirkman, [illegible])
7.	*Lisuarte de Grecia y Perion de Gaula* (Feliciano de Silva, 1514)	(Herberay, 1540)	(Do.)......	(1603)
8.	*Lisuarte de Grecia y Muerte de Amadis* (Juan Diaz, 1526)	Not translated ..	Not trans.	....
9.	*Amadis de Grecia* (Feliciano de Silva, [illegible])	(Herberay, 1546-48)	(1550)	....
10.	*Florisel de Niquea*, pts. 1-2 (Fel. de Silva, [illegible])	([illegible], 1552; J. Gohorry, [illegible])	(1551)	....
11.	*Rogel de Grecia*, pt. 3 of *Florisel* ([illegible])	(J. Gohorry [illegible], G. Aubert, [illegible])	(1551)	....
12.	*Silves de la selva* ([illegible])	([illegible]; A. Tyron, [illegible])	([illegible])	....
13.	*[illegible] del Caballero de la Cruz* (1521)	[illegible]	*Cav. della Croce* ([illegible])	....
14.	*Leandro el Bel* (1563)	Not translated	Not trans.	....
	Esferamundi de Grecia ..	[illegible] pt. 1 (A. Tyron, [illegible])	*Sferamundi*, pts 1-6 (1558)	
	....	*Sferamondi*, pts. 2-6 ([illegible])	....	....
	Febo y Rosicler, 4 pts. (Ortuñez de Calahorra and others, 1562-89)	[illegible] ([illegible])	([illegible])	(1585)
	Belianis de Grecia (J. Fernandez, 1547)	(1625)	(1586)	(1598)
	....	*F[illegible]* (1615)	....	....
	....	*Flores de Grèce* (Herberay, 1552)	....	....
	....	*Romans des Romans* ([illegible])	....	....
	Penalva.		..	

Although the Palmerins have not enjoyed the celebrity of the line of Amadis, they were nevertheless closely allied in dignity and importance, and their histories are written in evident imitation of their distinguished original. At the head of this second great family of Spanish romances stands *El libro del Cavallero Palmerin de Oliva*. From some Latin verses at the end it appears to have been written by a woman, said to have been a carpenter's daughter of Burgos, or a lady of Puente del Arzobispo (Augustobriga), at the beginning of the 16th century. Only one copy is known of the *editio princeps* of Salamanca (1511). The love-scenes are described with more voluptuous detail than is usually to be expected in a female author. But this warmth of colouring may have been one of the causes of the success of the romance. There are many Spanish and Portuguese editions, and it was first translated into French by Jean de Voyer, vicomte de Paulmy, in 1546, into Italian by Mambrino Roseo in 1544, into English by Anthony Munday in 1588, and into Flemish in 1602.

Like most of his compeers, Palmerin was not born in wedlock. He was the son of Griana, daughter of Reymicio, emperor of Byzantium, and of Florendos of Macedon. The infant was exposed on a hill covered with palm trees and olives (whence the name) and was discovered by a peasant, who reared him as his own son. Palmerin's earliest exploit is to save a travelling merchant from a lioness. The grateful traveller furnishes him with arms and a horse, and Palmerin sets forth in quest of adventures, the first of which is to kill a serpent that guards a fountain whose waters are necessary to Primaleon, king of Macedon. He then succours the emperor of Germany, with whose daughter, Polinarda, he falls in love. Like the lady in *Arthus de Bretaigne*, she had previously appeared to him in a dream. Norway, England, and Greece are successively the scene of his daring. He delivers from the power of the Grand Turk the princess Agriola, who ultimately marries Trineus, the companion of Palmerin. After many combats, enchantments, and love escapades, the hero at length marries Polinarda and becomes emperor of Byzantium upon the death of Reymicio.

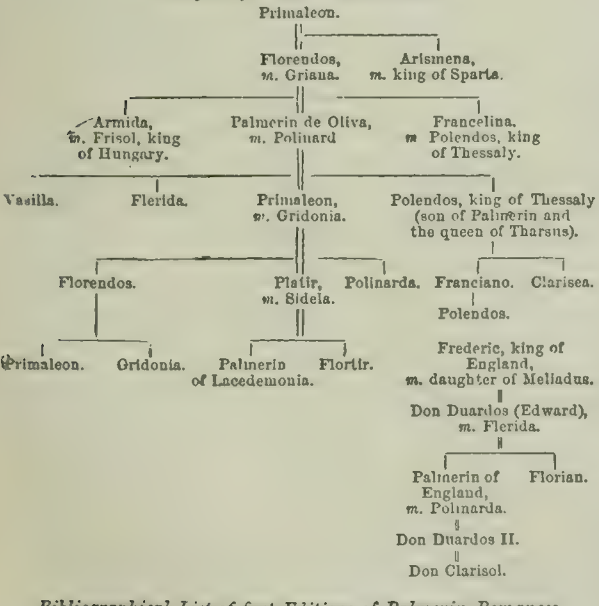
The same fair unknown also produced *Libro Segundo que trata de los Hechos en Armas de Primaleon y Polendos*, both of them sons of Palmerin by different mothers, the first by Polinarda and the second by the queen of Tharsus. While with his mother Polendos one day ill treats an old woman, who mutters that it was not thus that his father treated the helpless. This sets him to look for his sire. He meets with Primaleon and goes to the court of Duardos (Edward) of England. The beautiful Gridonia, daughter of Duke Hormedes, bears two sons to Primaleon, the second of whom is made the hero of the next romance, or third book, *Historia del Cav. Don Polindo* (*Polindo* is the fourth part of the Italian series). The fourth book is *La Cronica del Cav. Platir*, the son of Primaleon and Gridonia, and very properly condemned by the barber. The fifth book consists of *Historia del, Cavallier Flortir*, which is only to be found in Italian.

The sixth book, *Libro del Cav. Palmerin de Inglaterra*, was the most serious rival to the popularity of Amadis. Formerly this work was considered to have been first written in Portuguese and was attributed to Francisco Moraes, from the first edition then known in that language, printed at Evora in 1567. The statement of Moraes, now proved to be true, that it was translated from the French (1552), was looked upon merely as a literary device. On the discovery of the original edition in Spanish (Toledo, 1547-48) it was seen that the real author was Luis Hurtado, a Toledo poet. It was translated into French by Jacques Vincent in 1552, and into Italian by Mambrino Roseo in 1554-55. The first Portuguese version was republished at Lisbon in 1786 (3 vols. 4to) under the name of Moraes, and from this Southey edited his revision of Munday's translation (London, 1807, 4 vols. sm. 8vo). Palmerin and Florian are the twin children of Flerida (daughter of Palmerin de Oliva) and Duardos, king of England. The mother gives birth to them in a forest and they are taken away by a savage as food for his two lions. Duardos is in the power of an amiable giant, Dramuziando, and Primaleon with a company of knights starts from Constantinople to England in order to relieve him. In the meantime the children are being tended by the wife of the savage and reared with her son Selvian. Florian falls into the hands of

Sir Pridos, son of the duke of Wales, who educates him under the name of the Child of the Desert. Palmerin, his twin brother, meets with Polendos, who takes him and Selvian to Constantinople. Palmerin's first love-affair is with Polinarda, who repulses his affection, and he travels to England under the title of the Knight of Fortune. In the middle of a battle with Florian the brothers are separated by Flerida and the secret of their birth divulged by Daliarte, a magician. Their subsequent adventures are beyond enumeration, those of the Perilous Isle being the most interesting. A part of the story relates to the castle of Almourol, where resides the proud Miraguarda, whose peerless beauty is championed by enamoured knights. The giant Dramuziando becomes one of her admirers. In this romance the marriages take place in the middle, giving ample opportunity for many more combats, abductions, ravishments, murders, and other deeds of violence or valour. This is evidently so close an imitation of the *Amadis*, while only second to it in popularity and intrinsic merit, that a comparison between the two naturally arises. As in its prototype, there are two heroes. We have Palmerin, the faithful lover, and Florian, the fickle one, as well as Daliarte, the magician, and the Perilous Isle. The characters are well discriminated: Palmerin is generous, brave, and chivalrous; Florian, witty and courageous. The giant Dramuziando actually excites our sympathy and interest, and the emperor Primaleon is a fine and courtly old gentleman. Much feeling for the beauties of nature is shown; the dialogue is good. On the other hand, the story is not so simple and natural as the original *Amadis*. There are too many knights and battles, and the romance is distinctly inferior as a work of art.

The seventh book consists of *Terceira* [*e Quarta*] *Parte de Palmeirim de Inglaterra onde se contam os Feitos do Don Duardos Segundo seu Filho*, which continues the Portuguese version of Moraes, to which the two parts are the third and fourth books. It was composed by Diogo Fernandez de Lisboa. The eighth and last book of the Palmerin series are the fifth and sixth parts of the same work, being *Chronica do Famoso Princepe Don Clarisol de Bretanha*, by Balth. Gonçalvez Lobato. Like the preceding, it was written in Portuguese and not translated.

Pedigree of the Palmerin Heroes.



Primaleon.
Florendos, m. Griana.
Arismena, m. king of Sparta.
Armida, m. Frisol, king of Hungary.
Palmerin de Oliva, m. Polinard
Francelina. m Polendos, king of Thessaly.
Vasilla.
Flerida.
Primaleon, m. Gridonia.
Polendos, king of Thessaly (son of Palmerin and the queen of Tharsus).
Florendos.
Platir, m. Sidela.
Polinarda.
Franciano.
Clarisea.
Polendos.
Primaleon.
Gridonia.
Palmerin of Lacedemonia.
Flortir.
Frederic, king of England, m. daughter of Meliadus.
Don Duardos (Edward), m. Flerida.
Palmerin of England, m. Polinarda.
Florian.
Don Duardos II.
Don Clarisol.

Bibliographical List of first Editions of Palmerin Romances.

Bk.	Spanish.	French.	Italian.	English.
1.	*Palmerin de Oliva* (1511) ..	(1546)	(Mambrino Roseo, 1544)	(A. Munday, 1588)
2.	*Primaleon* (1512)	(1550)	(1548)	(Do., 1595)
3.	*Polindo* (1526)	Not in French ..	*Platir* (1548)	....
4.	*Platir* (1533)	Do.	*Polendo* (1566)	....
5.	*Flortir* (no Spanish edition)	Do.	*Palmerino d'Inghilterra* (1554-55)	.... (*P. of England.* A. Munday, 1602)
6.	*Palmerin de Inglaterra* (1547; in Portuguese, 1567)	(1552)	*Flortir* (1554)	....
7.	*Don Duardos II. de Bretanha* (Portug. by Diogo Fernandez de Lisboa, 1587)	Not translated ..	Not trans.	Not trans.
8.	*Don Clarisol de Bretanha* (B. Gonçalvez Lobato, 1602)	Do.	Do.	Do.

(*d*) *Teutonic, Anglo-Danish, &c.*

Outside the four great cycles of mediæval romance there lie some minor cycles, as well as various isolated fictions, to which we must now make reference.

The origins of the Teutonic cycle belong to epic or ballad literature, as we find them in the *Wilkinasaga*, in the *Nibelungenlied*, and the *Heldenbuch*. As those works have already been treated separately or in connexion with the national literature to which they belong, we need only make brief allusion to the fact that the Germanic legend of Siegfried (Sigurd, Siegmund, Sigenot) is very ancient, and that the Norse or Icelandic sagas embody its oldest existing form. The High German *Nibelungenlied*, *Hildebrandslied*, *Hadubrand*, *Dietrichssaga* (or *Heldenbuch*), *König Rother*, &c., are probably specifically older than the Norse books, but they contain the legend in a later shape,—the *Heldenbuch* especially deviating from the first two by the introduction of a number of names and incidents arbitrarily adapted from the history of the Gothic, Lombard, Burgundian, and Hunnic wars during the 5th and 6th centuries. There are no prose romances on these themes, but the mythical hero Siegfried, called Horn-Siegfried or Hörnen-Siegfried, gave his name to the French and English stories of *Horn and Rimenhild* (Rimenhild being derived from Chrimhild, the wife of Siegfried). Before these last came into existence there had arisen in England a set of legends of which Anlaf Sitricson, the Danish king of Dublin (converted to Christianity 943, deceased on a pilgrimage in 981), was the hero. They were combined in a French poem called *Havelok*, by Geoffrey Gaimar (12th century), the name Havelok being a corruption of Anlaf or Olaf, and reappearing still later in the form of Hamlet. Various trouvères composed ballads of greater length on the same theme, with many additions, and finally others appeared in English. In all of them we find mixed elements, including incidents which connect this Dano-Saxon romance with *Guy of Warwick* and the French *King Horn*.

Anglo-Danish. The fact last mentioned tends to justify the assumption of an Anglo-Danish cycle, which may be said to begin with the poem of *Beowulf*. Between the mythical Siegfried and Beowulf of the early centuries and the fictitious Horn and Guy of the 13th the Anglo-Danish Havelok of the 12th intervened, and furnished material to the trouvères who composed the last two works. In *Horn and Rimenhild* there is little more than the names to connect the story with the old Siegfried poem, but much that brings it into contact with Anlaf and Danish or Norse history. Its reappearance in prose as *Pontus et Sidoine* belongs to the second half of the 15th century. *Guy of Warwick*, from whatever actual personage its hero may have been derived, is a purely English story of the 13th century, connected with *Havelok* by its evident relation to legends of Danish wars in England, and with *King Horn* by its embodiment of the most striking incidents of that story,—namely, the return of Guy as a disguised palmer to his own castle, and the use of a ring by which he discloses himself to his wife.

Havelok the Dane appeared first in a French poem by Geoffrey Gaimar (12th century), and was inserted by him between his *Brut* or translation of Geoffrey of Monmouth (now lost) and his *Estorie des Engles*. The story runs that Adelbrict, a Dane, is king of Norfolk, while Edelsi is king in Lindsey. The former marries a sister of the latter, and both die; a girl, Argentille, remains, who is given by her uncle, out of spite, in marriage to a scullion-jongleur, Cuheran. She dreams that her new husband is of superior origin; he confesses that he comes from Grimsby. They both start for this place and discover that Cuheran's putative father, Grim, is dead. It turns out that Cuheran is the son of Gunter, an exiled king of Denmark, and that his real name is Havelok. He and Argentille set out for Denmark, where Edulf, the brother of the usurper, has become king. Sigar, formerly seneschal to Gunter, is lord of the town where Havelok lands and assists him when Argentille is attacked by miscreants. Havelok is made known by his power to sound Gunter's horn and is saluted as king. He returns to England, fights with Edelsi, and gains the day through Argentille's device of setting up the dead warriors on stakes. When Edelsi dies Havelok and Argentille reign in Lindsey as well as in Norfolk. The tale may have filtered through Welsh channels, as it seems to have gathered British elements before it was taken up by the Anglo-Danes. Argentille (or Argantel) appears to be formed from a Welsh name, which the early English writers converted to Goldborough. The French *chanson* belongs to the early part of the 12th century. It has no direct prose representative. Gaimar's text was first edited by Madden (Roxburghe Club, 1828), in the *Monumenta Hist. Brit.* (1848), and by T. Wright (Caxton Soc., 1850). A French *lai* on the same subject is included in the Roxburghe and in the Caxton volumes; it was issued separately by Francisque Michel in 1833. An English poem is also to be found in the Roxburghe volume and was likewise edited by W. W. Skeat (Early Eng. Text Soc. 1868).

Guy of Warwick is dealt with in vol. xi. p. 341. Besides the many editions of the prose romance, there is an unpublished *Heraud d'Ardennes*, sometimes known under the name of its other hero Rembrun, the son of Guy of Warwick, who is found in English metrical versions.

King Horn.—The primitive English form of the poem is lost, but is represented in the existing *chanson de geste* (*Horn et Rimenhild*, 12th century). An early version supplied some of the incidents for Richard of Ely's *Gesta Herewardi Saxonis* (first half of 12th century), which claims to be partly derived from an old book written by Leofric, Hereward's chaplain at Bourne. English MSS. (in verse) are preserved at the British Museum, Oxford, and Cambridge. Allof, king of Sudenne, is killed by Saracen (Danish) pirates, who also drive away his wife Godylt and turn their son Horn adrift at sea, with Athulf, Fykenild, and ten other children. They land at Westness (Cornwall) and the children are reared by King Aylmer. Horn is banished for a love passage with the king's daughter, Rymenild, and sails for Ireland under the name of Godmod. He returns with Irish warriors and by himself joins a feast held to celebrate the espousals of Rymenild with a King Mody. Horn, disguised as a pilgrim, drops a ring into Rymenild's cup with the words "Drink to Horn of horn." He defeats Mody and reinstates his mother in Sudenne. Rymenild is carried off by Fykenild, who is ultimately killed by the hero, by whom the lady is rescued. The only copy known of the knightly romance of *Horn Childe and Maiden Rimnild* is the Auchinleck MS. The story was very popular in Scotland. *Horn* and *Horn Childe* have both been printed by Ritson (*Ancient Eng. Metr. Rom.*, 1802, ii., iii.). Francisque Michel has edited *Horn et Rimenhild*, including the English and Scottish poems (Bannatyne Club, 1845). The Cambridge MS. was edited by J. R. Lumby for the Early Eng. Text Soc. (1866) and by E. Matzner in *Altenglische Sprachproben* (1867), and the Oxford text by C. Horstmann in Herrig's *Achio* (1872).

Ponthus et la Belle Sidoine.—In this prose romance the soldan of Babylon sends his three sons to seek their fortune at sea. One of them, Broadas, occupies Galicia and kills King Thibor, whose young son Pontus with the other children is sent off in a boat to France. They are wrecked off the coast of Brittany, and the story proceeds very much as in the poem of *Horn*. Nearly all the names are changed, however, and there are additional knightly episodes. The romance was first printed at Lyons about 1480. A German translation appeared at Augsburg in 1483, and an English version was printed by Wynkyn de Worde in 1511.

The Anglo-Danish cycle of romance, by reason of its origin and type of adventures, may be fitly supplemented by the stories, eminently English in character, although furnished with an Anglo-Norman setting, which have been called "outlaw romances."

Tales of outlaws form a considerable portion of English fiction, and, as elsewhere, the same incidents occur over and over again, being always attributed to the favourite hero of the day. The oldest was that of Hereward the Saxon, whose exploits against William were renowned in prose and verse soon after his own time. Most of the outlaw stories remain in ballad form; a prose example is the French *Fulk Fitzwarin* (about 1320), descriptive of outlaw life in the Welsh marches and other parts of England, Spain, &c.,—an embellished record of actual events from 1201 to 1203. We learn that Payn Peverel, having overcome a devil that tenanted the body of a Cornish giant, Geomagog, who haunts a ruined British village in Shropshire, builds a castle near the place with the assistance of his kinsfolk. A certain Melette Peverel marries Warin de Meez, and their son Fulk Fitzwarin is himself the father of five sons, who go through scenes many of which are obviously suggested by the Charlemagne *chansons*, such as the fatal chess-board quarrel, the taunting of Ogier by Roland, &c. The five brothers are outlawed and seek adventures. One of their followers, John de Rampayne, resembles Friar Tuck in his skill in playing, singing, and the use of the quarterstaff. The story ends with the submission and pardon of Fulk, the eldest of the brothers, the death of his wife Mahaud, his marriage with Clarice de Auberville, and his subsequent blindness,—all real historical events. It was the first wife of Fulk who became a personage as Maid Marian in the Robin Hood stories and in the plays of Munday and Chettle. The romance was first published by Francisque Michel in 1840, by T. Wright in 1855 (Warton Club), and at the end of *Ralph de Coggeshall* (Rolls Series, 1875).

Robin Hood.

The exploits of the earlier outlaws, Hereward and Fulk Fitzwarin, reappear under the name of Robin Hood (*q.v.*). The extensive ballad literature relating to the last and his companions Maid Marian, Friar Tuck, Little John, &c., needs only a passing reference. The *Life of Robin Hood*, a prose rendering of the *Geste of Robyn Hode* (Wynkyn de Worde, *c.* 1495), is reproduced by W. J. Thoms in his *Early Eng. Prose Romances*, 1858.

One of the most popular stories connected with the Robin Hood cycle is *Gamelyn* (*c.* 1340), sometimes inserted among Chaucer's *Canterbury Tales*. Here three sons are left equal shares in their father's property,—Gamelyn, the youngest, being under the charge of the eldest, John, who neglects him. At the age of sixteen he gains a ram at a wrestling match and invites the spectators home. After the guests retire John and Gamelyn quarrel. The latter is imprisoned, but released by Adam the Spencer, an old servant, and the two escape together. Gamelyn is made king of the outlaws and John becomes sheriff. Gamelyn is captured, but is bailed out by his other brother, Ote. Finally, John is hanged by Gamelyn. The tale was used by T. Lodge for *Rosalynde* (1590) and dramatized by Shakespeare in *As You Like It* (ed. W. W. Skeat, 1884).

(e) *Unaffiliated Romances.*

Unaffil ated ro mances

The works of this class are of less importance than those which belong to the great cycles; for, indeed, there are few which have not been drawn somehow into one or other of these last. Amongst the most striking we have *Pierre de Provence et la Belle Maguelonne*, a story of love, adventure, and magic, which existed in Provençal verse at the end of the 12th century, but was first compiled in French prose in 1457 (the text being printed at Lyons about 1478). It was very popular in Spain, and a Spanish translation appeared as a quarto volume at Toledo in 1526.—A similar romance is *Paris et Vienne*, belonging apparently to the first half of the 15th century; the first edition was printed at Antwerp, by Gerard Leeuw, in 1487, five years after the appearance of an Italian translation (Treviso, 1482), and two years after Caxton had issued an English version (Westminster, 1485).—Another French romance (better corresponding to the modern use of the word) is *Jean de Paris* (Paris, *c.* 1535), written by Pierre de la Sippade (1490-1500). It is a pleasant fiction, full of disguises and surprises like the works of G. P. R. James, and may be compared with *Le petit Jehan de Saintré* (Paris, 1517), written by Antoine de la Sale about 1470, in which we find a true picture of the manners of the French court in the first half of the 15th century.—The *Trois Filz de Roys* is a heavy and dull romance written in Flanders late in the 15th century.—A work of far superior order is *Tirant lo Blanch*, written in the Valencian language in the 15th century by Joannot Martorell. This was printed, with the fourth book added after the author's death, at Valencia in 1490, and has the honour of being the first romance which came from the Spanish press. The author professes to derive his stories from English sources, but he seems to be indebted only to *Guy of Warwick* for some of his situations and the names of the English localities in which his scenes are laid. Three other Spanish romances may be mentioned here. Though the earliest printed edition of *Oliveros y Artus* is in French, the work (printed in Spanish at Burgos in 1499) is undoubtedly of Spanish origin. It has been popular in all languages. An English version came from the press of Wynkyn de Worde in 1518. *Felix Marte de Hyrcania* (Valladolid, 1556), by Melchor Ortega, is chiefly remarkable as having been read by Dr Samuel Johnson, who is likely to have been the only person since the 16th century capable of such a feat. The *Guerras de Granada* (1595-1619) of Perez de Hita contains some of the finest ballads in the language, and is an interesting and well-written fiction. The first (and best) part deals with the reign of the last Moorish king of Granada, and the second part relates the final ruin of the Moors in Philip III.'s reign.—Another favourite fiction in many lands is that in which a chaste wife is wrongfully accused of infidelity and punished. The character even appears among the earliest ballads of the Charlemagne cycle (*La reine Sibelle*); but here we have to mention three distinct narratives which have attracted generations of readers, and which are widely known from their adoption by many writers. These are *Patient Grizel* (*Griseldis*), *Genevieve of Brabant*, and *La belle Hélène*. The story in each is similar, and the plot or some of the incidents may be traced in the *Lai del Fresne* of Marie de France (*c.* 1220), in the Latin legendary history of St Geneviève (written about 1272), in several old monkish lives of St Helena of Constantinople, in the late romances of *Valentine and Orson*, *Florent et Lyon*, and other stories,—the heroine being variously described as the Chaste Empress, the Chaste Queen, or the Chaste Duchess. The most celebrated of these stories is that of Griseldis. She is said to have been the wife of Walter, marquis of Saluces or Saluzzo, in the 11th century, and her misfortunes were considered to belong to actual history when they were handled by Boccaccio and Petrarch, although the probability is that Boccaccio borrowed his narrative from a Provençal *fabliau*. He included it in the recitations of the tenth day (*Decamerone*), and must have written it about 1350. Petrarch Latinized it in 1373, and his translation formed the basis of much of the later literature. These works, however, really belong to a different class from that treated here, and may be referred to popular tales, like the narratives which have been repeated in many forms and in many lands from the time of Bidpai downwards. The prose French romance, *La Patience de Griselidis* (Bréhan-Loudéac, 1484), was derived from Petrarch, as also Chaucer's narrative in the *Canterbury Tales*, and the Elizabethan drama in which Dekker was a collaborateur.—The *De Duobus Amantibus* (or *Evrialus and Lucretia*) of Æneas Sylvius is usually included amongst romances, but it is rather an historical novel based upon the imperial court gossip of his own day.—The Spanish *Carcel de Amor*, composed about 1480-90 by Diego de San Pedro, is also a novel; the famous or infamous *Celestina* is a drama of surpassing vigour and interest; and the pastoral romances of *Diana*, *Pastor Fido*, and *Arcadia* belong to a different class from that of mediæval romance.—As much may be said of the English romances produced in the 16th and the earlier part of the 17th century, which are chiefly weak novelistic imitations of the later adjuncts to *Amadis* and *Palmerin*.—The *Seven Champions of Christendom* is a popular tale.—The *Romance of the Fox* (*Reynard the Fox*) and the *Roman de la Rose* likewise belong to totally distinct orders of literature, the former to that of tales (*Volksbücher*) and the latter to the large class of allegorical poems.—The Norman stories of *Robert the Devil* and *Robert of Sicily* are also popular tales.

III. MODERN ROMANCE TO THE 17TH CENTURY.

The inspiration of mediæval romance is gone; but it is necessary briefly to trace its final reflexions to the close of the 17th century, when prose fiction began to assume more definitely the character of the modern novel.

We have seen how large a place in the history of romances is occupied by France down to the end of the 16th century. We first meet with the so-called "pastoral romance" in French in *L'Astrée* (1612) of Honoré d'Urfé, an enormous work inspired by Montemayor, which, however, La Rochefoucauld found interesting. It was frequently reprinted and had many continuations and imitations. Camus de Pontcarré wrote in opposition religious pastorals such as *Palombe*. To the same class belong *Floris et Cléonthe* (1613) by Moulinet du Parc, *Les Bergeries de Vesper* (1618) by G. Coste, *Chrysérionte de Gaule* (1620) by De Sonan, *Le Courtisan Solitaire* (1622) by J. Lourdelot, *Le Mélante* (1624) by L. Videl, *L'Endimion* (1624) by J. Ogier de Gombauld, *Cléomèdes et Sophonisbe* (1627) by De Gerzan, *Le Berger Extravagant* (1627) by Ch. Sorel, *Anaxandre et Orazie* (1629) by Boisrobert, *Ariane* (1632) and *Roxane* (1639) by J. Des Marets. Le Roy de Gomberville led the way to the new school of French romance in *Polexandre* (1632-39) and *La Cythérée* (1640-42), which were the models for the still more ponderous productions of La Calprenede and De Scudéry. *La jeune Alcidiane* (1651), an unfinished continuation of *Polexandre*, was completed by Mademoiselle M. A. Gomez. These form a link between the genuine romance of chivalry and the so-called heroic style. We still meet with giants and extravagant exploits. The adventures with pirates and the sea scenes show the influence of translations of Greek novels. Madeleine de Scudéry produced her romances under the name of her eccentric brother Georges, but the authorship was well known. The first to appear was *Ibrahim, ou l'Illustre Bassa* (1641); then the work for which she is best known, *Artamène, ou le Grand Cyrus* (10 vols., 1649-53); *Clélie, histoire romaine* (10 vols., 1650-53), contains the famous "carte du pays de Tendre"; then came *Almahide, ou l'Esclave Reyne* (1660), *Les Femmes Illustres* (1665), and *La Promenade de Versailles* (1669). One of the causes of her great popularity was her representation of living characters under flimsy disguise. Keys to *Le Grand Cyrus* have been published. Gauthier de Costes, chevalier de la Calprenède, wrote *Cassandre* (1642-50); *Cléopâtre* (12 vols., 1647-58), the best of his works, which contains the character of Juba satirized by Boileau; *Faramond* (12 vols., 1661-70), continued by Pierre Dortigue de Vaumorière; and *Les Nouvelles* (1661). In spite of their appalling length and their tedious conversations and descriptions, La Calprenède's romances are not without merit. The author has imagination, and his heroes have a share of the noble sentiments of their predecessors. *Bérénice* (1648) by J. R. de Segrais, *La Précieuse* (1656-58) by Mich. de Pure, *Histoire du Temps* (1654) and *Marcarise* (1664), both by Hédelin, and the mystical romances of the Jesuit Ceriziers, belong to the same school. Nearly all the familiar machinery of the old romances is now absent; we no longer meet with dragons, necromancers, giants, and enchanted castles. Formerly love was secondary to heroic achievement; now it becomes the ruling passion, and knightly deeds are performed only to excite the applauding smile of a mistress and not for the sake of military glory. The jargon of gallantry used in these fictions exercised an evil influence upon contemporary literature, until it was laughed out of existence by the *Précieuses Ridicules* of Molière and the dialogue of Boileau on *Les Héros de Roman*. Such works as *Marie Stuart* (1675) by P. Le Pesant de Boisguilbert, *Nouvelles d'Élisabeth* (1680), and *Frédéric de Sicile* (1680) are a connecting link between the romance of De Scudéry and the modern historical novel.

After the invention of printing England produced few original contributions to the literature of chivalric romance. There was a large number of translations of the old French works, and, in addition to these, a rich store of romantic ballads, which formed the customary literature of the people. The yeoman and the outlaw had succeeded the steel-clad knight in public favour. Robin Hood and his merry men appealed to a wider range of sympathies than did Arthur and his companions, and such tales as the *Exploits of Robin Hood*, *Tom a Lincoln*, *George a Green the Pinder of Wakefield*, and *Thomas of Reading* retained their vogue in abbreviated shape as chapbooks down to the end of the 18th century. The stage monopolized the chief forces of imaginative narration during the Elizabethan and Jacobean periods, and the next specimen of a native romance is to be found in the *Euphues* (1579-80) of John Lyly, who drew largely from Spanish sources. Euphuism gave rise to the *Philotimus* (1583) of Brian Melbanck, to Lodge's *Rosalynde* (1590), to Greene's *Dorastus and Fawnia* (1588), which was the foundation of Shakespeare's *Winter's Tale*, and to *Philomela* (1592) by the same writer. Sir Philip Sidney's *The Countess of Pembroke's Arcadia*, which appeared in 1590, after the author's death, is the most brilliant prose fiction in English of the century, and a genuine pastoral and heroic romance. We should not forget *Parismus, Prince of Bohemia* (1598), based upon Palmerin de Oliva, and *Ornatus and Artesia* (1607), both by Emanuel Ford; *Pheander, a Maiden Knight* (1595), by Henry Roberts; and *The Miseries of Malvillia* (1606), by Breton. Such compilations as Painter's *Palace of Pleasure* (1566), Whetstone's *Heptameron* (1582), *Westward for Smelts* (1620), and Goulart's *Admirable Histories* (1607) are composed of translations or imitations of Italian and French tales. Boccaccio, Giraldi Cinthio, Apuleius, Heliodorus, and Montemayor appeared in English in the latter half of the 16th century, and to the laborious Munday we owe versions of *Amadis* (1592) and *Palmerin of England* (1602) through the French. In the 17th century La Calprenède, Scudéry, Gombauld, and other romancists were translated, and Mrs. Behn, Lee, Lord Orrery, Settle, Banks, and Dryden adapted their works for the stage. Barclay's *Argenis*, a politico-heroic romance with characters representative of real and historical personages, first came out in Latin in 1622; Bishop Hall's *Mundus alter et idem* (1607) is an imitation of Rabelais. *Eliana* (1661) is a caricature of all the absurdities of the contemporary French school. The last of the English romances is the *Parthenissa* (1665) of Roger Boyle, earl of Orrery, which, although prolix and incongruous, has literary merit and a certain narrative interest.

The last of the Spanish romances is *Policisne de Boecia* (1602) by Juan de Silva. They received their death-blow in Spain at the hands of *Don Quixote* in 1605, and even those of the greatest merit and popularity almost entirely ceased to be reprinted after that date. Although the pastoral romance of *Diana* (1560) by Montemayor does not really belong to the present subject, it should be mentioned as forming a distinct school of fiction with a family of successors scarcely less numerous than the lineage of Amadis. It was continued by Gil Polo, and in it, as in the *Galatea* (1584) of Cervantes, figure real persons and incidents. The earliest representative of the *picaresque* tale is to be found in *Lazarillo de Tormes* (1554).

The heroic romance never became thoroughly naturalized in Portugal, and the narrative class chiefly found its way through Spain. The romancists Rodriguez Lobo, Eloi de Sá Sotomayor, and Pires de Rebello may be mentioned. The *Menina e Moça* (1554) of Bernardim Ribeiro is the earliest specimen of the pastoral style in the Portuguese language.

Although the *Pastoralia* of Longus is to be considered as the remote prototype of the modern works, *Arcadia* (1502), the Italian poem of Sannazaro, undoubtedly influenced the *Diana* of Montemayor, and through it inspired the *Arcadia* of Sir Philip Sidney. A few translations and weak imitations of foreign romances were printed in Italy in the 16th and 17th centuries, but *novelle* or short tales formed the staple of the national prose fiction during that period.

French romance—translations of *Amadis* in the 16th and the writings of Mademoiselle de Scudéry and her compeers in the 17th century—exercised a supreme influence in Germany, where the pastoral romance was represented by innumerable "Schäfereien." *Herkules und Valisca* (1659) of A. H. Bucholz is a specimen of the voluminous and tiresome heroic romance of the period. *Simplicissimus* (1669) by Hans Jakob von Grimmelshausen, in which the hero traverses the scenes of the Thirty Years' War, is less a romance than the first national novel. C. W. Hagdorn's *Acquan, oder der grosse Mogul* (1670) is an adaptation of La Calprenède's *Cassandre*, and E. W. Happel's *Der insulanische Mandorell* (1682) is a kind of foreshadowing of *Robinson Crusoe*. Two of the most admired fictions of the time were the *Asiatische Banise* (1688) of H. Anselm von Ziegler und Klipphausen and the *Arminius und Thusnelda* (1689) of D. K. von Lohenstein. Historical tales and love stories were the chief favourites at the end of the 17th and "Robinsonaden" or imitations of Defoe in the second quarter of the 18th century.

In Holland the French heroic school was mirrored in the works of Johan van Heemskerk, Hendrik Zoeteboom, and Lambertus Bos, published in the middle of the 17th century.

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ROMANCE LANGUAGES is the name generally adopted for the modern languages descended from the old Roman or Latin tongue, acted upon by inner decay or growth, by dialectic variety, and by outward influence, more or less marked, of all the foreign nations with which it came into contact. During the Middle Ages the old Roman empire or the Latin-speaking world was called Romania, its inhabitants Romani (adj. *Romanicus*), and its speech Romancium, Vulgar Romancio, Italian Romanzo, from *Romanice loqui* = to speak Romance; in Old French nominative *romanz*, objective *roman(t)*, Modern French *roman*, "a novel," originally a composition in the vulgar tongue. In English some moderns use Romanic (like Germanic, Teutonic) instead of Romance; some say Neo-Latin, which is frequently used by Romance-speaking scholars. By successive changes Latin, a synthetical language, rich in inflexions, was transformed into several cognate analytical tongues of few inflexions, most of the old forms being replaced by separate form-words. As the literary language of the ancient Roman civilization died out, seemingly extinguished by the barbarism of the Middle Ages, all the forms of the old classical language being confounded in the most hopeless chaos, suddenly new, vigorous, and beautiful tongues sprang forth, ruled by the most regular laws, related to, yet different from, Latin. How was this wonderful change brought about? How can chaos produce regularity? The explanation of this mystery has been given by Diez, the great founder of Romance philology. The Romance languages did not spring from literary classical Latin, but from popular Latin, which, like every living speech, had its own laws, not subject to the changing literary fashions, but only to the slow process of phonetic change and dialectic variety. It is wonderful how like the very oldest archaic Latin is to the youngest, Modern Romance. A great number of old sounds, forms, and expressions, which were discarded or disused by classical Latin, reappear in late vulgar Latin, and live on in the modern languages. Here especially the words of Horace come true:

> "Multa renascentur, quae jam cecidere. cadentque
> Quae nunc sunt in honore vocabula, si volet usus,
> Quem penes arbitrium est et jus et norma loquendi."

The present article, embracing all the Romance languages, dwells chiefly on their common origin and formation. Much of their general history has been treated under LATIN; only some points, especially phonetic, which need a fuller discussion, are taken up again here.

We will now briefly review the fate of popular Latin through its successive stages, showing everywhere the earliest appearance of the germs of Modern Romance.

I. *First (Pre-Classical) Period: to c.* 80 B.C. (*Cicero*).

Latin dialects

Latin, like all other literary languages, began as a living popular speech. There was during this first period practically little difference between the vulgar and the literary language. In the oldest historical time Latin was spoken only in the small territory called Latium. The greater part of Italy proper was occupied by the Umbro-Oscan tribes, whose languages were Italic, related to Latin, yet so different as to be unintelligible to the Romans. The two most distinct types were Umbrian in the north and Oscan in the south. The chief difference between them is that Umbrian was in a much more advanced state of phonetic decay, and was in many respects a precursor of Italian and Romance, while Oscan was still more antique than Latin. When the territories where these dialects were spoken became subject to the Romans, about the beginning of the 3d century B.C., the language of the conquerors was introduced, but of course modified by the speech of the conquered. Thus two groups of provincial dialects[1] were formed. (1) The North or Umbrian and Sabellian Latin, with which Etruscan Latin was closely connected, was peculiarly important, since it spread southwards and extended to the neighbourhood of Rome; thus Falerii, Præneste, and Tusculum spoke it. Later it spread to Northern Italy. Being really a fuller development of the tendencies of the old popular Latin and easier to pronounce than literary Latin, at last from the surrounding peasantry it reached the people of Rome and became the source of the modern tongues. (2) The South or Oscan Latin was Latin with some slight phonetic modifications, which, in Modern South Italian, have lived through the levelling influence of the north dialect. Between the Umbrians and the Oscans lay the Sabellians, occupying linguistically as geographically a middle position, yet somewhat nearer to the north dialect than to the south. To the west of Umbria lay the mysterious Etruria, whose language, preserved in numerous inscriptions, has long been an unsolved riddle and is still a matter of dispute, some considering it as utterly unconnected with Italic or even Aryan, some, as Deecke and Sophus Bugge, thinking it Aryan, intermediate between Greek and Italic, but partly decayed. In the last respect it has much in common with Umbrian, but its tendency to a rapid and slovenly utterance is still more distinctly traceable than in Umbrian.

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[1] The Latin dialects have been investigated by K. Sittl, *Die lokalen Verschiedenheiten der lateinischen Sprache*, Erlangen, 1882. On Latin sounds generally see Seelmann, *Die Aussprache des Latein*, Heilbronn, 1885. Both these books, however, must be used with caution. Sittl has the merit of having traced the relations of North Latin, but has many rash assertions; see *Zeitschr. f. rom. Phil.*, vi. 603 *sq.* Seelmann is superior to Corssen as a phonetician, but is often obscure and given to elaborating strange theories. Thus he arrives at the absurd conclusion that the differences of quantity did not exist in the classical age, but that the poets judged of quantity by the close or open sound of the vowel.

Of the other languages spoken in old Italy, such as Messapian, Celtic, Venetian, and Ligurian, too little is known to enable us to form an estimate of their phonetic character; but in general we see the peculiarities of North Latin penetrating more or less everywhere, in the north of Italy and in Spain (subjected at the end of the 3d century B.C.), as well as in Gaul, of which the southern part, Provincia (later Provence), was subjected first, and the rest, by Cæsar, in the 1st century B.C. All these countries were rapidly Latinized; but the provincial dialects did not always follow the phonetic development of the mother speech, just as American does not always follow the changes of English.

Old Popular Latin.

Consonants. *A. Phonetics.* 1. Final consonants, especially *s*,[1] *m*, partly *t*, *d*, *r*, were feebly pronounced and often dropped in writing: *s* in nominatives, as *Cornelio* (T. Scip.),[2]—even Ennius wrote *certissimu' nuntiu' mortis*; gen. *Scipione* filios (T. Scip.); acc. *viro'* nostros (Plaut.). In verse *s* was not counted in the metre till the manhood of Cicero, who, though he had himself followed the earlier use in his youth, calls it "subrusticum," which shows that it continued in the country. This agrees with Umbrian, where *s* was often dropped, as Ikuvinu[3] Iguvini (nom. plur.), *agre* agri (gen.), &c.; with North Latin, as *matrona Pisaurese* (nom. plur.; at Pisaurum); *maxomo* maximus, *zenatuo* (gen. at Falerii) = Old Lat. senatuos; *militare* (nom.; at Tusculum) looks quite Italian. *M* was often dropped, as in the well-known *honc oino duonoro optumo fuise viro* (T. Scip.). It was, by the express statement of Quintilian, obscurely pronounced (see LATIN), and must have been very loosely articulated, the lips probably only approaching, not closing, much like Polish *Dąbrowski* (Dombrowski), which gives a sound between a feeble *m* and a nasal vowel. In Umbrian this dropping of the *m* is frequent, as *poplo* for populum, and in Faliscan *sacru*, *datu*. *T*, on the contrary, was generally retained in Old Latin, but frequently dropped in Umbrian, as ḍeḍe dedit, *habe* habet, habia habeat; likewise in North Latin, as *dede* dedit, *dedro* and *dedrot* for dederunt (T. Pis.); *dede* (Tibur); *cupa* and *cupat* for cubat (Fal.). Sometimes *d* was used, as *fecid* (Præneste), in Osc. *fefacid*, *deded*. In the perfects, however, *d* is perhaps the older sound. *D* is the final consonant that was first dropped, as in *in altod marid* (Col. Rostr.), a *Gnaivod patre*, but also *longā vitā* (T. Scip)., later frequently. *Pate(r)*, *soro(r)*. *colo(r)*, occur in Plautus with *r* dropped or slightly pronounced (not counted in the metre); in *pate(r)* venit (Terence; see LATIN); in Fal. *uxo*, *mate*; in Æquian *uxo*; and in Ital. *frate*, *suora*, *moglie*. *N* was dropped in *tame(n)* suspicor (Ter.); Umb. *nome* and numem, pointing perhaps to a weak nasal vowel; Ital. *nome*.

2. *D* after vowels sometimes became *r*, as *ar* ad, *arvorsum* adversum, *arfuise*, *arger* agger,—rustic *ar* me advenias (Plaut., *Truc.*, ii. 2); it was retained in classical Latin in *arbiter*, *arcesso*, *meridies*. In Old Umbrian *d* constantly changes to a peculiar sound, here transcribed ḍ, in Later Umbrian spelt *rs*, as aḍ, *ars* ad, *petur-pursus* quadrupedibus, *dupursus* bipedibus. This sound appears to be only a less trilled variety of the Roman sound. In some few instances this old *r* reappears later, as in Mediæval Lat. *armessarius* (Lex Salica), in Roum. *armęsariu*, Ital. *árgine*, Ven. *árzare*, Span. *árcen* = Lat. arger (agger). In Modern South Italian *r* for *d* is quite common, as Neap. *rurece*, Sicil. *durici* = Ital. dòdici, Lat. duodecim.

3. *Z* for *s* is found in some unintelligible fragments of the *Carmen Saliare*, mentioned by Varro (*L.L.*, vii. 26), but in the text he says that the ancients used *s* for *r*. *Coz(ano)*, but also *Cosano*, is found on two old coins from Cosa, though here *z* may be due to Oscan influence. On the other hand, *veter*, *quirquir*, were found in the ancient augural books, perhaps Etruscan Latin(?). But the ordinary form of Old Latin was *s*, as in *asa*, *honos*, *honosis*, *flosem*, *Lases*, *Fusius*, *Papisius*, *Valesius*. Not *z*, but *s* or *ss* was used to render Greek ζ,—*Saguntum*, *comissor*, *massa*; in this last word (Fr. *masse*) the present pronunciation still testifies to the old voiceless sound. Thus the whole theory of the ancient Latin *z* becomes somewhat doubtful; yet it is probable that it existed in the oldest prehistoric Latin, and that forms like **easum resum* were pronounced with *z*, like the Osc. *eizazunc egmazum* (same meaning). Later on *s* (*z*) passed into *r*, following in this the Umb. urnasiaru, *pracatarum*, &c. In most words Latin now got *r*, even in some where Umbrian retained *s*; comp. Lat. *ara* with Umb. *asa*, Lat. *plenarius*, *ordinarius* with Umb. plenasier, urnasier. In Lat. *nasus*—*nares* the relation must be somewhat like that in A.S. *ceósan*, *ceás*—*curon*, *gecoren* (choose, chose, chosen), probably owing to an original difference of accent. In many cases where Latin retained *s* it was originally double, as in *caussa*, *cassus* (= cadtus), thus spelt by Cicero and Virgil (Quint., i. 7, 20); *formonsus* and *formossus*; this is the reason why Italian has always *s* hard (voiceless) in *cosa* (Ven. *cossa*), *doloroso*, &c., as Ascoli has shown. Thus, every *z* or voiced *s* having passed into *r*, the sound *z* must have disappeared from the language, and it was only much later that it was reintroduced. The sound of *z* seems to be especially at home on Celtic ground; the voiceless sound still exists in the south of Italy (Rome, Naples, Sicily) and of Spain. The English pronunciation of Latin words like *morose*, *jocose*, and of Greek words like *dosis*, *crisis*, is probably due to ancient tradition.

4. *N* was often dropped before *s*, as *cosol* consol, *cesor* censor, *cosentiont* (T. Scip.), *mo(n)strare*, *Mostellaria* (Plaut.); even *festram* for *fenestram* (*fen'stram*; Ennius); *Allicsis* dies dicebatur (Fest.); *meses* (inscr. Neap.), &c.; nearly always *formossus*, *formōsus* for *formonsus* (see 3). This agrees with Umb. *Eikrasese* and N. Lat. *Pisaurese*, Pomp. *castresis*, *pesa*, and reappears in Ital. *Milanese*, *Genovese*, *mese*, *pesare*, Fr. *mois*, *peser*. In Latin *n* generally did not quite disappear, but was feebly pronounced, very like French *n* in *penser*, or probably still more like the Polish nasal vowel in *mięso*, "flesh," *gęś*, "goose," half vowel, half consonant. By this partial absorption of *n* the preceding vowel was lengthened, *cōⁿsol*. Cicero expressly mentions *īnsanus*, Gellius *pēnsito*, the grammarians *mōns*, *mēns*, *gēns*. The same was the case before *f*, as *īnfelix* mentioned by Cicero; *n* sometimes dropped before *v*, *coventionid* (Bacch., 187 B.C.); comp. Umb. kuveitu convehito, kuvertu convertito, Fr. *couvent*, Eng. *covent*, *covenant*. *N* is rarely dropped before *t* and *d* except in N. Lat. *dedro(t)* (T. Pis.); but this does not count, as the *t* was mute. Cicero testifies to *īndoctus*, which proves the full sound of *n*. The spellings *tamtam*, *sentemtiam*, *damda*, *tuemdam*, &c., of the Lex Julia (45 B.C.) are probably only analogical from *eumdem*, *eamdem*, &c., pronounced *n*. *M* disappears in *Poponi*, *Seproni*, but perhaps only apparently, as Priscian tells us that medial *m*, as in *umbra*, had a middling force, not the obscure sound of final *m*. In most old spellings, as in the Scandinavian Runes, we frequently find nasals dropped before corresponding "mutes" or stops, where there is no suspicion of an obscured sound, *e.g.*, in Run. LAT for *land* the nasal is simply understood. Likewise in Umbrian the older ustetu is shown by the Latin spelling to mean *ostendu*, &c. In Modern Romance only Celtic districts have produced nasal vowels.

5. *H* is sometimes dropped from the 2d century B.C. downwards—"Parcissime ea [*H* littera] veteres usi etiam in vocalibus, quum *oedos* [read *aedos*] *ircosque* dicebant" (Quint., i. 5, 20); "in Latio rure *edus*, in urbe *aedus*" (Varro), for *haedus* = Goth. *gaits*, "goat"; likewise *olera*, *asta* (Varro); in Marsian Lat. *Irtius* for *Hirtius*, *Ostilius*; comp. Umb. eretu = *heritu* "velit." *H* must have had a rather feeble sound, something like French *h aspirée*.

6. *Rs* is found assimilated in *russum* (*rūsum*), *sussum* (*sūsum*), &c., in MSS. of Plautus and Cato, and in some inscriptions, always in *prōsa* (but *prorsus*) and *cēna*, Umb. çersnatur "cenati," *dossuarius* (Varro); "sic et *dossum* per duo *s* . . . quidam ut levius enuntiaverunt" (Vel. Long.). Comp. Umb. *Tursce*, *Tuscom* "Tuscum"; Ligurian Lat. *suso* (bronze tablet near Genoa, 117 B.C.). But this assimilation was never carried out consistently; we have L. Lat. *susum et jusum* (sursum et deorsum), Ital. *su e giù*, older *suso e giuso*; *dosso*, but *corso*, *verso*, *orso* (ursus), Fr. *ours*, Span. *oso*.

7. *I* was doubled between vowels, as in "antiqui *maiius*," which Priscian distinctly explains to have been pronounced with the sound of *i* consonant (Eng. *y* in *you*), and "*Pompeiii* ut si dicas *Pompelli*." Cicero spelt *aiio*, *Maiium*; "quod si est, etiam jungetur [*i*] ut consonans" (Quint., i. 4, 11). Comp. also Osc. *Pompaiians*. Out of the older and popular *majjus*, *pejjus* grew Ital. *maggio*, *peggio*, whereas classical Latin had *mājus*, *pējus*. For *filius* = *filjus*, see 23 below, p. 664.

8. *V* occurs in Old Lat. *perplovere* perpluere (comp. *pluvia*),

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[1] There is nothing to prove that this *s* was voiced, like Eng. *z*; probably it was voiceless and weakly articulated, much the same as in Andalusian *lo(h) padre*, for Span. *los padres*, "the parents."

[2] Abbreviations—*T. Scip.*, Tituli (Elogia) Scipionum; *Col. Rostr.*, Columna Rostrata; *Bacch.*, Epistola Consolum de Bacchanalibus; *T. Pis.*, Tituli Pisaurenses; *L. Lat.*, Low or Late Latin; * before a word means hypothetical.

[3] Spaced letters signify the inscriptions in the national character, generally supposed to be older; italics mean the inscriptions in Roman letters, supposed to be younger.

conflovont (comp. *floviom*; *fluvidus*, Lucretius), *sovo*, *suvo*, suo, *ingenuvae*, *cloracas*. Comp. Umb. tover and *tuer*, tui; Osc. *suvad*, &c. It reappears in Petronius, urceatim *plovebat*, and in Ital. *piovere*, *rovina*, *védova*, *Gènova*, *Mántova*, *chiávica*, Span. *llovér*, Fr. *pleuvoir*.

9. In *qu* the *u* after *q* was only a lip glide, defined by the grammarians as "neither vowel nor consonant," as it did not count in the metre. It was therefore easily dropped altogether, as in *Cinti* for Quincti in an old inscription. This was especially peculiar to Etruscan Latin, as in the very old *Aecetiai* Aequitiae, *Tarcna*, Etrus. *Tarχnas*, Tarquinius. Instances occur later everywhere, as *cocus* for *coquus*, *cottidie* (Lex Julia), &c.; L. Lat. *cinque*, *cinquaginta* (Edict. Diocl., 301); Ital. *chi* qui, *che* quid, *cuocere* coquere, *cucina*=vulg. Lat. coquina (=culina), *cinque*, &c. But generally Italian retains *qu* with the old sound, *quinto*, *quanto*, Span. *cuanto*, but *que*, *quinto* (=*k*), Fr. *qu*=*k*.

10. The Old Romans, having no aspirates in their own speech, could not pronounce the Greek ϕ, χ, θ, but generally turned them into *p*, *c*, *t*, as *Pilippus* Φίλιππος, *Prune* Φρύνη, *colapus*, *Bacanal*. In some words the old popular pronunciation continued later, as class. *ampulla*, *purpura*; Silver Age, *percolopabant* (Petron.); Mediæval, *colopus*, *colpus*, Ital. *colpo*, Fr. *coup*; *spaera*, Old Ital. *spera* (Dante), Early Eng. *spere* (Chaucer), vulg. Eng. *spear*, "sphere"; *Josepus*, Ital. *Giuseppe*; *Stepanus*, Span. *Estéban*, Slav. *Stepan*.

11. Greek initial π was often rendered *b*, as *Burrus* Πυρρός, also adj., "*burrum* antiqui quod nunc dicimus rufum" (Fest.); hence, through *bur(r)eus*, Ital. *bujo*, "dark"; likewise *buxus* πυξός, Ital. *busso*, *bosso*, Fr. *buis*, "box tree"; from πυξίς, class. *pyxis*, popular and L. Lat. *buxis*, *buxida*, Fr. *boîte*.

12. *F* after vowels is rare in Latin, but frequent in Umbro-Oscan, as Umb. *prufe* probe, Osc. *amprufid* improbe, *Safinim* Samnium (*Sabinium), corresponding in cognate words to Greek aspirates where Latin commonly had *b*: Lat. *vafer*, "sly," orig. "varius"; comp. *vabrum* "varium" (Gloss. Isid.), Umb. vufru. The relation between Lat. *rufus*, Umb. rofu and Lat. *ruber* is very like that between *nasus* and *nares*, or that between *veho* and *lingo*, *ligurio* as representing Gr. χ. We may suppose that *f* is the older and stronger common Italic form, sometimes retained in old popular Latin speech, partly by provincial influence. We find *sifilare* for *sibilare* mentioned as archaic by Nonius, as vulgar in the appendix to Probus, Ital. *zufolare*, Fr. *siffler*. *F* is preserved in many provincial names, as *Safinius* (Petron.) and *Tifernum*, Ital. *Tiferno*. We find this *f* again in the Italian *tafáno* tabanus, *búfolo* bubalus, Eng. buffalo. The Neapolitan *attrufe*, "October," has a very Oscan appearance.

Vowels. 13. Old Latin often prefers short *e*, especially original and unaccented, to *i*, as in *dedet*, *fuet* (T. Scip.), *cepet*, *refecet* (Col. Rostr.), *velet* (Bacch.), *Condetios* (inscr.), *acetare*=*agetare* (Fest.), *dubenus* dominus (Fest.), *componeto* (Cato), *genetrix*, *mereto*, *calecare* (inscr.), *famelia*, *magester* (Quint.). It stands for radical *i*, mostly orig. *e*, as in *en*, *endo*=Gr. ἐν, *semol* (Plaut.)—comp. Ital. insieme, Fr. ensemble; *Menerva* (inscr., and mentioned by Quintilian). Sometimes it stands even for original *i*, as *tempestatebus*, *aidiles* (T. Scip.), *navebos*, *navaled*, but *marid* (Col. Rostr.), *sei ques*, si quis (Bacch.). This is quite Umbrian; comp. kanetu canito, urfetam orbitam, fratreks "fratricus," *fuçefele*=L. Lat. *facibilis*, Old Fr. *fesible* feasible, famedias familiae (nom. plur.), kvēstretie quaestura, formed like Lat. *segnities*. In North Latin we find Etrus. Lat. *Aecetiai* Aequitiae; Umb. Lat. *Publece*, *menesterium* (T. Pis.), *Apolenei*, *dede*, *Nome(lia)*; Mars. *dedet*, *mereto*; and rustic "rustici etiam nunc quoque viam *veham* appellant" (Varro). *E*, being more subject to be obscured than *i*, is not unfrequently dropped, as in *cante* for *canete, class. *canite* (Carm. Sali.), *Numtoriai* (inscr. c. 290 B.C.), *oinvorsei* (Bacch.), *unversum* (Lucretius), *caldus* (Cato), *ardus*, *frigdaria* (Lucilius); always *fert*, *ferte*=φέρετε. Popular Latin here approached the North dialect, where such syncopes were constant: comp. Umb. *nomne* nomine, *termnu* termino, *postro* postero; they were still more violent in Etruscan, as *Elχsentre* Alexander, *Sehtmnal* Septimienâ nata, *Tarχnas* Tarquinius; Pis. Lat. *dedro(t)* dederunt, *Lebro* Liberum; Umb. Lat. *cedre* cedere, &c. South Latin, on the contrary, favoured *i* (see below).

14. Of long *i* Lucilius distinguishes two kinds—close (*i* tenue), as in *pīla*, "mortar," and open (*i* pingue), approaching to *e*, written *ei*, as in *peilum*, "spear," *meilia*, "thousands"; he might have added *feilius*, "son," comp. *fēlare*, θηλή. There was an original diphthong *ei*, as in *deicere*, Osc. *deicum*, Gr. δεικνύναι, which was early contracted into this middle sound, exactly like Eng. *ey* in *money* from Old Fr. *moneie*. This too is quite Umbrian, spelt *ei* and *ee*, *e*, as enetu inito, Arch. Lat. eneito, feliuf filios, *screihtor*, *screhto* scripti, *preve* privus, *Iovine*=*Ijovine*, Iguvini; comp. the datives *Juve patre*, *mehe*, *tefe* (tibi), Osc. *Diuvei*, *paterei*; also Umb. Lat. *fel*=filius, and Pis. *Lebro*. In North Latin datives in *e* are generally constant (*Apolenei*, Pis., uncontracted), as *Junone matre*, *Jove*, *patre*, *Marte*, &c., extending sometimes even farther south; and Gallo-Lat. *nise* (Lex Rubr. de Gall. Cisalp.). Livy used *sibe* and *quase* (originally -*ei*). This exactly agrees with the rustic pronunciation *vēlla*, *spēca* recorded by Varro, *lēber* by Festus—"ab antiquis et *ameci* et *amecae* per *e* litteram efferebantur" (Fest.). And this again surprisingly agrees with the Modern Emilian (Romagnuòlo) pronunciation, as Bolognese *méga* mica, *dég* dico, *méll* mille, plur. *méla*=Ital. mila, *véta* vita, *maré* marito, *prém* primo. Thus this old rustic sound seems to have extended northwards, but later to have been driven from its old home by the classic close *i*, which penetrated everywhere else, and is generally represented in all the Romance languages.

15. Old Latin often prefers short *o*, especially original and unaccented, to *u*, as in *consol* (T. Scip.), *tabola* (Bacch.), *pocolom* (many old inscr.), *popolum* (Tab. Bantina), *epistola*=ἐπιστολή, *Patricoles*, *Hercoles*, *colpa* (Prisc.), *Volcanom* (inscr. 3d century B.C.), *volgo* and *volt*, &c. (Plaut.; *o* after *v* continued in the classical age), *sont* sunt, *cosentiont* (T. Scip.), *devontiari* (Tab. Bant.); in terminations—*Venos*, *opos*, *robose*, *filios*, and *Luciom*, &c. (T. Scip.); in Umb. acc. *poplo*, *salvo*, *tertio*; even for orig. *u*—*useriato est*, observatum ibit; radical—*molta* multa, "fine," *onse* (h)umero, Ital. *ómero*, Span. *ombro*, *somo* summo (orig. supmo), Ital. *sommo*; in North Latin *moltaticod* (T. Picen.); in Fal. *maxomo*, *zenatuo*; and in Ligurian Latin *floviom*, *infumo*, *suso* (bronze tablet near Genoa, 117 B.C.). *O* reappears in Late Latin and Italian *móllo*, *dólce*, &c. Medial *o* is often dropped before *l*, as in omni *poplo* (Plaut. Pseud.), *teglarius* (inscr.), *Fostlus* (Faustulus, 114 B.C.), *Hercle* (Plaut.), *singlariter* (Lucr.)—comp. Fr. *sanglier*, Ital. *cinghiale*—*coplata* (Lucr.); in some cases, as *poclum*, *periclum*, the contraction does not appear till the empire; at Pompeii *anglata*, *subla*, &c. As Umbrian always has contraction, *pihaclom*, *anglom*, *Treblanir*, *vitlu*, *katlu*, *stiplo*, whilst Oscan distinguishes diminutive forms like *zicolom*, *zicelei*, *ziculud* from such forms as *sakaraklom*, *pestlom*, the strongest impulse must have come from the north, although there must have been a pretty general tendency to syncope everywhere. In Italian contraction is the rule in popular words, as *vecchio* for *vet'lus*, Late *veclus*, *occhio* oc'lus, &c. In *pòpolo*, *távola*, *ísola*, &c., and diminutives like *rívolo* and *góndola*, the original vowel has remained throughout. South Latin favoured *u* (see below).

16. The use of *o* for *e* after *v* is shown by Old Lat. *oinvorsei*, *vortere*; in *vostrum* (Plaut., Ambrosian palimpsest), the original sound (from *vos*) occurs, which must have been universal in popular speech, since it reappears in Late Latin and all the Romance languages—Ital. *vostro*, Fr. *votre*, &c. There was a tradition that Scipio Africanus had been the first to spell these words with *e* (Quint., i. 7, 25). Here Umbrian distinguished between *e* and *o*, as in *vestra*, *covertu* (pres.), but *covortus* (perf.); Lat. *vorsare* is perhaps Span. *vosar*, *bosar*, "to vomit"; in other words *e* is now universal.

17. *U* occurred for *i* before labials; but the old *optumo* has scarcely left any trace, yet Ital. has *menomo* besides *minimo*. Later *u* was pronounced with the sound of *ü*, Gr. υ, Fr. *u*, which at last was turned into *i*, as in *optimus*, Ital. *ottimo*. But in some few words the old popular form has survived—*stupula*, Ital. *stóppia*, Fr. *étouble*, "stubble," *dissupare*, Ital. *sciupare*.

18. *U* stands for *o*—"*Frundes*, *funtes* vetustissimi; quae tamen a primoribus repudiata sunt, quasi rustico more dicta" (Prisc.)—contrary to the general rule (see 15). Spellings like *muns*, *muntem*, *funtem* abound in Late Latin, as *puntifex* (already in 98 A.D.), Σεπτομουντίῳ (Plut., *c.* 100); whence Old Fr. and Old Eng. *munt*, "mount," Ital. *mónte*, *pónte*, *fónte* with close *o*. In Sienese we have even *pognere*, *ponto*, Ital. and Florentine *pugnere*, *punto* (pungere, pūnctum); the connexion, however, of *ó* with Old Latin *u* is doubtful.

19. Greek υ was pronounced *u*, as in *Bruges* Φρύγες, *Burrus*, *purpura*, *gubernum*, *gubernare*, *cupressus*,—the last four also classical; otherwise the classical age adopted the Greek sound *y*, as in *Cyprus*. In popular Latin the old sound remained, and *u* was sometimes (before *r*, as in *fore*) even changed into *o*, as in *storax* (Ter.), *ancora* (Nævius). In Low Latin *u* is frequent: *cuprum*, "copper," for which Pliny used *Cyprium* (*aes*); comp. *bursa*, Ital. bórsa, Fr. bourse, *crupta*, Ital. gròtta, *tumba*, Ital. tómba, &c.

In popular Latin there was a general tendency to contract the old diphthongs, in accordance with Umbrian and North Latin.

20. *Au* in North Latin began very early to be contracted into long open *o*, as *Pola* (inscr. Picen., 218 B.C.). In Umbrian this is a constant law—*ote* aut, Ital. *ò*, Umb. *toru* tauros, Ital. *toro*, &c. The only form of the oldest Roman Latin was *au*, as *Taurasia*, *Aulla* (T. Scip.), *Claudi* (Bacch.). When the Umbrian poet whose provincial name was Plot(u)s settled in Rome in the latter half of the 3d century B.C. his name was Latinized into Plautus. Meanwhile the North Latin *ò* began to penetrate into Latium as rustic, vulgar, and familiar: Cato and Varro often use it in their books *De Re Rustica*, as *coles* (Cato), *colis*, *orata* (Varro): "*Orata* genus piscis appellatur a colore auri, quod rustici *orum* dicebant, ut auriculas, *oriculas*" (Fest.). But in the classical age there was a good deal of reaction against this vulgarism, and there is a well-known anecdote of Mestrius Florus warning the emperor Vespasian against saying *plostra*, and being next day facetiously greeted by the emperor as *Flaurus* (Suet., *Vesp.*, 22). At Pompeii

copo took the place of *caupo*, *o(p)scultat* of *auscultat*. It is scarcely possible to fix the precise period at which *ò* for *au* became general with the upper classes; but, as it was never changed into *uò* like the original open *o*, the general contraction of *au* is probably later than that of *ae* to *è*, which was accomplished about the time of the introduction of Christianity. That the contracted sound is open *o*, not closed, may be inferred from the Italian *ò* in *oro*, *toro*, *cosa*, *povero*, in Old French *chòse*, *pòvre*, as is shown by the rhymes, only in Mod. Fr. *chóse*, *póvre* (etymologically spelt *pauvre*). The Eng. *cause*, *sauce*, *poverty*, have kept the Old French sound; the Spanish forms are *cosa*, *oro*, *pobre*. The old diphthongal pronunciation of *au* was never quite lost, but preserved in literary tradition all through the Middle Ages, as in Italian and Spanish literary words like *causa*. It even appears to have been popular in some Roman provinces, judging from the Prov. *paubre*, *causa*, in Mod. Prov. *còuzo* (spelt by the French "coouso"), and the Portug. *ouro*, *cousa* (also *oiro*, *coisa*). Even Fr. *chose*, *chou* presuppose *causa*, *caulis*, not *cosa*, *colis*. In Italian, words like *cavolo*, "cabbage," *Paolo*, "Paul," are rare exceptions. It is to be especially noted that *cauda* seems to be false, *cōda* being the correct Latin form, which is corroborated by Ital. *códa* with close *o*. Some philologists, however, think *ó* is the old contraction, unconnected with *ò*.

21. *Ae*, oldest form *ai*, occurs very early, as in *aes*, *praedad* (Col. Rostr.), and was general at the time of the Gracchi. The difference between *ai* and *ae* is really very slight, the sound of *i* being open, which is very near "raised *e*" (both vowels occur in Eng. *pity*). The pronunciation must have been essentially the same as in the Osc. *aí*, which in the Latin transcription of the Tab. Bantina wavers between *ai* and *ae*. The contraction of *ae* into *è* first occurs in the north, where it was constant, for example Umb. *kvēstūr*, *prē*, *mēstro* magistra, dat. *asē* arae; North Latin—Fal. *pret(or)*, *Cesilia*; T. Pis. *Cesula*; Etrus. Lat. *Quecili* (= *Cecili* for *Caecilii*), *Cnevia* Gnaevia, Gnaeja, &c. From the north it spread to Latium, where it first occurs as a rustic pronunciation scoffed at by Lucilius, as quoted by Varro: "Rustici Pappum *Mesium*, non *Maesium*, a quo Lucilius scribit—*Cecilius Pretor* ne rusticus fiat." "In Latio rure *edus*, in urbe *aedus*" (Varro). We find *e* for *ae* quite commonly used in the vulgar dialect of the 1st century A.D.,—at Pompeii *letus*, *queres*, *etate*, *presto*, *tabule*, *que*. In Rome *e* became the pronunciation of the upper classes only in the Christian period, 3d and 4th centuries, as *Emiliano*, *φελειε* = filiae (inscr. 3d century), *Cesur* (4th century). Servius (4th century) says "*ĕ* is pronounced almost like *ae*," that is, with the same sound, only shorter (at least in theory), *equus* like *aequus*.

22. In Old Latin compound words often did not soften their radical vowel; the preposition being then an adverb, and each word having a distinct stress, the compound was separable, as in manum *endojacito* (XII. Tables) = injicito; *ob vos sacro*, vos obsecro, and *sub vos placo*, vos supplico, in ancient prayers; *transque dato* = "et tradito," in ancient laws. This was imitated by classic poets (tmesis)—*inque ligatus* (Virg.). Only some of these separable compounds continued later on, such as the intensifying *per*, in *per ecastor scitus* (Ter.), nobis ista sunt pergrata *perque jucunda* (Cic., *De Or.*), *per* mihi *mirum* visum est (Cic., *ib.*), Platoni *per* fuit *familiaris* (Gellius). Instances of the unchanged vowel in verbs—écquid placeant, mé rogas? immo vero hercle *pérplacent* (Plaut.), and ea mihi *perplacet* (Cic.), to which correspond exactly the Old Fr. *par est bons*, *par me plaist*. While the older Latin accentuation was *áffatim*, *ádmodum*, these words seem at the time of Gellius to have been pronounced *affátim*, *admódum*. We have here a first step towards the modern system of accenting the last element of compounds; comp. the modern Comasco *ammò*, Roum. *amù*, "just now." *Quomodo* is continued in Ital. *come*, but is formed anew in the dialectic *comòdo*, *cmòd*. In Late Latin and Romance the old system reappears unimpaired; many of the old compounds, having been lost in popular speech, were formed anew with stress on the last element and unchanged vowel: for instance, class. *displĭcet*, vulg. *displácet*, Ital. *dispiáce*, Span. *despláce*, Fr. *déplaît*; class. *accĭdit*, vulg. *accádet*, Ital. *accáde* (inf. *accadére*); *rélĕgo* becomes Ital. *rilèggo*, &c.

23. Stress, which in Old Latin was often farther from the end than in classical Latin, seems early to have become pretty strong, so as to induce the voice to hurry over unaccented syllables even though they were long by position (see LATIN), as *magistratus*, *ministerium*, *volŭntate*, in Plautus, where *st*, *nt* were pronounced as quickly as in Eng. *voluntary*, *magistrate*. The vowels, too, were hurried over; that *fénĕstra* was pronounced as *fen'stra* is corroborated by the Ennian *festra* = fe^{n}stra,—comp. Ital. *mestiero* = ministerium. Scansions like *sagĭttis*, *simĭllumae* show that double consonants might count as long or short; position was not regarded so nicely as in Greek till the classical age. The real reason may have been the stress on the first syllable. In accented syllables double consonants cannot have been really short, considering the full length of Italian double consonants in *bello*, *anno*, *saétta*, &c. Likewise final vowels of iambic words were shortened, as *novo*, *habe*, *puta*, *bene*, *homo* (see LATIN). This is important, as marking the first step towards the Romance levelling of the old quantities. This tendency, too, was carefully restrained during the classical age, but reappears early in the post-classical period. Another effect of the strong popular stress is the pronunciation of *i* before vowels as a consonant; thus words like *fili͡us* in Plautus often count as two syllables, *filjus* (*j* = Eng. *y*). This is evidently the preparatory stage to the Romance *figlio*, &c., with palatal *l*,—*l* and *j* having been fused into one sound. This pronunciation, too, was carefully suppressed by the classics.

B. *Vocabulary.*—We append, in chronological order, a brief selection of archaic words, disused, vulgar, colloquial, or used with a disparaging sense, in the classical age, but reappearing later as quite usual and dignified expressions. The many modern derivatives should be noticed.

LIVIUS ANDRONICUS (*c.* 240 B.C.): *sortus* surrectus, Ital. sorto, sortire, Fr. sortir de l'eau. PLAUTUS (254-184): *bucca*, "mouth" (fam. Cic.), bucca panis (Petron.), Ital. bócca, Fr. bouche; *minaciae*, "threats," Ital. minaccia, Fr. menace; *calceolarius*, "shoemaker," Ital. calzolaio. Diminutives—*vidulus*, *vid'lus*, "wallet," Ital. valigia (*vid'litia, Diez), Fr. valise; *auricula*, Ital. orecchia, Fr. oreille; *apicula*, Fr. abeille; *lusciniola*, Ital. usignuòlo, rosignuòlo, Fr. rossignol; *sororcula*, Ital. sirocchia, commonly sorella; *vitellus*, Ital. vitello, Fr. veau, Eng. veal; *agnellus*, Ital. agnello, Fr. agneau; *putillus*, "little boy," Ital. putello (*putus* fam. for *puer*, Virg.). Adjectives—*bellus* (later fam. Cic.)—the Romance *bello* has quite superseded *pulcher*; *minutus*, "small," populus *minutus* (Petron.) = Fr. le *menu* peuple; *rivalis*, originally a law term, figuratively of a rival in love (class. *aemulus*; fam. Cic.); *ebriācus*, "drunk," Ital. ubbriáco; *sucidus*, "juicy," "dirty," Ital. súcido, súdicio, Span. súcio. Verbs—*ambulare*, "walk," "go," familiar in all ages, hence according to Dr. Vilh. Thomsen the Romance *andare*, *aller*, Roum. *umblà*, Ladino *amnar*; *bajulare*, "carry," *bajulus*, "carrier," L. Lat. "educator," Ital. *bàlio*, "steward," *bàlia*, "nurse," Fr. *bailler*, "reach," "give"; *mandūcus*, "glutton," *manducare*, "chew," "eat," frequent in Old Latin—the emperor Augustus wrote familiarly *manducavi duas buccas* = Ital. mangiai due bocconi—in the Vulgate *manducat* et bibit, Ital. mangiare, Fr. manger; *auscultare*, "listen" (once Cic., mihi *ausculta*), Ital. ascoltare, Span. escuchar, Fr. écouter; *cantare*, frequent in Old and classical Latin, the only word in Romance (*canere* has been lost); *adjutare*, Ital. ajutare, Fr. aider (*adjuvare* lost); *exradicare*, *eradicare*, Ital. sradicare, Fr. arracher; *mendicare*, Ital. mendicare, Fr. mendier; *batuere*, *battuere*, "strike," Ital. *bàttere*, Fr. battre (*bàtto* from *battuo*), L. Lat. *battualia*, Ital. *battaglia*, Fr. bataille; *muttire*, "mutter"—palam *mutire*, "speak" (Ennius)—L. Lat. subst. *muttum* nullum emiseris, "not a word," Ital. motto, Fr. mot; *sapere*, "understand"—sometimes very near to the modern sense, *sapit* scelesta multum (Plaut.) = Ital. la scellerata sa molto, nullam rem *sapis* = Ital. non sai nulla—Ital. *sapére*, Span. sabér, Fr. savoir; *comedere*, "eat" (Cic. fam.), *comedere* numos = Fr. manger son argent, Span. comér; *despoliare* (Cic., *Ep.*; Liv. once), Ital. spogliare, Fr. dépouiller; *comparare*, "to procure," later "to buy" (Suet.), Ital. comprare. Greek words—*colaphus* (*colapus*), "buffet," "box on the ear" (fam. Quint., Plin.), *percolopabant* (Petron.), L. Lat. *colpus*, Ital. colpo, Fr. coup. ENNIUS (239-169): *civitas*, "city" (reappears in Petronius and later), Ital. città, Fr. cité, Eng. city; *campsare*, "double (a cape)," a ἅπαξ λεγόμενον, recognized by Diez in the Ital. *(s)cansare*, "to avoid"; *nitidare*, Ital. nettare; *petra*, "rock," frequent in Pliny and later—in the Vulgate tu es *Petrus*, et super hanc *Petram* aedificabo ecclesiam meam—Ital. piètra, Fr. pierre. CATO (234-149): *nascere* nasci, Ital. nascere, Fr. naître; *fracidus*, "mellow," "damaged (olives)," Ital. *frácido*, *fradicio*, "rotten." PACUVIUS (219-129): *causari*, "to plead," not classical, reappears in the Silver Age in the sense of pleading as an excuse, still later in that of disputing, discussing, Fr. *causer*, "to chat, talk"; comp. Ladino *plidar* (plead), "to speak." LUCILIUS (*c.* 148-103): *acceptor* for *accipiter*, "a hawk," frequent in Low Latin, Ital. astóre, Fr. autour; *quirītare*, "cry"—ut *quiritare* urbanorum, sic *jubilare* rusticorum est (Varro; fam. Cic.)—Ital. gridare, Fr. crier. Greek words—*gubernum*, "rudder," Ital. governo; *schedium*, "improvised or unpolished poem," Ital. *schizzo*, "sketch"; *caballus*, "jade," seems first to occur here—optat arare *caballus* (Hor.)—later "horse," "steed," Ital. cavallo, Span. caballo, Fr. cheval, L. Lat. *caballarius*, "chevalier," "knight"; *cyma*, "young sprout of cabbage" (later Plin., Colum.), Ital. *cima*, "top." Q. CLAUDIUS QUADRIGARIUS—Gellius blames several expressions of his as vulgar or rare: *diurnare* diu vivere, comp. Ital. soggiornare, Fr. séjourner, Eng. sojourn, and aggiornare, ajourner, adjourn; *arboretum*, "grove," Ital. arboreto, Span. arboleda. VARRO (116-28), especially in *De Re Rustica*: *belare* balare, Ital. belare, Fr. bêler; *olor* odor, Span. olor; *capitium*, "bodice," Ital. *capezzale*, "cape," "pillow"; *nervium* = νεύριον, Span. nérvio; *rubeus*, "red" (later Colum., Pallad.), Fr. rouge, Span. *rúbio*, "fair"; *badius*, "bay (horse)," a rare word, Ital. bajo, Fr. bai. LABERIUS (105-43) is blamed by Gellius for using obsolete, rare, and vulgar words: *lavandaria* lavanda, later "laundress," Ital. lavandaja; *gurdus*, "stupid," a Spanish word, says Quintilian, and in fact we find Old Span.

gordo, "stúpid," Mod. Span. "fat,"—comp. *pinguis* Minerva; *pittacium*, "patch," "label,"=πιττάκιον, Span. *pedazo*, "piece"; *nanus*, "dwarf,"=νᾶνος. Ital. nano, Fr. nain; *botulus*, "sausage" (also Petron.), dim. *botellus* (Martial), later="bowels," Ital. budello, plur. budella, Fr. boyaux. LUCRETIUS (94-55): *baubare*, "bark," Ital. abbajare. Fr. aboyer, Eng. bay; *russus*, "red"—a rare word. *russa* gingiva (Catull.), mentioned as usual by Gellius—Ital. *rósso*, "red." Fr. *roux, rousse*, "red-haired." Old words mentioned by GRAMMARIANS: *burrus* (see 11, above); *artitus*=bonis instructus artibus, Prov. *artisia*, "trade," Fr. *artisan*; *gluto* (Fest.), *glutto* (Persius and later), Ital. ghiottone, Fr. glouton (comp. Lat. *glut glut*, Fr. *glouglou*); *planca* tabula plana, Fr. *planche*. Eng. plank; *sarpere* putare, "to imp," Fr. *serpe*, "pruning knife."

C. *Grammar* (Plautine, when no author quoted).—Gender: *collus* collum, Old Fr. *cols*, now *cou*; *dorsus*, &c. Declensions: *lacte* lac, Ital. latte (Petron. unum *lactem* biberunt); *vasum*, Umb. *vaso*(*r*), Ital. vaso; *ossum*, Ital. osso, Fr. os; *pauper,-a,-um* (also Petron.), Ital. povero. Comparison: *magis* pulcer=Span. *mas* hermoso; even *magis majores*, as vulg. Ital. *più meglio*, vulg. Fr. *plus meilleur*, vulg. Eng. *more better*(*er*). The ordinary Romance formation with *plus* only appears in the 3d period. With ego *ipsissumus*, "my very self," comp. *ipsimus*, "himself," *i.e.*, the master of the house (Petron.). Out of (ego)*met-ipsimus* grew Ital. *medesimo*, Span. *mismo*, Fr. *même*. Pronouns: dat. fem. *illae* for illi, Ital. *le*; *eccum*=ecce eum, Ital. *ecco*—pater *eccum* advenit=*ecco* che viene il padre; *eccisle, eccista*=Old Fr. cist, ceste, Mod. Fr. ce, cet, cette; *eccille, eccilla*=Old Fr. cil, cele, Mod. Fr celui, celle. In Italian these were replaced by *eccum istum*, Ital. *questo*, and *eccum illum*, Ital. *quello*, analogous to the Plautine *eccum ipsum, eccam eampse*, &c.; *quotumus*, "which of the number"—*quotumo* die huc pervenisti? Ital. lavorare a *còttimo*, "work by the job." *Unus* indefinite was sometimes very like the modern indefinite article—Huic filia *una* est, "he has a daughter," Ital. quest'uomo ha *una* figlia. *Ille* was sometimes used very like the modern definite article—Imponit geminorum alterum in nave pater, *illum* reliquit *alterum* apud matrem domi, Ital. lasciò *l'altro* colla madre a casa. Note also *natus* nemo in aedibus, "not a living soul," "not a mother's son," Span. *nadie*, "nobody," likewise from *nata* (res), Span. *nada*, "nothing," whereas the Catalan prefers *res*, Prov. *ren, re*, Fr. *rien* (rem). *Homo* is sometimes like an indefinite pronoun—Nequior nemo, quisquamst, quem *homo* aut amet aut adeat, Fr. *on*. Verbs: *moriri* mori, Ital. *morire*, Fr. mourir. Active for deponent—*jocare*, Ital. giocare, Fr. jouer, *partire*=Ital.; *fabulare*, Span. *hablar*. Perfects in *si*—*parsi*, praemorsi, Ital. *morsi*; the formation in *si* greatly increased in Romance. *Habere* with past part. often approaches to modern compound tenses, Res omnis *relictas habeo*, Ital. ho lasciato tutto. Adverbs: *Aliorsum* ire for aliō, Prov. alhors, Fr. ailleurs. Prepositions: *de* for genitive, dimidium *de praeda* mihi dare, Ital. la metà del bottino; *ad* for dative, te *ad patrem* esse mortuom renuntiem, Ital. dire *al padre*; *cum* instrumental, *cum* virgis caseum radere, Ital. *con*; *de* instr., quam illa *de meis opulentiis* fiat propensior, Ital. *di*. Peculiar local uses are *in* Ephesum ire, *in* Epheso esse, *ab domo*, "from home," *ex Epheso*, "from Ephesus"; *ab*, from (at) one's house, as Esne tu *ab illo milite*, servus ejus=from (at) the soldier's, foris concrepuit *a vicino sene*, Ital. *dal soldato, dal vecchio vicino*.

Syntax and Phraseology.—Pater tuus *is* erat patruelis meus; comp. Fr. le père est-*il*, Ital. il padre *lo* conosco. Pone aedem *ibi sunt* homines, Ital. *vi sono* degli uomini. Scio jam quid *vis* dicere, Ital. so (quel) che *vuoi* dire. *Ne time, ne fac*, Fr. ne fais pas cela. *Tòtus* gaudeo, *tota* sum misera, even Cic. falsum est id *totum*, "it is all false," Ital. è tutto falso, son tutta contenta, Fr. elle est toute joyeuse. *Multum* miseri, even Cic. fam. *multum* bonus, Ital. molto buono, Span. muy bueno, Port. muito bom. *Bene* morigerus (Plaut.), *bene* saepe (Enn.), *bene* mane (Cic.), Ital. ben bene, ben tosto, Fr. bien bon, bientôt, bien souvent. *Bene velle alicui*, Ital. voler bene ad alcuno. Epityrum estur *insane bene* (Plaut.), showing that the *furieusement bien* of the *Précieuses* was no novelty. Aequo animo *stare*, Ital. star di buon animo; *stabam* tanquam mortuus (Petron.), Ital. *stava* come morto, *stare* in letto. *star* seduto, &c. *Dictum* (*ac*) *factum* (Ter.), Ital. detto fatto, "said and done." *Cum* (*bona*) *gratia*, "with a good grace" (Ter.), Fr. de bonne grâce. *Id restabat* (*deerat, ut*), used ironically, (Ter.), It. questa mancava ancora, Fr. il ne manquait (plus) que cela.

II. *Second* (*Classical*) *Period*: 80 B.C. *to* 100 (150) A.D.

At this time we begin to have an idea of what South Latin was, of which the chief characteristics were—(1) its conservative character supported by the antique forms of the Oscan language; (2) its preferring *i* to *e*, as in *sinatum, cinsuerint, cintum, rim, ris, diibus* (Lex Jul.; Heraclea); *nigalis, tenimus, Lucrilius, dicembres, ocilli* (Pompeii), *tenimus*=Mod. Neap. *tenimmo*; *fruminto, siptim* (Puteoli); *venirandas* (Nap.); later *sicundo, siptim* (Borgia, 386); (3) its preferring *u* to *o*, as in *furtunilla, posteru, olu* (Pompeii). These forms are constant in Modern South Italian. Now classical Latin was an approach to South Latin, and there arose a strong reaction against the vulgar North Latin forms. But even a purist like Cicero could not always abstain from using colloquial forms, and he sometimes gives us precious information about familiar pronunciations, as *cun nobis* for *cum nobis*, showing the assimilation of *mn* to *nn*. He hesitates to use the new word *medietas*, which later became the ordinary expression, Ital. metà, Span. mitad, Fr. moitié. Catullus has *involare*, "steal," Ital. involare, Fr. voler, and *basium*, Ital. bacio (for *basio, bagio*, like *cacio* caseus), Span. beso, Fr. baiser, and the familiar caressing *issa* for *ipsa*, Ital. essa. He and Horace have *platĕa*, "street" (for platēa=πλατεῖα), Ital. piazza, Fr. place. Vitruvius has *octuaginta*, Ital. ottanta, *a peregre*="from abroad," and the Greek words *chalare*, Ital. calare, *zelus*, Ital. geloso, Fr. jaloux, and *schidia*, "wooden chip," "splinter," Ital. scheggia. The transition from *b* to *v* begins, *triumphavit* for *-bit* (Lex Jul.). Gradually the popular speech undermined the classical correctness of the brief Golden Age, and at the beginning of the empire again rose to the surface. The emperor Augustus was fond of talking slang and bad grammar, as *simus* for *sumus*, and he wrote as he spoke in his familiar letters, although he was very hard upon a poor *legatus consularis* for barbarously writing *ixi* instead of *ipsi* (Suet., *Aug.*, 88; comp. *proximus* for *propsimus*).

At Pompeii and Herculaneum we find a town dialect fully developed, half South Latin, half vulgar Roman. Final consonants were dropped, for instance *m* in the acc. *puella, laudata*; *t* in the verse "quisquis *ama valia, peria* qui *nosci* (?=nescit) amare (Pomp.); *s* rarely, *valea*=valeas (Pomp.). *H*, the right pronunciation of which had become a mark of education, just as in English (Rusticus fit sermo, si aspires perperam; Nigid. Figulus), was constantly dropped, as in *abeto, abuaerit* (Pomp.), *abiat* (Herc.). *Nn* took the place of *nd*: *verecunnus* (Pomp.), later *innulgen.* (Abella, 170 A.D.), *agennae* (Puteoli), were generally Italic; comp. Umb. *pihaner* piandi (*distennite, dispennite*, Plaut.), Osc. *opsannam* operandam; now South Italian—Roman *monno*, Neap. *munno*, Sicil. *munnu*=Ital. mondo, Lat. mundus. *Ss* was used for *cs* (*x*) as in words in *-triss* for *-trix* (Pomp.). Φ popularly became *p*, as *Aprodite*, but with those who tried to speak fine *f*, just as they made the Greek *υ* an *i*—*Iacintus, Amarillis, Dafne, Filetus*, Ital. *fisico, fisonomia*, &c. *E* for *oe* seems first to occur during the empire, for example, *pomerii* (8 B.C.), *pomerium* (49 A.D.), *Phebus* (Pomp.). There is no certain evidence of the sound of Germ. *ö*, Fr. *eu*; we see that the first vowel is absorbed by the second. According to Diez, *oe* becomes close *e*, *ae* open *e*, which is true for popular words like Ital. *péna*, Fr. peine, but untrue for Latinisms like *fète, fèdo, amèno, cèto, commèdia, tragèdia, Fèbo*, *oe* in Low Lat. being constantly confounded with *ae*. Original *oe* never becomes *ie*, as *ae* does (*cielo, fieno*).

Vocabulary.—We remark at Pompeii *exmuccavit* emunxit, Ital. dial. *smoccare*, "snuff (the candle)"; mi *similat*, Ital. mi somiglia, Fr. il me ressemble, elsewhere only in Late Latin. PETRONIUS: *bisaccium*, Ital. bisaccia, Fr. besace; *nesapius*, "unwise," Ital. sávio, sággio, Span. sábio, Fr. sage; *berbex*, Fr. brebis; *peduclus*, Ital. pidocchio, Fr. pou (*panus* facit diminutivum *panucula*, Fest., Ital. pannocchia—comp. L. Lat. *genuculum, acucula*, Ital. ginocchio, agocchia, Span. hinojo, aguja, Fr. genou, aiguille); *striga*, "witch," Ital. strega; *fatuus*, Fr. fat; basiavit me *spissius*, Ital. spésso, "often." Instances of Petronius's grammar are—*vinus, caelus*, comp. Old Fr. *vins, ciels*; jacebat tanquam *bovis*, Ital. bove, bue; hoc vetare nec *Jovis* potest (Old Lat. *Jovis pater*=Jupiter), Ital. Giove; munus *excellente*, neuter, shows the L. Lat. declension; Ital. eccellente; habet *unde*=il a de quoi (vivre); unus *de nobis*=uno di noi (see also LATIN). PLINY mentions *sanguisuga* as vulgar for *hirudo*, Ital. sanguisuga, Fr. sangsue; he has *gyrare*=Ital. girare, "turn," "roam about." PERSIUS (34-62) has *stloppo* tumidas rumpere buccas, "a slap," L. Lat. sclopus, sclupare, Ital. schioppo, "gun." QUINTILIAN (*c.* 40-118): δυνατὸν quod nostri *possibile* nominant, quae ut dura videatur appellatio, tamen sola est, Ital. possibile, &c. JUVENAL has buccā *foculum* excitat, Ital. fuoco, Fr. feu, and TACITUS *spatha*, Ital. spada, Fr. épée (see also LATIN).

III. *Third* (*Post-Classical*) *Period*: 100 (150) *to* 300 (350).

This period is represented by the latest pagan inscriptions, by Gellius, Apuleius, &c. On the decay of classical Latin, see LATIN. In pronunciation only few decided changes appear.

1. *I* is inserted before *s* impurum, as *iscripta* (Afr., 197) εισπειρειτω=*ispirito* (Rome, 269); later this was universal, but in Italian only after consonants—*non istà* (colloq. *non stà*), *in ispirito in iscritto*; Span. always, as espíritu, está, escribir, escuela; Fr. esprit, écrire, école.

2. *Tt* is put for *pt*, as *Setemb.* (Helvet., 219), *Settimus* (Afr., 3d century), later frequent. This assimilation originally came from the north; comp. Etrus. Lat. *Nethunus* (*th*=*t*), Etrus. *Nethuns* Neptunus, Etrus. Lat. *Setumnal*, Etrus. *Setumnal*—Septimia nata

(inscr. biling.), *Setume*, *Setimi*, Septimius. Umb. *screihtor*, *screhto*, Ital. *Settimo*, *Nettuno*, *atto* aptus. *cattivo*, *scritto*.

3. *Tt* takes the place of *ct*, as in *Beneditus* (204), *lattuca* (Edict. Diocl., 301). This too came from the north: *vitoria* occurs on an ancient mirror, probably Etruscan. Comp. Umb. subahtu and *subator*, formally = subacti. *rehte* recte, where *h*, originally sounded, had become mute or nearly so, which is further proved by the spellings *ambrehtu*. *ambretu*. ambito. &c.; comp. *tettom*(*e*), probably = Ital. *tetto* tectum. just as Ital. *retto* rectus, *atto* actus, *otto* octo, *notte* noctem. This change was restricted to Italy; elsewhere *ct* became *it*, as Fr. *fait* factum. Port. *feito*, Span. *hecho* (= *feitjo). Likewise *cs* (*x*) became in Italy *ss*. as in Lat. *cossim*, *vissit*, elsewhere *is*, as Span. and Port. *seis*. Fr. *cuisse*, *laisser*.

4. *G* before a single *e*. *i* becomes palatal (like the old-fashioned Eng. *gyarden*, &c.) or nearly *j* (Eng. *y* in *you*), so that both are confounded—*magestati* (inscr. before 243); *cogiugi*, conjugi. The sign for *J* in the Gothic alphabet, taken from Latin *G*, shows the pronunciation of the 4th century.

5. *Ngn* for *gn*, as *congnato*, *singno*, belongs perhaps to this period—*connato*, &c., is also found—E. Ital. *sengno*, now spelt *segno*, with palatal *n*, *degno* dignus, *regno* regnum, &c., Fr. *digne*, &c.; sometimes *n*(*n*), as in *conóscere*, Fr. *connaître* There are traces of some other transitions that appear to have been completed only in the next period.

6. *Vocabulary*.—Apuleius has *supidus*, "savoury" (comp. insipidus), Old Fr. *sade*, whence Fr. *maussade* (mal-sade); *morsicare* = Ital.; *follicare*, "breathe" (like a bellows), Port. *folgar*, Span. *holgar*, "rest," "lounge", *masticare*, Ital. masticare, Fr. mâcher; *minari* (equum baculis), "threaten," hence "drive," Ital. menare, Fr. mener; *cambiare* (better than *cambire*), Ital. cambiare, Fr. changer, *victualis* adj, in the 6th century subst *victualia* (nom. plur.), Old Fr. and E. Eng. *vitaille*, Eng. *vittles*, spelt etymologically *victuals*; *aucilla*, *aucella* for *avicella*, the existence of which had been denied by Varro, L. Lat *aucellus*, Ital. *uccello*, poet *augello*, Prov. *auzels*, Old Fr. *oisel*, Mod Fr *oiseau*. Cælius Aurelianus (2d or 3d century) has *testa*, "skull," frequent in the 4th century, Ital. *testa*, "head," Fr. tête. Lampridius (*c.* 250): *papilio* = pavilion, *pullicenus*, Ital. pulcino, Fr poussin; *pipio*, "pigeon"; *platea*, "place" Tertullian, first Christian author: *rememorare*, "remember," *aeternalis*, "eternal," *compassio*, "compassion," and many other modernisms, such as *plus miser* = Ital. più misero, Fr. plus misérable. Diocletian: *fata*, parca, Ital. fata, Fr. fée Solinus (*c.* 3d century): *repatriare*, "to repair (to)." Apicius (*c.* 3d century): *excaldare*, Ital. scaldare, Fr. échauder; *spatula*, Ital. spalla, Span. espalda, Fr. épaule.

IV. *Fourth Period*: 300 (350) *to* 500 (550).

This period extends from the introduction of Christianity to the Middle Ages and the great migrations. Christianity marks an important epoch in the history of the Romance languages. Pagan literature was abhorred, and classical traditions lost. Popular speech got the upper hand; the gospel was preached to the people in the people's own language, and the New Testament translated into vulgar Latin. Several phonetic changes which formerly had been wavering and uncertain became rapidly fixed and decided. The whole language was revolutionized.

1. Palatal *g* or *j* was developed into *dj* (like *gy* in Hung. *Magyar* = palatal *d* + Eng. *y*) or *dzh* (Eng. *j*), sometimes *dz*, and was confounded with original *di*—*Zerax*, Hierax (Cumæ, 202); *Ζουλιαε* (pagan inscr.), comp. *Diuliali* (568), *Madias* (364), also *Mazas* = majas, *Giannaria* (503), also *Zannari*, &c. Italian still retains the sound of *dzh* in *giungere* jungere, *Giove* Jovem, *gènere*, *giacére*, &c. Original *di* in *Aziabenico* (Afr., 195), *medius*, pronounced *medsius* according to Servius (4th century) and Consentius (5th century), Ital. *mezzo*, pronounced *med-zo* (but *giorno* from *diurnus*).

2. *Ti* was assibilated before vowels; there are no certain pre-Christian instances. In the 4th century the Gothic *laiktjō* = lectio shows that the change had only begun; *ci* and *ti* were sometimes confounded, as in *κάλτιος* calceus (Plut., *c.* 100; Ed. Diocl., 301), *ocio* (Rome, 389); we have *ti* for *si* in *ecletiae* (early Christ. inscr.). In the 5th century the change appears as fully accomplished; the grammarian Pompeius (probably a Mauretanian) expressly teaches the pronunciation *Titius* as *Titsius*, and Consentius (a Gaul) *etiam* as *eziam*, *i.e.*, *etsiam*. In the 6th century we have the Gothic *kautsjo*, cautionem. It is probable that this change too originally came from the north, especially from Etruria, where it was very old: we have Etrus, *Vestia Venza*, *Arnθia Arnza*, Etrus. Lat. *Venei*, *Vensias*, *Arnzias*, while Umbrian has *tertio*, *Martie*, &c.), Mars. Lat. *Martses*, evidently the source of the Latin *Marsi*. At length this pronunciation reached the capital and became general, mostly expressed by *c*, as in *eciam*, *tercius*, *milicia*, *justicia*, *stacio*, *nacionem*, &c. The pronunciation *ts* is confirmed for Spain by Isidore in the 7th century. This sound is still preserved by Italian in words like *piazza*, *grazia*, *nazione*, *giustizia*, likewise by Old French, as *naciun*, *place*, whereas in Spanish *ts* has coalesced into a lisped *s*, as in *gracia*, *nacion*, and in Portuguese, Provençal, and Modern French it has been assimilated into a hard (voiceless) *s*, as in *praça*, *plassa*, *place*.

3. *Ci* was assibilated before vowels. In the 4th century we have the Gothic *faskja*, which shows no change. Schuchardt is probably right in supposing that *ci* was assibilated a good deal later than *ti*,—an inference from the comparative rarity of instances of change, and from the silence of the grammarians. From instances like *ocio* (see 2) it would appear that *ci* and *ti* had the same sound, but this cannot have been the case, as Italian still keeps up a difference, as in *piaccia* placeat, *piazza* platea. Yet there may have been a beginning of a palatal affection, making the two sounds somewhat like each other. In the 6th century we have the Gothic *unkjane* (unciarum) and *οινκια* in the Ravenna charters, but on the other hand *πρεκειω* = *precio* for *pretio*, *Urbitcius* (533, which, however, may be a miscorrection, *c* being added instead of substituted for *t*), *Mauriscius* on a Gaulish coin, from the same period,—making it probable that the assibilation had been accomplished. In the 7th and 8th centuries spellings like *onzia* for *uncia* are quite common.

4. The most important change of all was the victory of stress over quantity and tones. The popular songs of the classical period show a decided prevalence of accent. In the soldiers' songs from the end of the 3d century stress has quite superseded quantity and is the ruling principle of the metre:—

> "Unus *homo* mille, mille, mille decollavimus.
> Tantum vini nemo *habet* quantum fudit sanguinis."

This is just like the metre of early Christian hymns—"*Dies* irae, *dies* illa," and "O Rex aeterne, *Dómine*," &c. The old quantities had been levelled. St Augustine (354-430) says that in his time only a few grammarians had kept up the distinction between *mŏrae* and *mōre*, and that the Africans confounded *ŏs* and *ōs*. Servius (4th century) could only find out quantity from stress in words like *impius*, *amicus*. Consentius says that some, especially Africans, said *pīper* for *pĭper* and *ŏrātor* for *ōrātor*. This does not necessarily mean that all short accented vowels before single consonants had become long; probably both short and long coalesced to a medial quantity, rather short than long, and there was no very marked difference of quantity between accented and unaccented vowels. This appears plainly from the nature of Romance poetry, where stress has only a moderate importance—namely, in the most prominent parts of the verse—while the chief principle is the number of syllables. In Italian, especially in the Tuscan dialect, we may hear *bambíno* with short accented *i*, the unaccented *o* being rather longer than the accented *i*, just as Eng. *y* in *pity*, when emphatic, is longer than *i*. In Spanish words like *máno*, *priméro*, *señóra* the accented vowel is generally as short as the unaccented or even shorter, which does not prevent the Spaniards from counting it as "*dos tiempos*" (duas moras); the unaccented final syllables are often rather longer, as in Eng. *pity*. In Italian the longest syllables are those containing two or more consonants after the accented vowel, as *tèmpo*, *paziènza*, *bócca*, *gatto*; the chief difference between *fátto* and *fáto* is the length of the *t* in the former. In Spanish and French even long consonants are shortened, as Span. *boca*, *gato*, Fr. *chatte*; *jette* and *achète* are equally short; vowels are generally short or medial, as *une belle ville* (not like *veal*, as the English make it), and are long only by compensation, as in *âne*, *chante* (where the nasal is absorbed by the vowel). The old distinction of tone necessarily disappeared with these, the acute or high even (*Rṓmā*) and the circumflex or high falling tone (*Rōma*) being dependent on the quantities.

Vocabulary.

5. *Vocabulary*.—Ausonius (Burdigala, 309-392): *burrae*, nugae, Ital. burla, "joke." Arnobius (Afr., *c.* 330): *coquina*, Ital. cucina, Fr. cuisine. Firmicus Maternus (*c.* 340 ?): *compŭtus*, Ital. conto, Fr. compte. Palladius (*c.* 350): *cattus*, "cat"; *species* = Fr. épices. Ammianus Marcellinus (end of 4th century): *molina*, Ital. molino, Fr. moulin; *impedicare* empêcher; *pilāre* = expilare, Fr. piller, Ital. pigliare; *proba*, preuve. Vegetius (end of 4th century): *burgus*, castellum parvum, Ital borgo, Fr. bourg. Jerome (331-420): *camisia* (Celtic), Ital. camicia, Span. camisa, Fr. chemise; *carricare*, Ital. caricare, Span. cargar, Fr. charger; *impostor* = Eng.; *rancor*, "rancour." The Vulgate: *grossus*, Ital. grosso, Fr. gros (see also Latin). Servius (*c.* 390): *falco*, Ital. falcone, Fr. faucon. Lactantius (d. *c.* 330): *meridionalis*. Augustine (354-430): *combinare*; *vanitare* vanter. Codex Theodos. (438): *exagium*, Ital. saggio, Fr. essai; *paraverēdus*, L. Lat. palafredus, Ital. palafreno, Fr. palefroi; *acucula*, aiguille. Cassiodorus (beginning of 6th century): *modernus*, "modern." Codex Justinian. (527-565): *amicabilis*, "amiable."

V. *Fifth Period*: 500 (550) *to c.* 900 (1000).

Fifth period.

This period, which extends from the migrations to the first appearance of the modern Romance languages, is the age of Low or barbarous Latin, as written especially in charters and laws. While Christianity had brought vulgar

Latin into the foreground, barbarism quite made away with literary Latin. Latin was not only dead but forgotten. The old sounds and forms had been lost, and the scribes, ignorant of classical grammar, tried nevertheless to make a show of learning by putting Latin forms at random. This makes the language look much more barbarous than it really was. It is sometimes very hard to find out the living popular form under the Latin varnish, and harder still to find out what is proper to each country, as Low Latin is very much the same everywhere. The following were some of the chief peculiarities.

1. Old Latin forms reappeared, especially in Italy. Final consonants, especially *m*, *t*, *s*, were dropped or wrongly put. In Italy the nom. *annus* (*-os*), the acc. *annum* (*-om*), the dat. abl. *anno*, the acc. plur. *annos*, coalesced in *anno*; as this was the real pronunciation, the scribes confounded the Latin forms. There being no longer any difference between *in locum* and *in loco*, both were confounded; even *in locus*, *per locus*, &c., were written. The prevalence of the type *anno* on the one hand and the growing use of the preposition *de* for the genitive on the other made the genitive *anni* disappear, and *anni* (with which *annis* coalesced) was used solely for the plural, likewise *fiori*, *monti*. Sometimes, as in Old French, the objective form *anno*, Old Fr. *an*, was used as a genitive, of which *Hôtel-Dieu* is still a remnant. In the same way Ital. *rosa* became the common singular, *rose* the common plural form. Out of Italy, final *s* being retained, the plural form was *annos*, *rosas*, *flores*, which is the Spanish (*años*) and Portuguese form, and partly the French, as *roses*, with *fleurs* and *ans* as accusatives. In Provençal and Old French *s* was kept in the nom. sing. masc., *ans*, but in the nom. plur. the oldest form was *i*, retained in some Old French monosyllables—*li* illi, *dui*, *trei*, *tuit* from *tutti*, used in the Gloss. of Cassel; in polysyllables this *i* was lost, and *an* remained, likewise *flor* (**flori*; comp. *sapienti*, Gloss. Cass.), *munt*. The verbs *canto*, *cantas*, *cantat* in Spanish only lost *t*; in Ital. *cantas* through *cantis* (caused by the affinity of *s* to *i*) became *canti*. In French both *s* and *t* were kept—*chante*, *chantes*; *chantet*, later *chante*; *est*, *vit*, *vient*, and from the analogy of these Mod. Fr. *aime-t-il*, *chante-t-il*. Many old tenses were lost, as *ama*(*ve*)*ram*, which even in Latin sometimes had the sense of the simple past (see LATIN), only in the oldest Fr. *rovéret*, roga(ve)rat = rogavit. *Ama*(*v*)*i* became Ital. *amai*, Fr. *aimai*, and was used as simple past (perfectum historicum); the praesens perfectum was expressed by a new tense, as *habeo amatum* (of which early germs are found), Ital. *ho amato*, Span. *he amado*, Fr. *j'ai aimé*. The old future was destroyed and a new future formed out of *amare habeo* (of which early traces are found), Old Ital. *ameraggio*, Mod. Ital. *amerò*, Span. *amaré*, Fr. *j'aimerai*, &c. In consequence of the general loss of body, short words dwindled down so much that they became unfit for use, and were superseded by fuller words or reinforced by composition; this is especially the case in pronouns and particles. As *ad* became *a*, Lat. *a*, *ab* could no longer keep its ground, and was replaced by *de*, likewise *vis* by *fortia*, &c. (see LATIN). *Hic* disappeared and was replaced by *iste*, which remained uncomposed in Span. *este*, and in the others was composed with *ecce*, *eccum* (see above). *Abante*, Mod. Ital. *avanti*, Fr. *avant*, occurs in a pagan inscription. Lat. *unde* became *de unde*, Ital. *donde*; in Spanish this was further composed with *ad*, as *adonde*, and as this in time came to mean "where" a new *de* had to be added,—*de adonde*, &c.

2. *C* became assibilated before single *e*, *i*. That during all the preceding periods *c* had the sound of *k* is proved by Old Latin spellings like *dekem*; by Greek transcriptions, as Κικέρων, Καῖσαρ; by the German renderings *Kaiser* (Old Eng. *cásere*), *Keller*, "cellar," *Kirsche*, "cherry," &c., and by the use of *c* for *k* in Old English, as in *cynne*, "kin," *cennan*, "ken"; by late Latin spellings like *quesquenti*, quiescenti, *pache* (Rome, 408), *chingxit* (Gaul, 676), *cnchis* (Lucca, 722)—in Italian still *ch* = *k*, as *chi* quis, *che* quid; and lastly *dulkisma* (Pisaur., 410), *ofikina* (Gallic vase, end of 6th century; see *Romania*, xiii. 485). Yet *c* before *e*, *i* must early have had a more palatal sound than before *a*, *o*, *u*, something like the old-fashioned English pronunciation *kyard* for *card*. But it was not until very late that the difference became so marked as to be expressed by different letters: the palatal sound began to be assibilated into something like Italian *ce*, *ci*, Eng. *ch* (as in *child* from Old Eng. *cild*), about the 6th century, although perhaps not equally early everywhere. We find κειτανε and *tzilanc* (Ravenna charter, 591), and *paze* (inscr. about the same time). Ital. *c* = Eng. *ch* in *pace*, *dieci* (in Central Italy mostly pronounced *sh*), *cielo*; Span. *paz*, *diez*, *cielo* (lisping *s* from *ts*); Fr. *ciel* (Old *ts*, Mod. *s*).

3. *E* for accented *ĭ* became frequent. As original *ĭ* and *ē* were no longer different in quantity, they had to be distinguished by quality; accordingly *vīnum* became Ital. *vino*, *mĭnus* (*mínus*, open *i*), Ital. *méno*, with the same vowel as in *véna* from *vēna*; thus Latin *ĭ* and *ē* coalesced; likewise we have *scrivo* scrībo, *bévo* bĭbo, *sévo* sēbum, *fido* fīdus, *féde* fĭdes, *créde* crēdit. *scritto* scrīptum, *detto* dīctum. We find traces of this in the Pomp. *veces*, Ital. *vece*. In Low Latin *menus*, *fedes*, &c., are constant. But many who had a little more learning retained the Latin spelling *minus*, pronouncing *méno*(*s*), and by this were induced to write constantly *i* for close *e*, especially accented, as *habire*, *vedire*, *cridere* = Ital. avére, vedére, crédere; *vindere*, *stilla* = vēndere, stēlla, Ital. véndere, stélla, Piedm. esteila, Old Fr. esteile, Fr. étoile. In some few instances this may represent a provincial *i*, as in Sicil. *aviri*, or special cases like Fr. *tenir*, *plaisir*, *merci*.

4. Unaccented *e* for *ĭ*, which is frequent in Old Latin and not unfrequent in the post-classical age, returns in Low Latin with redoubled force. Thus we find *fedelis* (404), later *Domenecus*, *septemus*, *decemus*, *anema*, *deposeta*, *genetor*, *capete*, *soledos*; in the Ravenna charters *ceccaomeno*, *vendecare*, *ordenata*, &c.; in Frankish charters *decemo*, Fr. dime, *Domenecus*, *venerabelis*, *nobelis*, *lacrema*, *caretate*, *veretate*, *femena*, *placetus*, &c. This penetrated even into Central Italy, as in the Tuscan Latin of the 8th century, *dedet*, *placetum*, *homenis*, *inviolavelis*. In Middle Italian *uomeni*, in Modern Italian *Domeneddio*, *ospedale*, are rare remnants of the earlier form. Generally classical *i* has prevailed in Florentine and Italian, as *uomini*, *femmina*, *anima*, *asino*, *ordine*, *spirito*. In the Sienese dialect *e* has remained, as *ordenàre*, *cardenàle*, and in North Italian—Venet. *òmeni*, *fèmena*, *menèstra*, *òrdene*, *àseno*; Lomb. *òmen*, *àsen*, *ordenàri*, &c. In Spanish it is not unfrequent—*órden*, *úmedo*, *novedád*, *corredór*; comp. Prov. *lagrema*, *semenar*, *conoissedor*, and Old Fr. *aneme*, pronounced *ánme* (the spelling points to an older stage).

5. Unaccented medial *e* was often dropped, though less in Italian, except in the north, as in L. Lat. *dulkisma*, dulcissima (Pisaur., 410), answering to modern Romagnuòlo forms like *'strissm* = illustrissimo; generally L. Lat. *domnus*, *domna* = Ital. *donna*, "lady," "woman." In French all proparoxytones are contracted; for instance, Old Fr. (asinum, *as'no) *asne* âne, (anima, *an'ma) *anme* âme, (hominem, *hom'ne) *homme*, (femina, *fem'na), *femme*.

6. Accented *o* for *ŭ*, not unfrequent in the preceding period, was constant in Low Latin. While Lat. *lūcem* became Ital. *lúce*, Lat. *crŭcem*, *nŭcem* (*nŭcem*, open *u*) became *cróce*, *nóce*, like *vóce* from *vōcem*; comp. *jūstus*, Ital. giusto, Fr. juste, but *augŭstus*, Ital. agósto, Fr. août. This caused many to write *u* for close *o*, as *oxure* uxore, *geneture* genitorem, although this may partly represent a provincial *u*, as in Sicil. *amúri*. In Old Fr. we have *honour*, *favour*, and still *amour*, and in L. Lat. *curte* = cohortem, *cŏrte, Ital. córte, Fr. cour, Eng. court.

7. Unaccented *o* for *ŭ* as in Old Latin is frequent, as in L. Lat. *tabola*, *popolo*, *secolom*, *regola*, *volontate*, Ital. *távola*, *pòpolo*, &c.; even for original *u*, as *mano*, *spirito*.

8. Unaccented medial *o* was often dropped before *l*, in which case the unfamiliar group *t'l* was changed into *cl*, as in L. Lat. *oclus* oculus, Ital. *òcchio*, Span. *ojo*, Fr. œil; *veclus* vetulus, Ital. *vècchio* (Old Ital. *veglio*), Span. vièjo, Fr. vieil, vieux; also L. Lat. *tabla* = Span. tábla, *poplom* = Span. puéblo. In French syncope is a law—*table*, *peuple*, *sangle* cingulum, &c.

9. Final unaccented vowels in Italian on the whole obey the general laws. By the loss of the Latin final consonants all words end in a vowel, except such as *per*, *con*, *non*, *in*, *un bel giorno*, *buon giorno*. In South Italian *i*, *u* stand for *e*, *o*. In Spanish *e* is sometimes dropped, as *sed* sitim, Ital. séte; *paréd* parietem, Ital. paréte; *fácil*, *órden*. In Portuguese *o* is pronounced *u*, but often only whispered; *e* is nearly always whispered or mute. In North Italian, Ladino, Catalan, Provençal, and French all final vowels are generally dropped, except *a*, which remains in Provençal, as *port*, but *porta* (Mod. *pòrto*). In Catalan *a* is mostly pronounced as open *e*; in French this becomes obscure *e*, which in modern French is mute except in such cases as *table ronde*.

10. Accented *ie* stands for *ĕ*, *uo* for *ŏ*. As *ē* and *ĕ*, *ō* and *ŏ* were levelled in quantity, they were already distinguished in quality, as in Ital. *bène* bĕne, *véne* vēnae; Portuguese has got no further than this. But generally this was not distinct enough for the wants of the speakers, and unconsciously *è* (in which *è* from Lat. *ae* was included) became *iè*, and *ò* (in which *ò* from Lat. *au* was *not* included) became *uò*, both diphthongs being generally accented on the last vowel—Ital. and Span. *viène*, Fr. *vient* venit; Ital. *buono*, Span. *bueno*; Ital. *suòno*, Span. *suéno* (generally *sonido*) sonus, different from Ital. *sóno* sunt, Span. *son*. This change must be very old, as it is found in nearly all the Romance languages. In Spanish, Provençal, and French *uò* was changed into *ué*, and this in Modern French to *eu*, *œu*, contracted into the sound of *ö*. In Spanish the use of diphthongs is extended to position—*tiémpo*, *siéte* septem, Ital. sètte, *hiérro*, Ital. fèrro, *cuérpo*, Ital. còrpo, *muérte*, Ital. mòrte. Mark the displacement of stress in popular Latin—*pariétem* for pariĕtem, Ital. paréte, Span. paréd, Fr. paroi; *filiólus* for filiŏlus, Ital. figliuòlo, Span. hijuélo, Fr. filleul.

11. Of *mediae* (voiced stops) for *tenues* (voiceless stops), especially between vowels, we find some few earlier instances, as *grassus* for *crassus*, Ital. grasso, Fr. gras. This is generally rare in Italian Latin, as *gubitus*, cubitus, Ital. gómito, and is still comparatively rare in Italian. Yet it occurs in some of the most familiar words, as *ago* acus, *lago*, *luogo*, *segare*, *pagare* (pacare, "to satisfy,"

"pay"), *pregare, budello, parentado, contado* (comitatus), *contrada, spada, strada*; *p* from *b* becomes *v*, as in *riva, riviera, povero, savio*; before *r*—*padre, madre, segreto, lebbra.* This recalls similar changes in Umbrian, and was perhaps originally North Italian and from thence penetrated into Tuscany. In Spanish the voiced sounds are the general rule, as *fuégo*, Ital. fuòco, *amigo*, Ital. amico, *amado, finido*, Ital. amato, finito, *sabér*, Ital. sapére, &c., yet there are some exceptions, such as *poco* (paucum). In Old French the soft sound is the constant law, but this mostly disappears later, as in *aimé, aimée* (see FRANCE, vol. ix. p. 632 *sq.*). A general Romance case is placitum, Old Ital. *piaito*, Ital. *piato*, Span. *pleito*, Old Fr. *plaid*, through *plagito, *plajeto, which is singularly like the Umbrian *feitu, feetu* for *façitu.* A limited case is that of such words as Fr. *raison*, Ital. *ragione* from *rationem*, probably first changed to *ratsióne*, **radsióne*, thence to *rasione*, which sometimes occurs in Late Latin, and often in Early Italian, Span. *razon*; comp. Ital. *cagione* occasionem.

12. *I* and *e* unaccented before vowels, especially post-tonic, became *j*, as *filjus* (Plautus), *olium* pron. *oljo.* *J* coalesced with the preceding consonant, making it palatal, as in Ital. *figlio, oglio, figlia, maraviglia* (mirabília), *battaglia*; Span. *maravilla, batalla*; Fr. *fille, merveille, bataille* (in North French the palatal sound is replaced by *i* or *j*), &c. *N*—Ital. *vigna* vinea, *Spagna* Hispania, *ingegno, castagna, campagna, bagno* balneum; Span. *España, campaña*; Fr. *vigne, champagne.* In some cases *j* was assibilated, as Span. *granja, estranjero*, Fr. *songe, grange, étrange.*

13. Sometimes attraction takes place, *i* being transposed to the radical syllable, especially in French, as *huile, bain, témoin, Antoine, gloire, histoire.* Before and after *r* peculiar forms appear—Ital. *primaio* (*-jo*); *muojo* morior; Ital. *primiero, cavaliere*, from *primario*, probably assimilated into **primer*(*i*)*o* (Dr Thomsen). Forms like *paner, sorcerus* are found as early as the 8th century.

Vocabulary. 14. *Vocabulary.*—During this period the Roman world, after being conquered by the Germanic nations, adopted many words from their conquerors. The German influence was strongest in France; hence we find Germanic expressions for many of the most common words except form-words, though the stock of the language remains Latin. A curious instance, characteristic of the Middle Ages, is *rauba*, which from "robbery," "prey," came to mean "property," Ital. *roba* (*robba*), "things in general," Span. *ropa*, "linen," "stuff," Fr. *robe*, "gown." In Rumonsch we have *la rauba c'aud a mi*, "the property that belongs to me." The German *h*, as in *haïr*, old *hadir* = "hate," is peculiar to French, and is still sounded in Normandy. Some Germanic sounds had to be modified, as *w* to *gu*, for instance, *guerra* from *werra*, "war"; *guanto*, Old Fr. *guant*, Fr. *gant*, from *want*, Dan. *Vante*; in North French *w* remained, whence Eng. *war*, &c. Among the *leges barbarae*, the LEX SALICA is perhaps the most remarkable as a document of Low Latin. It has sentences and words like—hoc sunt *pariculas causas* = ce sont pareilles choses; si in dominica *ambactia* fuerit occupatus, Ital. ambasciata, Fr. ambassade; si quis alterum voluerit occidere et *colpus* praeter *fallierit*, Ital. se il colpo fallisce; si quis alterum *de* sagitta toxicata percutere voluerit et praeter *sclupurerit* (see *stloppus*, p. 665); si quis *caballum* extra consilium domini sui *caballicaverit*, Ital. cavalcare, Fr. chevaucher; si quis per malo ingenio in *curte* (Ital. córte, Fr. cour) alterius aut in *casa* (Ital. *casa*, "house") aliquid de furtum miserit; *companium*, Ital. compagnía; *baro, baronis*, "a free man," Old Fr. nom. *ber*, obj. *barun*, "hero," "baron"; *diffacere*, Ital. disfare, Fr. défaire; *excorticare*, Ital. scorticare, Fr. écorcher. From OTHER LAWS we have—*fortia*, Ital. forza, Fr. force; *hostis* exercitus, Eng. host; *vassus* (Celtic), "a vassal"; *auca*, Ital. òca, Fr. oie (from *avica*); *troppus*, grex (from Germ. *thorp*), Ital. truppa, Fr. troupe, and also Ital. *troppo*, "too much," Fr. *trop*; *forestis* (from *foris*), "foreign," Ital. forestiere; *marca* (Germ.), "border," whence *marchensis*, Ital. marchese, Fr. marquis; *tornare* (Greek; also Dacian Latin[1]). GREGORY OF TOURS (6th century) has *pagensis*, Ital. paése, Fr. pays. GREGORY THE GREAT has *merces*, "mercy"; *flasco*, Ital. fiasco, "a flask." CORIPPUS (Afr., *c.* 570): *cara*, "face" (Gr. *κάρα*, "head"), Span. *cara*, Old Fr. *chiere*, whence *bonne chère*, "good cheer" (originally the kind, hospitable countenance of the entertainer). VENANTIUS FORTUNATUS (*c.* 580): *cofia*, "coif"; *crema*, "cream"; *viaticum*, Ital. viaggio, Fr. voyage. OTHER SOURCES: *caminus*, "road" (Spanish Latin, 7th century; probably Celtic), Ital. cammino, Fr. chemin; *directum*, jus (Italian Latin, 551), Ital. diritto, Fr. droit. The late AGRIMENSORES: *circare*, Ital. cercare, Fr. chercher. OLD GLOSSES (7th and 8th centuries): *aciarium*, Ital. acciaio, Fr. acier; *cosinus*, consobrinus, Ital. cugino, Fr. cousin; *gamba*, Ital. gamba, Fr. jambe (Gloss. Cass.). ISIDORE: *tructa*, Fr. truite, Eng. trout; *cama*, Span. *cama*, "bed"; *ficatum*, "liver" (properly *jecur ficatum*, liver of geese fed with figs), Ital. fégato, Span. hígado, Fr foie; and *cusire*, consuere, Ital. cuscire, cucire, Span coser, Fr. coudre (Gloss. Isid.); *selvaticus*, Ital. selvaggio, Fr. sauvage; *formaticum*, Ital. formaggio, Fr. fromage.

VI. *Sixth* (*Last*) *Period.*

For the sixth and last period—that is, for the history and distinctive traits of the great modern Romance languages,—the reader is referred to the separate articles.

1. *Italian* is distinguished by its harmonious form, its vocalic endings, and the rich fulness of its tones.

2. *Spanish* is distinguished by its regularity, by its short, distinct sounds and its fixed tones, and by many Arabic words. Certain "thick" sounds, as the *j* (like Dutch and South German *ch*, though in the south of Spain much weaker, almost *h*) and the lisping *c, z* seem to be rather modern developments than due to direct Arabic influence.

3. *Portuguese* is, with *Gallego* (the dialect of Galicia), the western dialect of Spanish, and has almost the same words, but a very different pronunciation; in sound it approaches somewhat to French, as in the nasal vowels (which, however, are less purely vocalic than in French) and the voiced sounds of *s*, *z*, and *j*. It has partly retained the Old Spanish form, as in *filho* for Span. *hijo*, and partly it has a character of its own owing to its many obscured vowels and contractions, as *boa* for *bona*, *dôr* for *dolor*.

4. *Provençal* in many respects represents the earliest form of French; in others it has peculiar developments (see PROVENÇAL). *Catalan* is the southern dialect of Provençal.

5. *French* makes up for the want of the full forms and tones of Italian by its grace and delicacy. It has more of a history than the other Romance languages, Old French being very different from Modern.

6. *Ladino* (*Rumonsch*,[1] Germ. *Churwälsch*, from the town of Chur) or *Central Romance* extends from the Grisons to Friuli on the Adriatic. It is not uniform, being only an agglomeration of cognate dialects; and it is scarcely more Latin than any other Romance language. It has chiefly been elucidated by Ascoli.

7. *Roumanian* has probably not survived from the old Roman colonists of Dacia, but been imported from Istria (which has a cognate dialect) or Northern Italy. It has been greatly mixed up with Slavonic words and sounds (such as the "mixed" vowels), and has some distinctive marks, such as the post-positive article, *Romunul* = Romanus ille; compare the similar phenomenon in the Slavonic dialect of Bulgaria and in the Albanian language.

Literature.—The real founder of scientific Romance philology and linguistics is Friedrich Diez, in his *Grammatik der romanischen Sprachen*, 3 vols., Bonn, 1836-42, and *Etymologisches Wörterbuch der romanischen Sprachen*, 2 vols., 1852. He also published *Altromanische Sprachdenkmaler*, 1846; *Zwei altromanische Gedichte*, 1852; and *Altromanische Glossare*, 1865. Pott contributed several articles on the Low Latin of the *leges barbarae* in the *Zeitschriften* of Höfer and Kuhn. Other authorities on various branches of the subject are—Ducange, *Glossarium mediæ et infimæ latinitatis*, 7 vols.; Marini, *Papiri diplomatici*; Muratori, *Antiquitates Italicæ*; Schuchardt, *Der Vocalismus des Vulgärlateins*, 3 vols., 1866-68 (a valuable collection of materials), also several minor works by the same author; and Gaston Paris, *Étude sur le Rôle de l'Accent Latin dans la Langue Française*, Paris, 1862, and *La Vie de St Alexis* (a poem of 11th century), 1872. The principal magazines devoted to the subject are—*Jahrbuch für romanische und englische Literatur* (ed. Wolff, Ebert, and Lembcke), later only *für romanische Literatur*; *Archiv für das Studium der neueren Sprachen* (ed. Herrig), of a more popular character; *Romania* (a quarterly, ed. Gaston Paris and Paul Meyer, since 1872), contains articles of the most eminent Romanists; *Revue des Langues Romanes* (Montpellier, from 1870 onwards), chiefly devoted to Provençal; *Romanische Studien* (ed. Boehmer); *Zeitschrift für romanische Philologie* (ed. Gröber, since 1877); and *Romanische Forschungen* (ed. Vollmöller, since 1884). Mussafia has written many articles and treatises, chiefly in the *Transactions* of the Vienna Academy of Sciences. Ascoli, author of *Studi Critici*, has edited since 1873 the *Archivio Glottologico*, which has articles by Flecchia. The *Rivista di Filologia Romanza* (ed. Manzoni, Monaci, and Stengel, 1873) in 1878 became *Giornale di Filologia Romanza* (ed. Monaci). For the etymological dictionaries of the separate languages see the special articles. (J. ST.*)

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[1] The Greek historians Theophylact (*c.* 600) and Theophanes relate that the Dacian soldiers said in their native tongue *τόρνα, τόρνα, φράτρε, ρετόρνα.* This has been called by some the earliest trace of Roumanian.

[1] Rumonsch is properly the dialect of the upper Rhine valley, Ladino that of the Engadine. Ascoli includes all varieties under the common name of Ladino.

ROMAN LAW

CHAPTER I.—THE REGAL PERIOD.

Contributories to People, Customs, and Law.—The union of the Latin, Sabine, and, to a small extent, Etruscan bands that, as conquerors or conquered, old settlers or new immigrants, together constituted the first elements of the Roman people, did not necessarily involve contemporaneous adoption of identical institutions or identical notions of law. Although they were descended from the same Indo-European stock, and inherited the same primitive ideas about religion and government, those ideas must have been modified in the course of centuries of separate and independent development. The characteristics of the Latin race are said to have been its sense of the importance of discipline and the homage it paid to power and might; those of the Sabines were their religious feeling and their reverence for the gods; the characteristic of the Etruscans was their subservience to forms and ceremonies in matters both divine and human. Corresponding influences are very manifest in the growth of Rome's early public institutions, civil, military, and religious. It does not seem too much to say that these same influences are traceable also in the institutions of the private law. The *patria potestas*, with the father's power of life and death over his children; the *manus* and the husband's power over his wife; the doctrine that those things chiefly was a man entitled to call his own which he had taken by the strength of his arm; the right which a creditor had of apprehending and imprisoning his defaulting debtor and reducing him to slavery,—all these seem to point to a persuasion that might made right. The religious marriage ceremony and the recognition of the wife as mistress of the household and participant in its sacred offices as well as its domestic cares; the family council of kinsmen, maternal as well as paternal, who advised the *paterfamilias* in the exercise of the domestic jurisdiction; the practice of adoption, to obviate the extinction of a family and to prevent its deceased members being deprived of the prayers and sacrifices necessary for the repose of their souls,—these seem to have flowed from a different order of ideas and to bear evidence of Sabine descent. Etruscan influence could make itself felt only at a later date; but to it may possibly be attributed the strict regard that came to be required to the observance of ceremonials and words of style in the more important transactions both of public and private life.

While it can hardly be doubted that the result of the union of Latins and Sabines was that regulations were at once adopted which should apply to their public life as a united people, it is not only conceivable but probable that each tribe, as regarded the private relations of its members, continued for a time to accord a preference to its own ideas and traditions of right and law, and that the amalgamation was a gradual process, partly silent, partly due to regal or pontifical intervention.

Patricians, Clients, and Plebeians.—There was part of the law of Rome that even in the empire was known by the name of *Jus Quiritium*, the Law of the Spearmen; and this in the regal period constituted its main element. The *Quirites* were the members of the gentile houses, organized in their curies, primarily for military and secondarily for political purposes. They alone of the rapidly increasing population settled round the *urbs quadrata* ranked as citizens, down at least to the time of Servius Tullius. They alone could consult the gods through the medium of *auspicia*, and participate in the services offered to the tutelary deities of Rome. From their number the king drew his council of elders, and they alone could take part in the curiate comitia, the assembly of the warriors. They alone could contract a lawful marriage and make a testament; in a word, it was they alone that were entitled directly to the benefit of Rome's peculiar institutions.

These prerogatives they enjoyed as members of the gentile houses. Patrician Rome was a federation of *gentes* or clans, the clans aggregations of families bearing a common name, and theoretically at least tracing their descent from a common ancestor. Whether or not the traditional account of the numerical proportion of families to clans and of clans to curies has any substantial historical foundation, and whatever may be the explanation of the method by which the symmetry on which the old writers dwell with so much complacency was attained, it is beyond doubt that the gentile organization was common to the two races at least that contributed most largely to the citizenship of Rome, and that it was made the basis of the new arrangements. Federation necessitated the appointment of a common chieftain and common institutions, religious, military, political, and judicial. But it was long before these displaced entirely the separate institutions of the federated *gentes*. Every clan had its own cult, peculiar to its own members; this was the universal bond of association in those early times. It had its common property and its common burial-place. It must have had some common council or assembly, for we read not only of special gentile customs but of gentile statutes and decrees. Instances are on record of wars waged by individual *gentes*; so they must have had the right to require military service alike from their *gentiles* and *gentilicii*. Widows and orphans of deceased clansmen were under the guardianship of the *gens*, or of some particular member of it to whom the trust was specially confided. If a clansman left no heirs, his property passed to his fellow gentiles. Over the morals of its members the *gens* exercised supervision and discipline, interfering to prevent prodigality and improvidence, restraining abuses of the domestic authority, and visiting with censure and probably in grave cases with punishment any breach of faith or other dishonourable conduct; and it is difficult to suppose that, within its own limits, it was not constantly called upon, through the medium of its chief, to act the part of peacemaker and arbiter. Finally, its members were always entitled to rely upon its assistance, to have maintenance when indigent, to be ransomed from captivity, to be upheld in their just disputes and quarrels, and to be avenged when killed or injured.

Client

The successes of the burgesses in one petty war after another deprived many small communities of their independent existence, leaving their members bereft alike of their religion, their territory, and their means of subsistence. These had to turn elsewhere for protection, and in large numbers they sought it from their conquerors. To many others, both voluntary immigrants and refugees from other cities, the new settlement proved a centre of attraction. It was quite ready to receive them, but as subjects only, not as citizens. Following a custom familiar to both Latins and Sabines, the new-comers invoked the protection of the heads of patrician families of repute, to whom they attached themselves as free vassals. The relationship was known as that of patron and client. (See PATRON AND CLIENT, vol. xviii. p. 412.). The client became a dependent member of his patron's clan,—not *gentilis*, however, but only *gentilicius*. His patron had to provide him with all that was necessary for his sustenance and that of his wife and children; and, as private holdings increased in extent, it was not unusual for the patron or his *gens* to give him during pleasure a plot of land to cultivate for himself. The patron had, moreover, to assist him in his transactions with third parties, obtain redress for him for his injuries, and represent him before the tribunals when he became involved in litigation. The client, on the other hand, had to maintain his patron's interests by every means in his power. But the advantage must have been chiefly on the side of the client, who, without becoming a citizen, obtained directly the protection of his patron and his clan, and indirectly that of the state.

The plebeians, as distinguished from the clients, must be regarded as a heterogeneous mass of non-gentile freemen, small probably in numbers at first, but augmenting with ever greater rapidity, who had of choice or compulsion made Rome their domicile, but declined to subject themselves to a patron. That there was any general cohesion amongst them before the time of Servius there is not the slightest reason to believe. They were of different races, settling in Rome from different motives, practising in many matters different customs. The bulk of them, however, were undoubtedly Latins, with traditions and customs much the same as those of the greater number of the patrician houses; and this it was that in time caused the triumph of Latinism and the predominance of the masterful spirit in the *jus Quiritium*. But by the ruling caste those traditions and customs were simply ignored; till the time of Servius what protection the plebeians got was simply of the grace of the kings, whose policy it was to conciliate them as a body that in time might be a valuable auxiliary against the pretensions of the patricians.

The Regulatives of Public and Private Order.—We look in vain for, and it would be absurd to expect, any definite system of law in those early times. What passed for it was a composite of *fas*, *jus*, and *boni mores*, whose several limits and characteristics it is extremely difficult to define. This may to some extent be accounted for by the fact that much of what was originally within the domain of *fas*, once it had come to be enforced by secular tribunals, and thus had the sanction of human authority, was no longer distinguishable from *jus*; while it may be that others of its behests, once pontifical punishments for their contravention had gone into desuetude, sank to nothing higher than precepts of *boni mores*.

By *fas* was understood the will of the gods, the laws given by heaven for men on earth, much of it regulative of ceremonial, but a by no means insignificant part embodying rules of conduct. It appears to have had a wider range than *jus*. There were few of its commands, prohibitions, or precepts that were addressed to men as citizens of any particular state; all mankind came within its scope. It forbade that a war should be undertaken without the prescribed fetial ceremonial, and required that faith should be kept even with an enemy when a promise had been made to him under sanction of an oath. It enjoined hospitality to foreigners, because the stranger guest was presumed, equally with his entertainer, to be an object of solicitude to a higher power. It punished murder, for it was the taking of a god-given life; the sale of a wife by her husband, for she had become his partner in all things human and divine; the lifting of a hand against a parent, for it was subversive of the first bond of society and religion,—the reverence due by a child to those to whom he owed his existence; incestuous connexions, for they defiled the altar; the false oath and the broken vow, for they were an insult to the divinities invoked; the displacement of a boundary or a landmark, not so much because the act was provocative of feud, as because the march-stone itself, as the guarantee of peaceful neighbourhood, was under the guardianship of the gods. When an offence against any of these rules or prohibitions was inexpiable, the punishment was usually what is called *sacratio capitis*, excommunication and outlawry of the offender. The *homo sacer* was in every sense of the word an outcast,—one with whom it was pollution to associate, who dared take no part in any of the institutions of the state, civil or religious, whose life the gods would not accept as a sacrifice, but whom, nevertheless, any one might put to death with impunity as no longer god-protected. The precepts of the *fas* therefore were not mere exhortations to a blameless life, but closely approached to laws, whose violation was visited with punishments none the less effective that they were religious rather than civil.

Recent philology derives the word *jus* from the Sanscrit *ju*, to "join, bind, or unite," from which some deduce as its signification "that which binds," "the bond of society," others "that which is regular, orderly, or fitting." The latest inquirer (M. Bréal) identifies it with the *jos*, *jaos*, or *jaus* of the Vedas, and the *jaès* of the Zend-Avesta,—words whose exact meaning is controverted, but which he interprets as "the divine will." *Jubeo* is generally allowed to be a contraction of *jus hibeo*, "hold or take as *jus*." If Bréal's definition can be adopted we obtain a very significant interpretation of the words addressed by the presiding magistrate to the assembled comitia in asking them whether they assented to a law proposed by him,—*Velitis, jubeatis, Quirites*, &c., "Is it your pleasure, Quirites, and do you hold it as the divine will, that," and so on. As legislation by the comitia of the curies and centuries was regarded as a divine office, and their vote might be nullified by the fathers on the ground that there had been a defect in the *auspicia*, and the will of the gods consequently not clearly ascertained, this explanation of Bréal's seems not without support,—*vox populi vox dei*. If it be right, then the only difference between *fas* and *jus* was that the will of the gods, which both embodied, was in the one declared by inspired and in the other by merely human agency.

This *jus* might be the result either of traditional and inveterate custom (*jus moribus constitutum*) or of statute (*lex*).[1] We look in vain for any legislative enactment establishing such an institution, for example, as the *patria potestas*, or fixing the rules of succession on death. Statute may have regulated some of their details; but they had taken shape and consistency before Rome had its beginning. It can well be believed, however, that in the outset the customs in observance may have been far from uniform, that not only those of the different races but those also of the different *gentes* may at first have varied in some respects, but undergoing a gradual approximation, and in course of time consolidating into a general *jus Quiritium*. That the bulk of the law was customary is universally admitted. But Pomponius speaks of certain laws enacted by the comitia of the curies, which he calls *leges regiae* and which, he says, were collected by one Sext. Papirius in the reign of one of the Tarquins, under the name of *Jus Papirianum*. The opinion of the best authorities is that it is a mistake to attribute these so-called "royal laws" to that assembly. According to the testimony of the old writers it had very little share in the work of legislation. Romulus *jura dedit* at his own hand, not *jura tulit*. Mommsen is probably near the mark when he describes the *leges regiae* as mostly rules of the *fas* which were of interest not merely for the pontiffs but for the public, with which it was of importance that the latter should be acquainted, that they might know the risks they incurred from their contravention.[1] It is not to be assumed that there was no legislation beyond this; some of the laws of which we have record were of a different character. But on the whole it seems beyond doubt that it was custom rather than statute that was the main factor of the *jus* of the regal period.

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[1] There is controversy about the etymology of the word *lex*. It was used by the jurists in two distinct senses—(1) as meaning a comitial enactment (Gai., i. 3), and hence was occasionally called *lex publica* (Gai., ii. 104, iii. 174); (2) as meaning an obligation, restriction, condition, declaration, or what not, expressly incorporated in a private deed (*lex privata*), as in the phrases *lex mancipii*, *lex contractus*, *lex testamenti*, &c. Its most likely derivation is from λέγειν, "to say" or "to speak." The *lex publica* was always put to the comitia by word of mouth; and the XII. Tables, in declaring the binding effect of a *lex privata* when grafted on a conveyance or contract *per aes et libram*, use in reference to it the phrase *uti lingua nuncupassit* (Festus s.v. *Nuncupata*; Bruns, *Fontes jur. rom. antiqui*, p. 23).

What went by the name of *boni mores*, quite distinct from the *jus moribus constitutum*, must also be regarded as one of the regulatives of public and private order. Part of what fell within their sphere might also be expressly regulated by *fas* or *jus*, but there was much that was only gradually brought within the domain of these last, and even down to the end of the republic not a little that remained solely under the guardianship of the family tribunal or the censor's *regimen morum*. Its function was twofold: sometimes it operated in restraint of law by condemning—though it could not prevent—the ruthless and unnecessary exercise of legal right, as, for example, that of the head of a house over his dependants; and sometimes it operated supplementarily, by requiring observance of duties that could not be enforced by any compulsitor of law. Dutiful service, respect, and obedience from inferiors to superiors, chastity, and fidelity to engagements, express or implied (*fides*), were among the *officia* that were thus inculcated, and whose neglect or contravention not only affected the reputation but often entailed punishments and disabilities, social, political, or religious. It was the duty of those in authority to enforce their observance by such *animadversio* as they thought proper,—the *paterfamilias* in his family, the *gens* among its members, the king in relation to the citizens generally; and many a wrong was prevented not by the fear of having to make reparation to the party injured but by the dread of the penalties that would follow conduct unbecoming an upright citizen.

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mily.

The Quiritian Family.—The word *familia* in Roman law had at once a more extensive and a more limited meaning than it has in its English form.[2] Husband, wife, and children did not necessarily constitute an independent family among the Romans, nor were they all necessarily of the same one. Those formed a family who were all subject to the right or power—originally *manus*,[3] but latterly *jus*—of the same family head (*paterfamilias*). He might have a whole host dependent on him,—wife and sons and daughters, and daughters-in-law, and grandchildren by his sons, and possibly remoter descendants related through males; so long as they remained subject to him they constituted but one family, that was split up only on his death or loss of citizenship. But if his wife had not passed *in manum*—and that was common enough even during the republic, and universal in the later empire—she did not become a member of his family: she remained a member of the family in which she was born, or, if its head was deceased or she had been emancipated, was the sole member of a family of her own. Both sons and daughters on emancipation ceased to be of the family of the *paterfamilias* who had emancipated them. A daughter's children could never under any circumstances be members of the family of their maternal grandfather; for children born in lawful marriage followed the family of their father, while those who were illegitimate ranked from the moment of birth as *patresfamilias* and *matresfamilias*.

With the early Romans, as with the Hindus and the Greeks, marriage was a religious duty a man owed alike to his ancestors and to himself. Believing that the happiness of the dead in another world depended on their proper burial and on the periodical renewal by their descendants of prayers and feasts and offerings for the repose of their souls, it was incumbent upon him above all things to perpetuate his race and his family cult. In taking to himself a wife, he was about to detach her from her father's house and make her a partner of his family mysteries. With the patrician at least this was to be done only with divine approval, ascertained by *auspicia*. His choice was limited to a woman with whom he had *connubium* (ἐπιγαμία) or right of intermarriage. This was a matter of state arrangement; and in the regal period Roman citizens could have it outside their own bounds only with members of states with which they were in alliance, and with which they were connected by the bond of common religious observances. A patrician citizen, therefore, if his marriage was to be reckoned lawful (*justae nuptiae*), had to wed either a fellow-patrician or a woman who was a member of an allied community. The ceremony was a religious one, conducted by the high priests of the state, in presence of ten witnesses, representatives probably of the ten curies of the bridegroom's tribe, and was known as *confarreatio*. Its effect was to dissociate the wife entirely from her father's house and to make her a member of her husband's; for confarreate marriage involved what was called *in manum conventio*, the passage of the wife into her husband's "hand" or power, provided he was himself *paterfamilias*; if he was not, then, though nominally in his hand, she was really subject like him to his family head. Any property she had of her own—which was a possible state of matters only if she had been independent before marriage—passed to him as a matter of course; if she had none, her *paterfamilias* provided her a dowry (*dos*), which shared the same fate. Whatever she acquired by her industry or otherwise while the marriage lasted also as a matter of course fell to her husband. In fact, so far as her patrimonial interests were concerned, she was in much the same position as her children; and on her husband's death she had a share with them in his inheritance as if she had been one of his daughters. In other respects *manus* conferred more limited rights than *patria potestas*, for Romulus is said to have ordained that, if a man put away his wife except for adultery or one of two or three other very grave offences, he forfeited his estate half to her and half to Ceres, while if he sold her he was to be given over to the infernal gods.

The *patria potestas* was the name given to the power exercised by a father, or by his *paterfamilias* if he was himself *in potestate*, over the issue of such *justae nuptiae*

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[1] The most recent and comprehensive treatise on the subject of the Royal Laws, which also contains references to the earlier literature, is that of Voigt, *Ueber die Leges Regiae*, Leipsic, 1876, 1877 (republished from the *Transactions* of the Saxon Academy). A collection of them from Livy, Dionysius, Plutarch, Servius, Macrobius, &c., will be found in Bruns, p. 1 *sq.* Of the *Jus Papirianum* referred to by Pomponius no remains are extant; but Paul (*Dig.* l. 16, fr. 144) mentions incidentally that it was commented on by one Granius Flaccus, who was of the time of Julius Cæsar.

[2] *Familia* and "family" are used in this section solely to designate the group of persons subject to the same *paterfamilias*. Occasionally the word meant (1) a *gens* (or group of families in the stricter sense); or (2) the family estate proper, as in the provisions of the XII. Tables about succession—*adgnatus proximus familiam habeto*; or (3) the family slaves collectively, as in the phrases *familia urbana*, *familia rustica*.

[3] This word *manus*, though in progress of time used chiefly to express the power a husband had over the wife who had become a member of his family, was originally the generic term for all the rights exercised not only over the things belonging but also the persons subject to the head of the house; for a slave when enfranchised was said to be "manumitted," and the same phrase was also employed occasionally to express the condition of a *filiusfamilias* released from the *potestas*, although "emancipated" was the usual one.

The Roman jurists boasted that it was a right enjoyed by none but Roman citizens; and it certainly was peculiar to them in this sense, that nowhere else, except among the Latin race from which they had sprung, did the paternal power attain such an intensity. The omnipotence of the *paterfamilias* and the condition of utter subjection to him of his children *in potestate* became greatly modified under the empire; but originally the children, though in public life on an equality with the house father, in private life, and so long as the *potestas* lasted, were subordinated to him to such an extent as, according to the letter of the law, to be in his hands little better than his slaves. They could have nothing of their own: all they earned was his; and, though it was quite common when they grew up for him to give them *peculia*, "cattle of their own," to manage for their own benefit, these were only *de facto* theirs, but *de jure* his. For offences committed by them outside the family circle, for which he was not prepared to make amends, he had to surrender them to the injured party, just like slaves or animals that had done mischief. If his right to them was disputed he used the same action for its vindication that he employed for asserting his ownership of his field or his house: if they were stolen, he proceeded against the thief by an ordinary action of theft; if for any reason he had to transfer them to a third party, it was by the same form of conveyance that he used for the transfer of things inanimate. Nor was this all; for, according to the old formula recited in that sort of adoption known as adrogation, he had over them the power of life and death, *jus vitae necisque*. This power was subject to certain restrictions during the infancy of a child; but, when he had grown up, his father, in the exercise of his domestic jurisdiction, might visit his misconduct, not only in private but in public life, with such punishment as he thought fit, even banishment, slavery, or death.

It might happen that a marriage was fruitless, or that a man saw all his sons go to the grave before him, and that the *paterfamilias* had thus to face the prospect of the extinction of his family and of his own descent to the tomb without posterity to make him blessed. To obviate so dire a misfortune he resorted to the practice of adoption, so common in India and Greece. If it was a *paterfamilias* that he adopted the process was called adrogation (*adrogatio*); if it was a *filiusfamilias* it was simply *adoptio*. The latter, unknown probably in the earlier regal period, was a somewhat complicated conveyance of a son by his natural parent to his adopter, the purpose of course being expressed; its effect was simply to transfer the child from the one family to the other. But the former was much more serious, for it involved the extinction of one family[1] that another might be perpetuated. It was therefore an affair of state. It had to be approved by the pontiffs, who probably had to satisfy themselves that there were brothers enough of the adrogatee to attend to the interests of the ancestors whose cult he was renouncing; and on their favourable report it had to be sanctioned by a vote of the curies, as it involved the deprivation of his *gens* of their possible right of succession to him. The result was that the *adrogatus*, from being himself the head of a house, sank to the position of a *filiusfamilias* in the house of his adopting parent; if he had had wife or children subject to him, they passed with him into his new family, and so did everything that belonged to him and that was capable of transmission from one person to another. The adopting parent acquired *potestas* and power of life and death over the adopted child exactly as if he were the issue of his body; while the latter enjoyed in his new family the same rights exactly that he would have had if he had been born in it.

The *manus* and the *patria potestas* represent the masterful aspects of the patrician's domestic establishment. Its conjugal and parental ones, however, though not so prominent in the pages of the jurists, are not to be lost sight of. The Roman family in the early history of the law was governed as much by *fas* as by *jus*. It was an association hallowed by religion, and held together not by might merely but by conjugal affection, parental piety, and filial reverence. The purpose of marriage was to rear sons who might perpetuate the house and the family *sacra*. In entering into the relationship the wife renounced her rights and privileges as a member of her father's house; but it was that she might enter into a lifelong partnership with her husband, and be associated with him in all his family interests, sacred and civil. The husband was priest in the family, but wife and children alike assisted in its prayers, and took part in the sacrifices to its lares and penates. As the Greek called his wife the house-mistress, δέσποινα, so did the Roman speak of his as *materfamilias*,[2] the house-mother. She was treated as her husband's equal. As for their children, the *potestas* was so tempered by the natural sense of parental duty on the one side and filial affection on the other that in daily life it was rarely felt as a grievance; while the risk of an arbitrary exercise of the domestic jurisdiction, whether in the heat of passion or under the impulse of justifiable resentment, was guarded against by the rule which required the *paterfamilias* to consult in the first place the near kinsmen of his child, maternal as well as paternal. Even the incapacity of the subject members of the family to hold property of their own cannot in those times have been regarded as any serious hardship; for, though the legal title to all their acquisitions was in the house-father, yet in truth they were acquired for and belonged to the family as a whole, and he was but a trustee to hold and administer them for the common benefit.

In Greece the *patria potestas* never reached such dimensions as in Rome, and there it ceased, *de facto* at least, when a son had grown up to manhood and started a household of his own. But in Rome, unless the *paterfamilias* voluntarily put an end to it, it lasted as long as the latter lived and retained his status. The marriage of a son, unlike that of a daughter passing into the hand of a husband, did not release him from it, nor did his children become subject to him so long as he himself was *in potestate*. On the contrary, his wife passed on marriage into the power of her father-in-law, and their children as they were born fell under that of their paternal grandfather; and the latter was entitled to exercise over his daughters-in-law and grandchildren the same rights he had over his sons and unmarried daughters. But there was this difference, that, when the *paterfamilias* died, his sons and daughters who had remained *in potestate* and his grandchildren by a predeceased son instantly became their own masters (*sui juris*), whereas grandchildren by a surviving son simply passed from the *potestas* of their grandfather into that of their father.

The acquisition of domestic independence by the death of the family head frequently involved the substitution of the guardianship of tutors (*tutela*) for the *potestas* that had come to an end. This was so invariably in the case of females *sui juris*, no matter what their age: they remained under guardianship until they had passed by marriage *in manum mariti* It was only pupil males, however, who required tutors, and their office came to an end when puberty was attained. It is doubtful whether during the regal period a testamentary appointment of tutors by a husband or parent to wife or children was known in practice,—probably not. If so the office devolved upon the *gens* to which the deceased *paterfamilias* belonged; and it may reasonably be assumed that it delegated the duties to one of its members in particular, retaining in its collective capacity a right of supervision.

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[1] A *paterfamilias* who had no person subject to him constituted a "family" in his own person.

[2] *Materfamilias* is used in the texts in two distinct senses,—(1) as a woman *sui juris*, *i.e.*, not subject to any family head, and (2) as a wife *in manu mariti*.

The Quiritian Law of Property.—The distribution of land amongst the early Romans is one of the puzzling problems of their history. The Servian constitution classified the citizens and determined their privileges, duties, and burdens according to the extent of their freeholds; and yet we know very little with certainty of the way in which these were acquired.[1] We have indeed a traditional account of a partition by Romulus of the little territory of his original settlement into three parts, not necessarily of equal dimensions, one of which was intended for the maintenance of the state and its institutions, civil and religious, the second (*ager publicus*) for the use of the citizens and profit of the state, and the third (*ager privatus*) for subdivision among his followers. Varro and Pliny further relate that to each of them he assigned a homestead (*heredium*) of two jugers, equal to about an acre and a quarter, to be held by him and his heirs (*quae heredem sequerentur*),—Pliny adding that to none did the king give more. There can be no doubt that a portion of the territory, gradually augmented through new conquests, was reserved as *ager publicus*; that is sufficiently attested by the complaints made for centuries by the plebeians of its monopolization by the patricians. But it is impossible to admit the accuracy of the account of the mode in which the *ager privatus* was dealt with. The fact that the majority of the Servian local tribes bore the names of well-known patrician *gentes* leads to the conclusion that many at least of the clans held tracts of land in their corporate capacity, and that their constituent families settled alongside each other, each with its own homestead in separate and independent right. It can hardly be assumed, however, that two and a half jugers was its maximum. Seven jugers, about 4½ acres, seems to have been the normal extent of royal grants to plebeians, and a patrician's freehold is not likely to have been less; probably in the ordinary case it was larger, seeing the minimum qualification for the third Servian class was ten jugers, and for the first twenty.[2] To enable him to make grants during pleasure to his clients he must have held more than seven. But he did not necessarily hold all his lands by gratuitous assignation either from the state or from his *gens*; purchase from the former was by no means uncommon; and it may have been on his purchased lands, outside his *heredium* proper, that his clients were usually employed. Those dependants were also employed in large numbers upon those parts of the *ager publicus* which were occupied by the patricians under the name of *possessiones*, and which really were the source of their wealth. These, however, were not the property of their occupant; it was the lands acquired by assignation or purchase that were alone regarded as his *ex jure Quiritium*,—what he held in independent ownership to him and his heirs according to the law and custom of the Quirites.

There are some who maintain that in the regal period, anterior to the reign of Servius Tullius, there was no private property in movables. The proposition thus broadly stated is manifestly untenable. If no more be meant by it than this, that movables were not then recognized as objects of quiritarian right that could be vindicated as such by a real action *per sacramentum*, it may be admitted that down to the time of Servius, with exception perhaps of captured slaves and cattle, there was no property in movables. But, if it be meant to negative the right of a man to alienate by tradition what he held as his own, and to protect himself, or have protection from the authorities, against any attempt to deprive him of it by theft or violence, then the non-existence of ownership of movables must be emphatically denied. Theft was theft, though the stolen article had been acquired only by natural means,—by barter in the market, by the industry of the maker, or as the product of something already belonging to its holder.

Quiritian law of succession.

The Quiritian Law of Succession.—The legal order of succession in the regal period was extremely simple. It was this: on the death of a *paterfamilias* his patrimony devolved upon those of his children *in potestate* who by that event became *sui juris*, his widow taking an equal share with them, and no distinction being made between movables and immovables, personalty and realty; and, failing widow and children, it went to his *gens*. The notion that between the descendants and the *gens* came an intermediate class under the name of agnates does not seem well founded as regards the regal period; they were introduced by the XII. Tables to meet the case of the plebeians, who, having no *gentes*, were without legal heirs in default of children.[3]

The later jurists more than once refer to the perfect equality of the sexes in the matter of succession in the ancient law.[4] But it was more nominal than real. A daughter who had passed into the hand of a husband during her father's lifetime of course could have no share in the latter's inheritance, for she had ceased to be a member of his family. One who was *in potestate* at his death, and thereby became *sui juris*, did become his heir, unless he had prevented such a result by testamentary arrangements. But even then it was in the hands of the *gens* to prevent risk of prejudice to themselves: for she could not marry, and so carry her fortune into another family, without their consent as her guardians; neither could she without their consent alienate any of the more valuable items of it; nor, even with their consent, could she make a testament disposing of it in prospect of death. Her inheritance, therefore, was hers in name only; in reality it was in the hands of her guardians.

Of primogeniture or legal preference of one member of the family over the others there is not the faintest trace. And yet we find record of *heredia* remaining in a family not for generations merely but for centuries,—a state of matters that would have been impossible had every death of a *paterfamilias* necessarily involved a splitting up of the family estate. It is conceivable that this was sometimes prevented by arrangement amongst the heirs themselves;

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[1] See Giraud, *Recherches sur le droit de propriété chez les Romains*, Aix, 1838 (only first vol. published); Macé, *Histoire de la propriété, du domaine public, et des lois agraires chez les Romains*, Paris, 1851; Hildebrand, *De antiquissimis agris Romani distributionis fide*, Jena, 1862; Voigt, "Ueber die *bina jugera* d. ältesten röm. Agrarverfassung," in *Rhein. Mus. f. Phil.*, vol. xxiv. (1869), p. 52 *sq.*, the opinions in which are somewhat modified in his *XII. Tafeln*, Leipsic, 1883, vol. i. § 102; Karlowa, *Röm. Rechtsgeschichte*, Leipsic, 1885, vol. i. § 15.

[2] At the same time the writers of the empire frequently refer to the early *heredium* of seven jugers as having been amply sufficient for its frugal owner, content to till it himself with the aid of his sons. The case of Cincinnatus in the year 293 U.C. is often mentioned: having a freehold of just that extent, he had to sell three jugers to meet engagements for which he believed himself in honour responsible, and yet found the remaining four ample enough to maintain him with all the dignity of a man who had been consul and who became dictator.

[3] It is quite true, however, that from the first the order of succession was agnatic; for it was those only of a man's children who were agnate as well as cognate that had any claim to his inheritance; and the *gens* was, theoretically at least, just a body of agnates. The supposed mention of agnates in a law attributed to Numa rests simply on a conjecture of I. G. Huschke's (*Analecta litteraria*, Leipsic, 1826, p. 375). The law, which is preserved in narrative by Servius, *In Virg. Eclog.*, iv. 43, runs thus: "In Numae legibus cautum est, ut si quis imprudens occidisset hominem, pro capite occisi et natis ejus in cautione (Scalig., concione) offerret arietem." Huschke's substitution of *agnatis* for *et natis* is all but universally adopted; but, even were it necessary, it need mean nothing more than his children *in potestate* or his *gens*.

[4] The Voconian law of 585 U.C. avowedly introduced something new in prohibiting a man of fortune from instituting a woman, even his only daughter, as his testamentary heir; but even it did not touch the law of intestacy.

and the practice of every now and then drafting the younger members of families to colonies diminished the number of those who had a claim to participate. But the simplest plan of avoiding the difficulty was for the *paterfamilias* to regulate his succession by testament; and there can be little doubt that originally such a deed was had recourse to, not so much for instituting a stranger heir when a man had no issue—according to patrician notions his duty then was to perpetuate his family by adopting a son—as for partitioning the succession when he had more children than one.

There were two sorts of testaments made use of by the patricians of the regal period,—that made in the comitia of the curies (*test. calatis comitiis*) and that made in the presence of a few comrades on the eve of battle (*test. in procinctu factum*). The first at least—and the second was just a substitute for it on an emergency—was far from being an independent exercise of the testator's *voluntas*. For, though in course of time and under the sanction of the *uti legassit ita jus esto* of the XII. Tables, the curies may have become merely the recipients of the oral declaration by the testator of his last will, in order that they might testify to it after his death, it is impossible not to see in the comitial testament what must originally have been a legislative act, whereby the testator's peers, for reasons which they and the presiding pontiffs thought sufficient, sanctioned in the particular case a departure from the ordinary rules of succession. The pontiffs were there to protect the interests of religion, and the curies to protect those of the testator's *gens*; and it is hardly conceivable that a testament could have been sanctioned by them which so far set at nought old traditions as to deprive a *filiusfamilias* of his birthright, at least in favour of a stranger.

Family, *Family, Property, and Succession amongst the Plebeians.*—If perfect identity of law and custom cannot be assumed to have existed amongst the patricians in the earliest years of Rome, far less can it be supposed to have existed amongst the heterogeneous population that constituted the *plebs*. A large proportion of them, it is true, were of Latin descent, to whom gentile institutions and the *manus* and the *patria potestas* of the family were nothing strange; but alongside of them were other tribes that Rome had vanquished, who had very different traditions, and some of whom, as is thought by one or two writers of note, laid more store on female kinship than on that through males. From the moment that any of the former became part of the Roman *plebs* everything like gentile organization was of course suppressed; public policy could not suffer the continuance of what might have proved an element of danger to the state. The inevitable consequence was a disturbance of the whole family system. Having no longer any clansmen to stand by them in emergencies, to avenge their quarrels and deaths, and to act as guardians of their widows and orphans, the plebeians of Latin origin seem to have drawn closer in their ideas to their fellows of Etruscan and Hellenic descent, and to have transferred their regards to the circle of their relatives by blood and marriage (*cognati et adfines*). It is remarkable that, notwithstanding the pre-eminence given to agnates by the XII. Tables in matters of tutory and succession, the law reserved to the cognates, as distinguished from the agnates, certain rights and duties that in patrician Rome must have belonged to the *gens*,—for example, the duty of prosecuting the murderer (originally of avenging the death) of a kinsman, and the right of appeal against a capital sentence pronounced upon a kinsman. This can only have been because in olden times, when agnation was unknown as distinct from the *gens*, it was plebeian practice to entrust those rights and duties to the sobrinal circle of cognates.[1]

In the discussions on the Canuleian law in the year 309 U.C. it suited the line of argument of patrician orators to decry plebeian unions as something not deserving of the name of *nuptiae*, and to stigmatize them as mere *matrimonia*,—relations entered into between men and women for the sake of making the latter mothers, but involving none of those features that characterized patrician marriage.[2] That there may have been laxity amongst many of the plebeians in their domestic relations is extremely probable. The ceremony of confarreation was denied to them, and coemption (as seems likely) was not yet invented, so that the only way of contracting a marriage that was open to them was simple interchange of consent, which was not legally creative of *manus*. Whether it was creative of *patria potestas* over the issue of the union may be doubted. Some of the plebeians may have been of opinion that it did create it and may *de facto* have exercised the right it conferred, while others may have been indifferent as to whether it did or not; but we may be very sure that the patricians denied its possibility, on the ground that it was a prerogative of Roman citizens, amongst whom the plebeians had no claim to rank.

Property The accounts of the early distributions of land amongst the plebeians are even more uncertain than those we have of its distribution amongst the patricians. They had undoubtedly become freeholders in large numbers before the Servian reforms. But they probably attained that position only by gradual stages. There are indications that their earliest grants from the kings in their character of royal clients (as Cicero calls them) were only during pleasure; but latterly, as they increased in numbers and importance, they obtained concessions of *heredia* varying in extent from two to seven jugers. That those who had the means also frequently acquired land by purchase from the state may be taken for granted. In fact there is good reason to believe that by the time of Servius the plebeians were as free to hold land in private property as the patricians, although the stages by which they reached equality in this respect are uncertain and difficult to follow. As for movable property their rights in it were presumably the same as those of the patricians.

Succession, amongst the plebeians. As regards the law of succession it may safely be assumed that by custom at all events the children of a plebeian usually took his estate on his death. But, as he was not a member of a *gens*, there was no provision for the devolution of his succession on failure of children. The want of them he could not supply by adrogation, as he had for long no access to the assembly of the curies; and it is very doubtful if adoption of a *filiusfamilias* was known before the reforms of Servius Tullius. The same cause that disqualified him for adrogating a *paterfamilias* disqualified him for making a testament *calatis comitiis*; and even one *in procinctu* was impossible, since, although before the time of Servius plebeians may occasionally have served in the army, they were not citizens, and so had not the requisite capacity for making a testament. Until therefore the XII. Tables introduced the succession of agnates a plebeian unsurvived by children was necessarily heirless,—that is to say, heirless in law. But custom seems to have looked without disfavour on the appropriation of his *heredium* by an outsider: a brother or other near kinsman would have the earliest opportunity, and, if he maintained his possession of it in the character of heir for a reasonable period, fixed by the XII. Tables at a year, the law dealt with him as heir, and in course of time the pontiffs imposed upon him the duty of maintaining the family *sacra*. This was the origin, and a very innocent and laudable one, of the *usucapio pro herede*, which Gaius condemns as an incomprehensible and infamous institution, and which undoubtedly lost some of its *raison d'être* once the right of succession of agnates had been introduced.

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[1] On this subject see Klenze, *Das Familienrecht der Cognaten und Affinen nach röm. u. verwandten Rechten*, Berlin, 1828.

[2] The same notion accounts for the grammatically untenable explanation of *patricii* in Liv., x. 8, § 10, "Qui patrem ciere possunt," *i.e.*, patricians were father's sons, while plebeians, before they were admitted to citizenship and *conubium*, were only reckoned mother's sons.

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Contract and its Breach.—To speak of a law of obligations in connexion with the regal period, in the sense in which the words were understood in the later jurisprudence, would be a misapplication of language. It would be going too far to say, however, as is sometimes done, that before the time of Servius Rome had no law of contract; for men must have bought and sold, or at least bartered, from earliest times,—must have rented houses, hired labour, made loans, carried goods, and been parties to a variety of other transactions inevitable amongst a people engaged to any extent in pastoral, agricultural, or trading pursuits. It is true that a patrician family with a good establishment of clients and slaves had within itself ample machinery for supplying its ordinary wants, and was thus to a great extent independent of outside aid. But there were not many such families; and the plebeian farmers and the artisans of the guilds were in no such fortunate position. There must therefore have been contracts and a law of contract; but the latter was very imperfect. In barter—for at that time money was not yet in use—with instant exchange and delivery of one commodity against another, the transaction was complete at once without the creation of any obligation. But in other cases, such as those alluded to, one of the parties at least must have trusted to the good faith of the other. What was his guarantee, and what remedy had he for breach of engagement?

His reliance in the first place was on the probity of the party with whom he was dealing,—on the latter's reverence for Fides, and the dread he had of the disapprobation of his fellows should he prove false, and of the penalties, social, religious, or pecuniary, that might consequently be imposed on him by his *gens* in the case of a patrician, by his guild in the case of a craftsman, or by the king in the case of any other plebeian.[1] If the party who had to rely on the other's good faith was not satisfied with his promise and the grasp of the right hand that was its seal,[2] he might require his solemn oath (*jusjurandum*); and it can hardly be doubted that, whatever may have been the case at a later period, in the time of the earlier kings he who forswore himself was amenable to pontifical discipline. If he preferred a more substantial guarantee, he took something in pledge or pawn from the other contractor; and, though he had no legal title to it, and so could not recover it by judicial process if he lost possession, yet so long as he retained it he had in his own hand a *de facto* compulsitor to performance. Upon performance he could be forced to return it or suffer a penalty,—not by reason of obligation resulting from a contract of pledge, for the law as yet recognized none, but because, in retaining it after the purpose was served for which he had received it, he was committing theft and liable to its punishment. At this stage breach of contract, as such, does not seem to have legitimated any action for damages or reparation before the civil tribunals; but it is not improbable that, where actual loss had been sustained, the injured party was permitted to resort immediately to self-redress by seizure of the wrongdoer or his goods. Such self-help was according to the spirit of the time,—not self-defence merely in presence of imminent danger, but active measures for redress of wrongs already completed.

Public and Private Offences and their Punishment.—For anything like a clear line of demarcation between crimes, offences, and civil injuries we look in vain in regal Rome. Offences against the state itself, such as trafficking with an enemy for its overthrow (*proditio*) or treasonable practices at home (*perduellio*), were of course matter of state concern, prosecution, and punishment from the first. But in the case of those that primarily affected an individual or his estate there was a halting between, and to some extent a confusion of, the three systems of private vengeance, sacral atonement, and public or private penalty.[3] It has been attempted to explain the coexistence of these systems by reference to the different temperaments of the races that constituted united Rome; and this certainly is a consideration that cannot be left out of view. But the same sequence is observable in the history of the laws of other nations whose original elements were not so mixed, the later system gradually gaining ground upon the earlier and eventually overwhelming it. The remarkable thing in Rome is that private vengeance should so long not only have left its traces but really continued to be an active power. It must still have been an admitted right of the *gens* or kinsmen of a murdered man in the days of Numa; otherwise we should not have had that law of his providing that, where a homicide was due to misadventure, the offering to them of a ram should stay their hands. To avenge the death of a kinsman was more than a right: it was a religious duty, for his *manes* had to be appeased; and so strongly was this idea entertained that, even long after the state had interfered and made murder a matter of public prosecution, a kinsman was so imperatively bound to set it in motion that if he failed he was not permitted to take anything of the inheritance of the deceased. Private vengeance was lawful too at the instance of a husband or father who surprised his wife or daughter in an act of adultery; he might kill her and her paramour on the spot, though, if he allowed his wrath to cool, he could afterwards deal with her only judicially in his domestic tribunal. The talion we read of in the XII. Tables is also redolent of the *vindicta privata*, although practically it had become no more than a compulsitor to reparation. And even the nexal creditor's imprisonment of his defaulting debtor (*infra*, p. 694), which was not abolished until the fifth century of the city, may not unfittingly, in view of the cruelties that too often attended it, be said to have savoured more of private vengeance than either punishment or procedure in reparation.

Expiatio, supplicium, sacratio capitis, all suggest offences against the gods rather than against either an individual or the state. But it is difficult to draw the line between different classes of offences, and predicate of one that it was a sin, of another that it was a crime, and of a third that it was but civil injury done to an individual.[4] They ran into each other in a way that is somewhat perplexing. Apparently the majority of those specially mentioned in the so-called *leges regiae* and other records of the regal period were regarded as violations of divine law, and the punishments appropriate to them determined upon that footing. Yet in many of them the prosecution was left to the state or to private individuals. It is not clear, indeed, that there was any machinery for public prosecution except in treason and murder,—the former because it was essentially a state offence, the latter because it was comparatively early deemed expedient to repress the blood-feud, which was apt to lead to deplorable results when friends and neighbours appeared to defend the alleged assassin.[1]

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[1] Such as debarment from gentile or guild privileges, exclusion from right of burial in the gentile or guild sepulchre, fines in the form of cattle and sheep, &c.

[2] Some of the old writers (*e.g.*, Liv., i. 21, § 4, xxiii. 9, § 3; Plin., *H.N.*, xi. 45; Serv., *In Aen.*, iii. 687) say that the seat of Fides was in the right hand, and that to give it (*promittere dextram*,—is this the origin of the word "promise"?) in making an engagement was emphatically a pledge of faith. See a variety of texts illustrating the significance of the practice, and testifying to the regard paid to Fides before foreign influences and example had begun to corrupt men's probity and trustworthiness, in Lasaulx, *Ueber d. Eid bei d. Römern*, Wurzburg, 1844, p. 5 *sq.*; Danz, *Der sacrale Schutz im röm. Rechtsverkehr*, Jena, 1857, pp. 139, 140; Pernice, *Labeo*, vol. ii., Halle, 1878, p. 408 *sq.*

[3] See Abegg, *De antiquissimo Romanorum jure criminali*, Konigsberg, 1823, p. 36 *sq.*; Rein, *Das Criminalrecht der Römer*, Leipsic, 1844, p. 21 *sq.*; Clark, *Early Roman Law: Regal Period*, London, 1872, p. 34 *sq.*

[4] Voigt (*XII. Tafeln*, vol. i. p. 484) observes that the patrician looked upon every offence as committed at once against gods and men, and held that the punishment should be one that satisfied both; hence the *deo necari*, *sacratio capitis*, and *consecratio bonorum*. The plebeians regarded its two moments as separable, and (as appears from the spirit of the XII. Tables) left it to the pontiffs to protect the gods, putting it on the state to protect itself by ordinary death punishment, addiction into slavery, declaration of *improbitas* or intestability, talion, and pecuniary penalties.

Take some of those offences whose sanction was *sacratio capitis*. Breach of duty resulting from the fiduciary relation between patron and client, maltreatment of a parent by his child, exposure or killing of a child by its father contrary to the Romulian rules, the ploughing up or removal of a boundary stone, the slaughter of a plough-ox,—all these were capital offences; the offender, by the formula *sacer esto*, was devoted to the infernal gods. Festus says that, although the rules of divine law did not allow that he should be offered as a sacrifice to the deity he had especially offended (*nec fas est eum immolari*), yet he was so utterly beyond the pale of the law and its protection that any one might kill him with impunity. But, as the *sacratio* was usually coupled with forfeiture of the offender's estate or part of it to religious uses, it is probable that steps were taken to have the outlawry or excommunication judicially declared, though whether by the pontiffs, the king, or the curies does not appear; such a declaration would, besides, relieve the private avenger of the incensed god of the chance of future question as to whether or not the citizen he had slain was *sacer* in the eye of the law.

That there must have been other wrongful acts that were regarded in early Rome as deserving of punishment or penalty of some sort, besides those visited with death, sacration, or forfeiture of estate, total or partial, cannot be doubted; no community has ever been so happy as to know nothing of thefts, robberies, and assaults. The XII. Tables contained numerous provisions in reference to them; but it is extremely probable that, down at least to the time of Servius Tullius, the manner of dealing with them rested on custom, and was in the main self-redress, restrained by the intervention of the king when it appeared to him that the injured party was going beyond the bounds of fair reprisal, and frequently bought off with a composition. When the offence was strictly within the family, the *gens*, and perhaps the guild, it was for those who exercised jurisdiction over those corporations to judge of the wrong and prescribe and enforce the penalty

Effect of Servian reforms.

Effect of the Servian Reforms on the Private Law.—The aim of the constitutional, military, and financial reforms of Servius Tullius was to promote an advance towards equality between patricians and plebeians. While it may be an open question whether the institution of the comitia of the centuries was of his doing, or only a result of his arrangements in after years, it seems clear that he had it in view to admit the plebeians to some at least of the privileges of citizenship, imposing on them at the same time a proportionate share of its duties and its burdens. Privileges, duties, and burdens were alike to be measured by the citizen's position as a freeholder; the amount of real estate with its appurtenances held by him on quiritarian title was to determine the nature of the military service he was to render, the extent to which he was to be liable for tribute, and, assuming Servius to have contemplated the creation of a new assembly, the influence he was to exercise in it.

To facilitate the execution of his scheme it was necessary to establish a register of the citizens (*census*), which should contain, in addition to a record of the strength of their families, a statement of the value of their lands and appurtenances, and which should be revised periodically. In order to ensure as far as possible certainty of title, and relieve the officials of troublesome investigations into the genuineness of every alleged change of ownership between two valuations, it was further declared—presumably by Servius—that no alleged transfer would be recognized which had not been effected publicly, with observance of certain prescribed solemnities, or else by surrender in court before the supreme magistrate. The form of conveyance thus introduced got the name of *mancipium*, and at a later period *mancipatio*, while the lands and other things that were to pass by it came to be known—whether from the first or not is of little moment—as *res mancipi*. Hence arose in the law of property a distinction of great importance, only abolished by Justinian more than a thousand years later, between *res mancipi*, which were transferable in quiritarian right only by mancipation or surrender in court, and *res nec mancipi*, which were transferable by simple delivery.

Mancipation is described by Gaius, but with particular reference to the conveyance of movable *res mancipi*, as a pretended sale in presence of five citizens as witnesses and a *libripens* holding a pair of copper scales. The transferee, with one hand on the thing being transferred, and using certain words of style, declared it his by purchase with an *as* (which he held in his other hand) and the scales (*hoc aere aeneaque libra*); and simultaneously he struck the scales with the *as*, which he then handed to the transferrer as figurative of the price. The principal variation when it was an immovable that was being transferred was that the mancipation did not require to be on the spot: the land was simply described by its known name in the valuation roll. Although in the time of Gaius only a fictitious sale—in fact the formal conveyance upon a relative contract—yet it was not always so. Its history is very simple. The use of the scales fixes its introduction to a time when coined money was not yet current, but raw copper nevertheless had become a standard of value and in a manner a medium of exchange. That, however, was not in the first days of Rome. Then, and for a long time, values were estimated in cattle or sheep, fines were imposed in them, and the deposits in the *legis actio sacramento* (*infra*, p. 681) took the same form. The use of copper as a substitute for them in private transactions was probably derived from Etruria. But, being only raw metal or foreign coins, it could be made available for loans or payments only when weighed in the scales: it passed by weight, not by tale. There is no reason for supposing that the weighing was a solemnity, that it had any significance beyond its obvious purpose of enabling parties to ascertain that a vendor or borrower was getting the amount of copper for which he had bargained.

It was this practice of everyday life in private transactions that Servius adopted as the basis of his mancipatory conveyance, engrafting on it one or two new features intended to give it publicity and as it were state sanction, and thus render it more serviceable in the transfer of censuable property. Instead of the parties themselves using the scales, an impartial balance-holder, probably an official, was required to undertake the duty, and five citizens were required to attend as witnesses, who were to be the vouchers to the census officials of the regularity of the procedure. They are generally supposed to have been intended as representatives of the five classes in which Servius had distributed the population, and thus virtually of the state; and the fact that, when the parties appealed to them for their testimony, they were addressed not as *testes* but as *Quirites* lends some colour to this view. Servius is also credited with the introduction of rectangular pieces of copper of different but carefully adjusted weights, stamped by his authority with various devices (*aes signatum*), which are usually supposed to have been intended to take the place of the raw metal (*aes rude*) formerly in use, and so facilitate the process of weighing; but there is more reason for thinking they were cast and stamped as standards to be put into one scale, while the raw metal whose weight was to be ascertained was put into the other.

Instead, therefore, of being a fictitious sale, as Gaius describes it, and as it became after the introduction of coined money early in the 4th century, the *mancipium* or mancipation, as regulated by Servius, was an actual completed sale in the strictest sense of the term. What were the precise words of style addressed by the transferee to the transferrer, or what exactly the form of the ceremonial, we know not. But, as attendance during all the time that some thousands of pounds perhaps of copper were being weighed would have been an intolerable burden upon the five citizens convoked to discharge a public duty, it may be surmised that it early became the practice to have the price weighed beforehand, and then to reweigh, or pretend to reweigh, before the witnesses only a single little bit of metal (*raudusculum*), which the transferee then handed to the transferrer as "the first pound and the last," and thus representative of the whole.[2] Whatever may have been its form, however, its effect was instant exchange of property against a price weighed in the scales. The resulting obligation on the vendor to maintain the title of the vendee, and the qualifications that might be superinduced on the conveyance by agreement of parties—the so-called *leges mancipii*—will be considered in connexion with the provisions of the XII. Tables on the subject (*infra*, p. 690).

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[1] On murder (*parricidium*) in regal Rome, see Osenbrüggen, *Das altrömische Parricidium*, Kiel, 1841, and review by Dollmann in Richter's *Krit. Jahrbuch*, vol. xi. (1842), p. 144 *sq.*; Clark, *op. cit.*, p. 21 *sq.*

[2] The conjecture is suggested by the words of style in the *solutio per aes et libram*, Gai., iii. §§ 173, 174. There were some debts from which a man could be effectually discharged only by payment (latterly fictitious) by copper and scales in the presence of a *libripens* and the usual five witnesses. In the words addressed to the creditor by the debtor making payment these occurred—*hanc tibi libram primam*

The things included in the class of *res mancipi* were lands and houses held on quiritarian title, together with rights of way and aqueduct, slaves, and domestic beasts of draught or burden (oxen, horses, mules, and donkeys); all others were *res nec mancipi*. In the time of Servius and during the greater part of the republic the domain land (*ager publicus*) in Italy, until it was appropriated by private owners, was also reckoned as *res nec mancipi*; like all other things of the same class, it passed by simple delivery, whereas *res mancipi* could not be transferred in full ownership except by mancipation or surrender in court. Many theories have been propounded to account for the distinction between these two classes of things, and to explain the principle of selection that admitted oxen and horses into the one, but relegated sheep and swine, ships and vehicles, to the other. But there is really little difficulty. Under the arrangement of Servius what was to determine the nature and extent of a citizen's political qualifications, military duties, and financial burdens was the value of his *heredium* (and other freeholds, if he had any), and what may be called its appurtenances—the slaves that worked for the household, the slaves and beasts of draught and burden that worked the farm, and the servitudes of way and water that ran with the latter. It may be that in course of time slaves without exception were dealt with as *res mancipi*,—without consideration, that is to say, whether they were employed on their owner's house or farm or on any part of the public lands in his occupancy—and reasonably, because they were often shifted from the one to the other. But the cattle a man depastured on the public meadows were no more *res mancipi* than his sheep. To say that the things classed as *res mancipi* were selected for that distinction by Servius because they were what were essential to a family engaged in agricultural pursuits would be to fall short of the truth. They *constituted* the *familia* in the sense of the family estate proper; whereas the herds and flocks, and in time everything else belonging to the *paterfamilias*, fell under the denomination of *pecunia*. So the words are to be understood in the well-known phraseology of a testament, *familia pecuniaque mea*.

The public solemnity of *mancipatio* thus sanctioned as a mode of transferring a quiritarian right of property, for which *manus* was probably as yet the only technical descriptive word in use, was not long of being adapted to other transactions in which *manus* of a different sort was to be acquired,—for example, coemption, emancipation, adoption of a *filiusfamilias*, the contract of *nexum*, release of a nexal debtor, and that *mortis causa* alienation of his estate by a plebeian which in time developed into the testament *per aes et libram*.

It has been already explained (p. 674) that, prior to the time of Servius, the matrimonial unions of the plebeians were not, in the estimation of the patricians at least, regarded as lawful marriages (*justae nuptiae*), although amongst themselves they may have been held effectual and productive, if not of *manus*, at all events of *patria potestas*. For this there were two reasons: (1) not being citizens, they did not possess the preliminary qualification for *justae nuptiae*, namely, *conubium*; and (2) not being patricians, the only ceremony of marriage known to the law was incompetent to them. The first obstacle was removed by their admission by Servius to the ordinary rights of citizenship, the second by the introduction of the civil ceremony of coemption. Once the efficacy of mancipation as a mode of acquiring *manus* over things was established, its adoption by the plebeians, now citizens enjoying *conubium*, as a method of acquiring *manus* over their wives was extremely natural. The scales, the *libripens*, and the five witnesses were all there; but, as there was no real price to be paid, the only copper that was needed was a single *raudusculum*. The words recited in the ceremonial, unfortunately not preserved, were necessarily different from those in an ordinary mancipation, and, according to the testimony of a considerable number of ancient writers, and as the word *co-emptio* itself seems to indicate (though this is disputed by most modern civilians), the nominal purchase was mutual; the man acquired a *materfamilias* who was to bear him children and enable him to perpetuate his family, while she acquired a *paterfamilias* who was to maintain her while the marriage lasted, and in whose succession she was to share when a widow. It was accompanied with other observances described by many of the lay writers, but these were matters of usage and fashion rather than of law, and it might be, and often was, accompanied also with religious rites, which, however, were private, not public as in confarreation. It is common, but not quite accurate, to speak of coemption as a form of marriage. It was strictly the acquisition of *manus* by the husband over his wife, and probably in most cases contemporaneous with the marriage; but they were really distinct, the latter being completed simply by interchanged consent. That this was so latterly at least is evident from two facts,—(1) that, according to Gaius, the *coemptio* might follow the marriage at any distance of time; and (2) that, according to the same authority, though the marriage was dissolved by divorce, the *manus* still remained until put an end to by remancipation (on which the divorced wife was entitled to insist).

It has also been explained that the plebeians were in a very much worse position than the patricians in regard to their power of disposing of their estates in contemplation of death. Their elevation to the rank of citizens did not apparently give them admission to the comitia of the curies; and, as it was many years after the assassination of Servius before the comitia of the centuries was convened, they had still no means of making testaments unless perhaps in the field on the eve of battle. So here again the expedient of mancipation was taken advantage of, not indeed to make a testament instituting an heir, and to take effect only on the death of the testator,—the form of the transaction, as an instant acquisition in exchange for a price real or nominal, could not lend itself to that without statutory intervention—but to carry the transferrer's *familia*[1] to a friend, technically *familiae emptor*, on trust to let the former have the use of it while he survived,[2] and on his death to distribute according to his instructions whatever the transferee was not authorized to retain for himself. Like so many others of the transactions of the early law, it was legally unprotected so far as the third parties were concerned whom the transferrer meant to benefit; they had no action against the trustee to enforce the trust; their sole guarantee was in his integrity and his respect for Fides.

Dionysius credits Servius with the authorship of more than fifty enactments relative to contracts and crimes, which he says were submitted to and approved by the assembly of the curies. The great majority of those so-called enactments were probably nothing more than formularizations of customary law, for the use of the private judges in civil causes whom the king is said to have instituted. There was one contract, however, notorious in after years under the name of *nexum*, that manifestly was influenced, either directly or indirectly, by his legislation. In its normal estate it was a loan of money, or rather of the raw copper that as yet was all that stood for it. Whether before the time of Servius it was accompanied by any formalities beyond the weighing of it in a pair of scales (which was rather substance than form) we know not; and what right it conferred on the creditor over his debtor who failed to repay can only be matter of speculation. But there are indications that, in the exercise of undefined self-help, defaulters were treated with considerable severity, being taken in satisfaction and put in chains by their creditors; for Servius is reported to have promised to pay their debts himself in order to obtain their release, and to pass a law limiting execution by persons lending money at interest to the goods of their debtors. Whether he fulfilled the first part of his promise we are not informed; but the second part of it was impracticable, since a debtor's failure to repay a loan was in most cases attributable to his insolvency and want of means with which to satisfy his creditor. So, apparently, Servius had to be content with regulating and ensuring the publicity of the contract, and making a creditor's right of self-redress by apprehension (*manus injectio*) and confinement of his debtor conditional on the observance of the prescribed formalities of the *nexum*. These were the weighing of the copper that was being advanced in a pair of scales held by an official *libripens*; the reweighing of a single piece in the presence of five citizen witnesses, and its delivery by the lender as representing the whole; and the simultaneous recital of certain words of style, which had the effect of imposing on the borrower an obligation to repay the loan, usually with interest, by a certain day. The consequence of this, the earliest independent contract of the *jus civile*, is explained in p. 693.

Servian Amendments on the Course of Justice.—Of the course of justice in the regal period, whether in criminal or civil matters,

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postremamque expendo ("I weight out to you this the first and the last pound"). The idea is manifestly archaic, and the words, taken strictly, are quite inappropriate to the transaction in the form it had assumed long before the time of Gaius.

[1] The *familia* was the collective name for a man's *heredium* and other lands, with their slaves and other mancipable appurtenances—an aggregate of *res mancipi*, and therefore itself capable of mancipation. The conveyance was universal, *i.e.*, the items of the aggregate, even though movable, did not require to be conveyed separately or to be handled in conveying; and apparently the *pecunia* was carried along with the *familia* as an accessory, at least if expressly mentioned.

[2] Sir Henry Maine (*Ancient Law*, p. 206) is of opinion that, as a mancipation could not be subject to a limitation either of condition or time, there must have been not only instant but total divestiture of the transferrer. But that this was not necessarily the result is shown *infra*, p. 691.

before the time of Servius we know little that can be relied on. Antiquity used to speak of the king as having been generally supreme in both. But this can be accepted only with considerable reservation. For the *paterfamilias*, aided by a council in cases of importance, was judge within the family,—his jurisdiction sometimes excluding that of the state, at other times concurring with it, and not to be stayed even by an acquittal pronounced by it. He alone was competent in any charge against a member of the family for a crime or offence against the domestic order,—adultery or unchastity of wife or daughter, immorality of his sons, undutiful behaviour of children or clients; while there are instances on record of his interference judicially where an offence such as murder or theft had been committed by a member of his family against a stranger, and even when his crime had been treason against the state. Death, slavery, banishment expulsion from the family, imprisonment, chains, stripes, withdrawal of *peculium*, were all at his command as punishments; and it may readily be assumed that in imposing them he was freer to take account of moral guilt than an outside tribunal. The indications of criminal jurisdiction on the part of the *gens* are slight; but its organization was such that it is impossible not to believe that it must occasionally have been called on to exercise such functions. And it must not be lost sight of that, as murder seems to have been the only crime in regard to which private revenge was absolutely excluded, the judicial office of the kings must have been considerably lightened, public opinion approving and not condemning self-redress so long as it was kept within the limits set by usage and custom.

The king as judge.

The boundary between civil and criminal jurisdiction, if it existed at all, was extremely shadowy. Theft and robbery, for example, if one may conclude from the position they held in the later jurisprudence, were regarded not as public but as private wrongs; and yet when a thief was caught plying his trade by night he might be slain, and when taken in the act by day might be sold as a slave. But in both cases it may also be assumed that a practice, afterwards formally sanctioned by the XII. Tables—that of the thief compounding for his life or freedom—was early admitted, and the right of self-redress thus made much more beneficial to the party wronged than when nothing was attained but vengeance on the wrongdoer. In assaults, non-manifest thefts, and other minor wrongs, self-interest would in like manner soon lead to the general adoption of the practice of compounding; what was originally a matter of option in time came to be regarded as a right; and with it there would be occasional difficulty in settling the amount of the composition, and consequent necessity of an appeal to a third party. Here seems to be the origin of the king's jurisdiction in matters of this sort. He was the natural person to whom to refer such a dispute; for he alone, as supreme magistrate, had the power to use coercion to prevent the party wronged insisting on his right of self-redress, in face of a tender by the wrongdoer of what had been declared to be sufficient reparation. But that self-redress was not stayed if the reparation found due was withheld; as the party wronged was still entitled at a much later period to wreak his vengeance upon the wrongdoer by apprehending and imprisoning him, it cannot reasonably be doubted that such also was the practice of the regal period.

How the kings acquired jurisdiction in questions of quiritarian right, such as disputes about property or inheritance, is by no means so obvious. Within the family, of course, such questions were impossible, though between clansmen they may have been settled by the *gens* or its chief. The words of style used in the sacramental real action (*infra*, p. 682) suggest that there must have been a time when the spear was the arbiter, and when the contending parties, backed possibly by their clansmen or friends, were actual combatants, and victory decided the right. Such a procedure could not long survive the institution of a state. In Rome there seems to have been very early substituted for it what from its general complexion one would infer was a submission of the question of right to the pontiffs as the repositories of legal lore. Their proper functions, however, were sacred. So, to bring what was a question of purely civil right within their jurisdiction, they engrafted on it a sacral element, by requiring each of the parties to make oath to the verity of his contention; and the point that in form they decided was which of the two oaths was false and therefore to be made atonement for. In substance, however, it was a finding on the real question at issue; and the party in whose favour it was pronounced was free to make it effectual if necessary by self-redress in the ordinary way.

Of Servius, Dionysius says—using, as he often does, language more appropriate to the republican than to the regal period—that he drew a line of separation between public and private judicial processes, and that, while he retained the former in his own hands, he referred the latter to private judges, and regulated the procedure to be followed in causes brought before them. Something of the sort was absolutely necessary. He was enormously increasing the number of the citizens,—that is to say, of those who were to enjoy in future the privileges of quiritarian right,—and multiplying the sources of future disputes that would have to be determined by the tribunals. The nature of the provision made by him to meet the new aspect of things is much controverted; but we are disposed to credit him alike with the establishment of the collegiate court of the centumvirs and the institution of the single judge (*unus judex*).

The centumviral court and centumviral causes are often referred to by Cicero, and the range of their jurisdiction seems to have included every possible question of *manus* in the old sense of the word,—status of individuals, property and its easements and burdens, inheritance whether testate or intestate,—in other words, all questions of quiritarian right. By the time of Gaius the only matters apparently that were brought before it were questions of right to an inheritance of the *jus civile*; but the spear, the emblem of quiritarian right generally, was still its ensign.

That Servius should substitute for king and pontiffs a numerous court of citizens, originally, as there is reason to assume, all patricians, to try questions of quiritarian right on remit from himself, was quite in accordance with the general spirit of his reforms. It was not mere matters of personal dispute they had to decide, but they had to build up by their judgments a law which was to be of general and permanent application; and, as it was beyond the power of the king to overtake the task, what could be a more appropriate substitute than a court of his counsellors acting under pontifical guidance?

Unus judex.

But there were many cases requiring judicial assistance in which no question of quiritarian right had to be determined, but only one of personal claim—of alleged indebtedness, whether arising out of a legal or illegal act, denied either *in toto* or only as to its amount. Matters of that sort were supposed to involve no general principle of law, but to be rather mere disputes or differences about facts, which could well be decided by a single judge. To meet their case the *unus judex* was introduced; he was appointed for each case as it arose, and acted really as the king's commissioner. This was the beginning of a system that bore wondrous fruit in after years, and that, as will be shown in the sequel, eventually displaced altogether the more imposing court of the centumvirs.

CHAPTER II.—THE JUS CIVILE.

(From the Establishment of the Republic until the Subjugation of Central and Southern Italy.)

I. FORMATIVE AGENCIES OF THE LAW.

Plebeians' struggl for equ ity.

The Legislative Bodies of the Period.—The limits and scope of this article do not permit of any detailed account of the consequences of the change from kings to consuls, or of the tribulations of the plebeians during the first two centuries of the republic. Stage by stage they fought and conquered in the uphill battle for social and political equality. In 260 U.C. they got their own special protectors in their tribunes, with the ædiles as their assistants, and *judices decemviri* to act under their instructions as arbiters in disputes amongst themselves. In 283 they obtained state sanction for their *concilium*, and recognition of its power to regulate purely plebeian interests. The XII. Tables of 303 were the fruit of their agitation for a revision and written embodiment of the law. It was in deference to their complaints of their practical disfranchisement through the unduly preponderating influence of the patricians in the comitia of the centuries that in 305 the comitia of the tribes was instituted. Their repeated protests against the monopolization of the public domain land by members of the higher order resulted at last in the definite recognition of their right to participate in its occupation by one of the Licinian laws of 387. The long course of cruel oppression of plebeian insolvents by their patrician creditors was put an end to by the Pœtilian law of 428 abolishing nexal contract, and prohibiting the use of chains and fetters on persons incarcerated for purely civil debt. By the Hortensian law of 467 the resolutions of the plebeian council (*plebiscita*) were declared binding not only on the plebeians themselves but on the whole body of the citizens. And from 333, when a plebeian first reached the magistracy through the quæstorship, down to 502, when they attained to the supreme pontificate, they gradually vindicated their right as citizens to share in all the honours and dignities of the state.

The legislative bodies were thus three in number,—the comitia of the centuries, the *concilium plebis*, and the comitia of the tribes. The first, if not organized by Servius Tullius, at all events grew out of his distribution of the populace into classes and centuries according to the value of their freeholds as appearing on the census-list. As just the national army assembled for a peaceful purpose (*exercitus civilis*), it could be convened and presided over originally only by a magistrate possessing the military *imperium*, *i.e.*, a consul; but, after the creation of the censorship in 311 and the prætorship in 387, the holders of those offices were entitled to convoke it,—the former for its assent to arrangements for the census, and the latter for state trials. It was the centuries that passed the XII. Tables; but for the most part their legislation was upon questions affecting public and constitutional rather than private interests. The procedure in the centuriate comitia was somewhat cumbrous. There was publication of the proposed law (*promulgatio rogationis*) a fortnight before the day appointed, sometimes one or more meetings (*conciones*) being held in the interval for its consideration and discussion. When the day arrived, the *auspicia* were taken by the presiding magistrate, assisted by an augur; if favourable, the citizens were summoned anew by blast of trumpet, and on their assembling, which originally they did under arms, prayer and sacrifice were offered by president, pontiffs, and augurs. A final *concio* might then be held if thought necessary; and, after it was over, on the order to "proceed to the comitia," the citizens marched to the Campus Martius (the formal assembly being incompetent within the city). There the *rogatio* was read and, if no sign from heaven indicated the dissent of the gods and warned the assembly to disperse, was at once put to the vote—"Is it your pleasure, Quirites, to hold this as law?" The vote was taken by centuries, those of the knights and the freeholders of full valuation voting first; if they were unanimous it went no further, for these formed more than a majority of the whole *comitia*. The resolution, if adopted, was *populi jussum*, but not yet law. It had still to run the gauntlet of the "fathers,"—whether the senate or only its patrician members is disputed; it was in their power to refuse to authorize it (*auctores fieri*), usually putting their dissent on the ground that the gods willed it not; but if they ratified it, then it became a *lex*, ordinarily getting the name of the magistrate by whom it had been proposed. The power of veto, however, was considerably qualified by a Publilian law of the year 415, which enacted that in future the "fathers" should grant (or refuse) their *auctoritas* before the vote was taken.

The points of difference between the enactments of the *concilium plebis* and the later *comitia tributa* are indicated by Mommsen in a paper in his *Researches.*[1] (1) The *comitia* was an assembly of the whole body of the people, voting according to tribes instead of centuries; the *concilium* was an assembly of plebeians only, also voting *tributim*. (2) The *comitia* was convened and presided over by a patrician magistrate, not necessarily, however, with military *imperium*, and therefore very frequently by the prætor; whereas the *concilium* could be convened and presided over only by a plebeian official, either a tribune or an ædile. (3) In the *comitia* the *auspicia* had to be taken before the proceedings commenced; in the *concilium* the will of the gods was not demanded, although listened to if communicated in a thunder-storm or the like. (4) The resolution of the *comitia* required to be confirmed by the "fathers"; while that of the *concilium* did not. (5) An enactment of the *comitia* was a *lex*, and bound the whole people; but before the Hortensian law an enactment by the *concilium plebis* was in the ordinary case no more than a *plebiscitum*, and of force only amongst the plebeians themselves. But there was an exception when, because of some constitutional change proposed by it, the senate had previously sanctioned the legislation, as in the case of the Terentilian law, which paved the way for the XII. Tables, of the Canuleian law authorizing the intermarriage of patricians and plebeians, of the Licinian laws about the occupation of the public lands, &c.; in such cases, although the final vote was that of the *concilium*, the enactment was binding on the citizens generally, and was spoken of as a *lex* rather than as a *plebiscitum*. The latter name seems practically to have been dropped after the Hortensian law had equalized them so far as their effects were concerned. The greater part of the legislation for amending the private law latterly fell to the *concilium*, owing so far, perhaps, to the greater simplicity of its procedure, but also to some extent to the fact that the prætors preferred making their amendments tentatively by edicts (which were revocable), instead of embodying them in statutes, which, as passed under divine *auspices* and representing the divine will, could not easily be repealed.

The XII. Tables.—We have already shown the efforts made by Servius Tullius to secure that the dispensation of justice should neither be neglected nor left to caprice or haphazard, one rule to-day and another to-morrow. With the consulate and the disregard of the "royal laws" and of Servius's instructions to the judges all this was changed. The consuls, with their harassing military engagements, could have little time to devote to their judicial functions or properly to instruct those to whom they delegated the duty of investigating and adjudicating on the merits of a complaint; and the yearly change of magistrates must itself have been a serious obstacle to uniformity either of rule or practice so long as the law rested on nothing but unwritten custom. One can well believe too, when feeling was so embittered between the orders, that it was no rare thing for a consul to use his magisterial punitive powers (*coercitio*) with undue severity when a plebeian was the object of them, or to turn a deaf ear to an appeal for justice addressed to him from such a quarter. The state of matters had become so intolerable that in the year 292 the demand was made by C. Terentilius Arsa, one of the tribunes, that a commission should be appointed to define in writing the jurisdiction of the magistrates, so that a check might be put on their arbitrary, high-handed, and oppressive administration of what they were pleased to call the law. His colleagues induced him for the moment not to press his demand, which he was urging with a violence of invective that was unlikely to promote his object. But next year they made common cause with him, requiring that the whole law, public and private, should be codified, and its uncertainty thus as far as possible be removed. After a few years' resistance the senate was induced to give its assent to a demand that in itself was too reasonable to be longer withstood.

The first practical step towards its realization was the despatch of a mission to Greece and the Greek settlements in southern Italy, to study their statute law and collect any materials that might be of service in preparing the projected code. On the return of the ambassadors in 302 all the magistracies were suspended, and a commission of ten patricians (*decemviri legibus scribundis*) was appointed with consular powers, under the presidency of Appius Claudius, for the express purpose of reducing the laws to writing. Before the end of the ensuing year (303) the bulk of the code was ready, and was at once passed into law by the comitia of the centuries, and engraved or perhaps painted on ten tables of wood, which were exposed in the Forum. Next year the decemvirate was renewed with a slight change of *personnel*, but under the same presidency as before; and in the course of a few months it had completed the supplemental matter, which was passed in due form, and displayed on two other tables, thus bringing the number up to twelve and giving the code its official name of *Lex XII. Tabularum*.

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[1] "Die Sonderversammlungen der Plebs," in his *Röm. Forschungen*, vol. i., Berlin, 1864, p. 177 *sq.*

There were provisions in them that were almost literal renderings from the legislation of Solon; and others bore a remarkable correspondence to laws in observance in Greece, but there is no authority for saying they were directly borrowed. By far the greater proportion of them, however, were native and original,—not that they amounted to a general formularization of the hitherto floating customary law, for, notwithstanding Livy's eulogium of them as the "fountain of the whole law, both private and public," it seems clear that many branches of it were dealt with in the Tables only incidentally, or with reference to some point of detail. The institutions of the family, the fundamental rules of succession, the solemnities of such formal acts as mancipation, *nexum*, and testaments, the main features of the order of judicial procedure, and so forth,—of all of these a general knowledge was presumed, and the decemvirs thought it unnecessary to define them. What they had to do was to make the law equal for all, to remove every chance of arbitrary dealing by distinct specification of penalties and precise declaration of the circumstances under which rights should be held to have arisen or been lost, and to make such amendments as were necessary to meet the complaints of the plebeians and prevent their oppression in the name of justice. Nothing of the customary law, therefore, or next to nothing, was introduced into the Tables that was already universally recognized, and not complained of as either unequal, indefinite, defective, or oppressive. Only one or two of the laws ascribed to the kings reappeared in them, and that in altered phraseology; yet the omission of the rest did not mean their repeal or imply denial of their validity, for some of them were still in force in the empire, and are founded on by Justinian in his *Digest*. Neither were any of the laws of the republic anterior to the Tables embodied in them, although for long afterwards many a man had to submit to prosecution under them and to suffer the penalties they imposed. In saying, therefore, that for the most part the provisions of the decemviral code were of native origin, all that is meant is that they were the work of the decemvirs themselves, operating upon the hitherto unwritten law in the directions already indicated.

The original Tables are said to have been destroyed when Rome was sacked and burned by the Gauls. But they were at once reproduced, and transcripts of them must have been abundant if, as Cicero says was still the case in his youth, the children were required to commit them to memory as an ordinary school task. This renders all the more extraordinary the fact that the remains of them are so fragmentary and their genuineness in many cases so debatable. They were embodied in the *Tripertita* of Sextus Ælius Pætus in the year 557; they must have formed the basis of all the writings on the *jus civile* down to the time of Servius Sulpicius Rufus (who first took the prætor's edicts as a text); and they were the subjects of monographs by a number of authors of distinction, amongst them by M. Antistius Labeo in the early years of the empire and by Gaius probably in the reign of Hadrian. Yet a couple of score or so are all that can be collected of their provisions in what profess to be the *ipsissima verba* of the Tables,—though in a form in most cases more modern than what we encounter in other remains of archaic Latin. These are contained principally in the writings of Cicero, the *Noctes Atticae* of Aulus Gellius, and the treatise *De verborum significatione* of Festus, the last two dealing with them rather as matters of antiquarian curiosity than as rules of positive law. There are many allusions to particular provisions in the pages of Cicero, Varro, Gellius, and the elder Pliny, as well as in those of Gaius, Paul, Ulpian, and other ante-Justinianian jurists; but these are not implicitly to be relied on, as we have evidence that they frequently represent the (sometimes divergent) glosses of the interpreters rather than the actual provisions of the statute. Reconstruction has therefore been a work of difficulty, and the results far from satisfactory, that of the latest editor, Voigt, departing very considerably from the versions generally current during the last half century.[1]

In form the laws contained in the Tables were of remarkable brevity, terseness, and pregnancy, with something of a rhythmical cadence that must have greatly facilitated their retention in the memory. Here and there the rules they embodied were potestative; but for the most part they were peremptory, running on broad lines, surmounting instead of removing difficulties. Their application might cause hardship in individual instances, as when a man was held to the letter of what he had declared in a *nexum* or mancipation, even though he had done so under error or influenced by fraudulent misrepresentations; the decemvirs admitted no exceptions, preferring a hard-and-fast rule to any qualifications that might cause uncertainty. The system as a whole is one of *jus* as distinguished from *fas*. In the royal laws execration (*sacratio capitis, sacer esto*) was not an uncommon sanction; but in the Tables it occurs only once pure and simple, and that with reference to an offence that could be committed only by a patrician,—material loss caused by a patron to his client (*patronus, si clienti fraudem faxsit, sacer esto*). In all other cases the idea that a crime was an offence against public order, for which the community was entitled in self-protection to inflict punishment on the criminal, is as prominent as the older one that it was a sin against the gods, to be expiated by dedication of the sinner to the divinity more especially outraged by his offence. Hanging and beheading, flogging to death, burning at the stake, throwing from the Tarpeian rock,—such are the secular penalties that are met with in the Tables; but often, though not invariably, the hanging and so forth is at the same time declared a tribute to some deity to whom the goods of the criminal are forfeited (*consecratio bonorum*).

It is not unworthy of notice that traces remained in the Tables of the old system of self-help. The *manus injectio* of the third Table—the execution done by a creditor against his debtor—was essentially the same procedure as under the kings, but with the addition of some regulations intended to prevent its abuse. Against a thief taken in the act something of the same sort seems still to have been sanctioned; while it was still lawful to kill him on the spot if the theft was nocturnal, or even when it was committed during the day if he used arms in resisting his apprehension. According to Cicero there was a provision in these words—"si telum manu fugit magis quam jecit, arietem subicito"; this is just a re-enactment in illustrative language of the law attributed to Numa, that for homicide by misadventure—"if the weapon have sped from the hand rather than been aimed"—a ram was to be tendered as a peace-offering to the kinsmen of him who had been slain. The original purpose must have been to stay the blood revenge, and it may even have been so with Numa; but in the Tables it can only have been intended to stay the prosecution which it was incumbent on the kinsmen of a murdered man to institute. So with talionic penalties: "si membrum rupit, ni cum eo pacit, talio estó"—such, according to Gellius, were the words of one of the laws of the Tables, and they undoubtedly contain a reminiscence of a time when talion was recognized, "an eye for an eye, a tooth for a tooth"; but in the mouths of the decemvirs they were nothing more than a clumsy mode of enabling an injured man to exact the greatest money recompense he could, and to have it measured according to the position and fortune of the individual who had done him injury.

Interpretati of the Tables.

The structure of the provisions of the Tables was not such as to enable the plain citizen to apply them to concrete cases, or know how to claim the benefit of them in the tribunals, without some sort of professional advice. Pomponius states that no sooner was the decemviral legislation published than the necessity was felt for its interpretation, and for the preparation by skilled hands of styles of actions by which its provisions might be made effectual. Both of these duties fell to the pontiffs as the only persons who, in the state of civilization of the period, were well qualified to give the assistance required; and Pomponius adds that the college annually appointed one of its members to be the adviser of private parties and of the *judices* in those matters. The *interpretatio*, commenced by the pontiffs and continued by the jurists during the republic, which, Pomponius says, was regarded as part of the *jus civile*, was not confined to explanation of the words of the statute, but was in some cases their expansion, in others their limitation, and in many the deduction of new doctrines from the actual *jus scriptum*, and their development and exposition. An event that did much to diminish the influence of the pontiffs in connexion with it was the divulgement in the year 450 by Cn. Flavius, secretary of Appius Claudius Cæcus, and probably at his instigation, of a formulary of actions and a calendar of lawful and unlawful days, which got the name of *Jus Flavianum*. The practice adopted in the beginning of the 6th century by Tiberius Coruncanius, the first plebeian chief pontiff, of giving advice in law in public had a still greater effect in popularizing it; and the *Jus Aelianum*, some fifty years later—a collection that included the Tables, the *interpretatio*, and the current styles of actions—made it as much the heritage of the laity as of the pontifical college.

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[1] Dirksen's *Uebersicht der bisherigen Versuche zur Kritik u. Herstellung d. Zwölf-Tafel-Fragmente*, Leipsic, 1824, supplies the basis of all the later work on the Tables anterior to that of Voigt. Schoell, in his *Legis XII. Tab. reliquiae*, Berlin, 1866, made a valuable contribution to the literature of the subject from a philological point of view. His version has been adopted substantially by Bruns in his *Fontes juris romani antiqui*, and by Wordsworth in his *Fragments and Specimens of Early Latin*, Oxford, 1874, p. 253 *sq.* The latter, in a subsequent part of his volume (pp. 502-538), has added notes, historical, philological, and exegetical, which constitute a valuable commentary on the Tables as a whole. Voigt's two volumes, under the title of *Geschichte und System des Civil- und Criminal-Rechtes, wie -Processes, der XII. Tafeln, nebst deren Fragmenten*, Leipsic, 1883, contain an exposition of the whole of the earlier *jus civile*, whether embodied in the Tables or not. The history of them occupies the first hundred pages or thereby of the first volume; his reconstruction of fragments and allusions—a good deal fuller than any earlier one, and supported by an imposing array of authorities—is in the same volume, pp. 693-737.

Subsequent Legislation.—Of legislation during the fourth and fifth centuries that affected the private law we have but scanty record. The best-known enactments are the Canuleian law of 309 repealing the decemviral prohibition of marriages between patricians and plebeians; the Genucian, Marcian, and other laws about usury and the rate of interest; the Pœtilian law of 428, abolishing the nexal contract; the Silian law, probably not long afterwards, which introduced a new form of process for actions of debt and appears to have given statutory sanction to the stipulation (in its earliest form of *sponsio*); and the Aquilian law of 467, which amended the decemviral provisions about actions of damages for culpable injury to property, and continued to regulate the law on the subject even in the books of Justinian.

II. The Actions of the Law.

The Legis Actiones generally.[1]—We owe to Gaius the only connected (though, owing to the state of the Verona MS., rather fragmentary) account we possess of the *legis actiones*, as the system of judicial procedure was called which prevailed in Rome down to the substitution of that *per formulas* by the Æbutian and Julian laws,—the first early in the sixth century of the city, and the second in the age of Augustus. He tells us that as *genera agendi* or generic forms of process they were five in number, each taking its name from its characteristic feature, viz., (1) *sacramento*, (2) *per judicis postulationem*, (3) *per condictionem*, (4) *per manus injectionem*, and (5) *per pignoris capionem*. The third was unknown in the decemviral period, and was introduced by the Silian law alluded to in last paragraph. The other four were all more or less regulated by the XII. Tables, but must in some form have been anterior to them. It is utterly impossible, however, to say of any one of them at what time it was introduced, or what was the statute (*lex*) by which it was sanctioned; it may well be that they were not of statutory introduction at all, but were called *legis actiones* simply because recognized and indirectly confirmed by the Tables. In character and purpose they were very different. The first three were directly employed for determining a question of right or liability, which, if persistently disputed, inevitably resulted in a judicial inquiry. The fourth and fifth might possibly result in judicial intervention; but primarily they were proceedings in execution, in which the party moving in them worked out his own remedy. As regards their comparative antiquity there is much to be said for the opinion of Ihering and Bekker that *manus injectio*, as essentially nothing more than regulated self-help, must have been the earliest of the five, and that the *legis actio sacramento* and the *judicis postulatio* must have been introduced in aid of it, and to prevent too hasty resort to it where there was room for doubt upon question either of fact or law.

In the three judicial *legis actiones* the first step was the *in jus vocatio* or procedure for bringing the respondent into court, minutely regulated by the provisions of the first of the XII. Tables. This duty was not committed to any officers of the law; there was no writ of summons of any sort; the party moving in the contemplated litigation had himself to do what was needed. Once before the magistrate (consul or prætor), the plaintiff stated his contention. If admitted unqualifiedly by the defendant, the magistrate at once pronounced his decree, leaving the plaintiff to work out his remedy as the law prescribed. But, if the case presented was met either with a denial or a qualified defence, and appeared to the magistrate to be one proper for trial, he remitted it for that purpose either to the centumviral tribunal or to one or more private citizens as judges or arbiters. The act of remit was technically *litis contestatio* or *ordinatio judicii*, the first so named because originally the parties called upon those present to be witnesses to the issue that was being sent for trial. This was the ordinary practice under both the system of the *legis actiones* and that of the *formulae*, and prevailed until the time of Diocletian. In the first stage the proceedings were said to be *in jure*, and the duties of the magistrate in reference to them made up his *jurisdictio*; in the second they were said to be *in judicio*, those presiding in it being styled *judices*. All that the judge or judges had to do was to pass judgment on the question remitted to them. They were "right-declarers" only, not "right-enforcers." If their judgment was for the plaintiff, and he failed to obtain an amicable settlement, he had himself to make it operative by subsequent proceedings by *manus injectio*, and that under the eye of the magistrate, not of the judge.

From an enumeration in Cicero of a variety of causes proper to the centumviral court the conclusion seems warranted that it was its peculiar province to decide questions of quiritary right in the strictest acceptation of the word. They were all apparently real actions (*vindicationes*),—claims of property in land or of servitudes over it, of right as heir under a testament or in opposition to it, of rights of tutory and succession *ab intestato* as agnate or gentile, and so forth. In all these it was a numerous court of Quirites, advised in the early republic by a pontiff, that determined by its vote the question of quiritary right submitted to it. Many such questions in course of time, and possibly at first of express consent of parties, came to be referred to a single judge; but some, and notably claims of inheritance under or in opposition to a testament, were still remitted to the centumviral court in the classical period. Personal actions, however, do not appear ever to have fallen within its cognizance: they were usually sent to a single judge—a private citizen—selected by the parties, but appointed by the magistrate, and to whom the latter administered an oath of office. But, in a few cases in which an action involved not so much a disputed question of right as the exercise of skill and discretion in determining the nature and extent of a right that in the abstract was not denied, the remit was to a plurality of private judges or arbiters, usually three.

Sacramento.

The Legis Actio Sacramento.[2]—The characteristic feature of this *legis actio*, as described by Gaius, was that the parties, after a somewhat dramatic performance before the consul or prætor, each challenged the other to stake a certain sum, the amount of which was fixed by the Tables, and which was to abide the issue of the inquiry by the court or judge to whom the cause was eventually remitted. This stake Gaius refers to indifferently as *sacramentum*, *summa sacramenti*, and *poena sacramenti*. The formal question the court had to determine was,—whose stake had been justified, whose not (*cujus sacramentum justum, cujus injustum*); the first was returned to the staker, the second forfeited originally to sacred and afterwards to public uses. But the decision on this formal question necessarily involved a judgment on the matter actually in dispute, and, if it was for the plaintiff, entitled him, failing an amicable arrangement, to take ulterior steps for making it effectual. The procedure was still employed in the time of Gaius in the few cases that continued to be referred to the centumviral court, but otherwise it had been long in disuse.

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[1] The literature on the subject is very voluminous, great part of it in periodicals. Amongst the leading works are those of Keller, *Der röm. Civilprocess u. die Actionen*, 1st ed. 1852, 6th ed. by Wach, Leipsic, 1883, §§ 12-21; Bethmann-Hollweg, *Der röm. Civilprocess in seiner geschichtl. Entwickelung*, 3 vols., Bonn, 1864-66, the first volume of which is devoted to the *legis actiones*; Buonamici, *Delle Legis Actiones nell' antico diritto romano*, Pisa, 1868; Bekker, *Die Aktionen d. röm. Privatrechts*, 2 vols., Berlin, 1871-73, particularly vol. i. pp. 18-74; Karlowa, *Der röm. Civilprozess zur Zeit d. Legisactionen*, Berlin, 1872; Padeletti, "Le Legis Actiones," in the *Archivio Giuridico*, vol. xvii. (1875), p. 321 *sq.* Schultze, *Privatrecht u. Process in ihrer Wechselbeziehung*, vol. i., Freiburg, 1883 (vol. ii. not yet published), in pp. 439-532 presents some novel and not unimportant views.

[2] To the literature in the last note may be added Asverus, *Die legis actio sacramenti*, Leipsic, 1837; Huschke (rev. Asverus), in Richter's *Krit. Jahrbuch*, vol. iii. (1839), p. 665 *sq.*; Stintzing, *Verhältniss d. l. a. sacramento zum Verfahren durch sponsio praejudicialis*, Heidelberg, 1853; Danz, *Der sacrale Schutz*, pp. 151-221; Maine, *Ancient Law*, p. 375 *sq.*; Danz, "Die l. a. Sacram. u. d. Lex Papiria," in the *Zeitschr. f. Rechtsgeschichte*, vol. vi. (1867), p. 339 *sq.*; Huschke, *Die Multa u. d. Sacramentum*, Leipsic, 1874; Lotmar, *Zur l. a. sacramento in rem*, Munich, 1876; Brinz (crit. Lotmar), "Zur Contravindication in d. l. a. sacr.," in the *Festgabe zu Spengel's Doctor-Jubiläum*, Munich, 1877, pp. 95-146; Münderloh, "Ueber Schein u. Wirklichkeit an d. l. a. sacramenti," in the *Z. f. Rechtsgesch.*, vol. xiii. (1878), p. 445 *sq.*; E. Roth, in the *Z. d. Savigny Stiftung*, vol. iii. (1882), *Röm. Abtheil.*, p. 121 *sq.*; Fioretti, *Leg. act. sacramento*, Naples, 1883; Ihering, "Reich u. Arm im altröm. Civilprozess," in his *Scherz u. Ernst in der Jurisprudenz*, Leipsic, 1885, p. 175 *sq.*

Gaius explains that it was resorted to both in real and personal actions. Unfortunately the MS. of his *Institutes* is defective in the passage in which he described its application to the latter. We possess the greater part of his account of the *actio in rem* as employed to raise and determine a question of ownership; but his illustration is of vindication of a slave, and not so interesting or instructive as the proceedings for vindication of land. These, however, can be reconstructed with tolerable certainty with the aid derived from Cicero, Varro, and Gellius.

The parties appeared before the magistrate, each armed with a rod (*festuca*) representing his spear (*quir* or *hasta*), the symbol, as Gaius says, of quiritarian ownership. The first word was spoken by the raiser of the action, and addressed to his opponent: "I say that the land in question [describing it sufficiently for identification] is mine in quiritary right (*meum esse ex jure quiritium*); wherefore I require you to go there and join issue with me in presence of the magistrate (*in jure manum conserere*)." Thereupon, according to the earliest practice, the magistrate and the parties, accompanied by their friends and backers, proceeded to the ground for the purpose: the court was transferred from the forum to the land itself. As distances increased, however, and the engagements of the consuls multiplied, this became inconvenient. Instead of it, this course was adopted: the parties went to the spot without the magistrate, but on his command, and there joined issue in the presence of their seconds, who had been ordered to accompany them, and who probably made a report of the due observance of formalities on their return. Still later the procedure was further simplified by having a turf brought from the place beforehand—probably as time advanced there would be no very particular inquiry as to where it had been obtained—and deposited a few yards from the magistrate's chair; and, when he ordered the parties to go to the ground and join issue, they merely brought forward the turf and set it before him, and proceeded to make their formal vindications upon it, as representing the whole land in dispute.

The ritual was as follows. The raiser of the action, addressing his adversary, again affirmed his ownership, but this time with the significant addition—"As I have asserted my right by word of mouth, look you, so do I now with my *vindicta*"; and therewith he touched the turf with his rod, which was called *vindicta* when employed for this purpose. The magistrate then asked the other party whether he meant to counter-vindicate. If he replied in the negative or made no response, there was instant decree (*addictio*) in favour of the first party, and the proceedings were at an end. If, however, he counter-vindicated, it was by repeating the same words and re-enacting the same play as his adversary:—"I say that the land is mine in quiritary right, and I too lay my *vindicta* upon it." The verbal and symbolical vindication and counter-vindication completed what was technically the *manus consertio*. The parties were now in this position: each had asserted his ownership, and had figuratively had recourse to arms in maintenance of his contention. But the matter was to be settled judicially, so the magistrate once more intervened and ordered both to withdraw from the land. The dialogue was then resumed, the vindicant demanding to know from his opponent upon what pretence (*causa*) he had counter-vindicated. In the illustration in Gaius he avoided the question and pleaded the general issue,—"I have done as is my right in laying my *vindicta* on the land." But there can be little doubt that in certain circumstances the counter-vindicant would deem it expedient to disclose his title. This was very necessary where he attributed his right to a conveyance upon which two years' possession had not yet followed; in such a case he had to name his author (*auctorem laudare*) if he desired to preserve recourse against the latter on the warranty implied in the mancipation. That probably entailed a suspension of the proceedings to allow of the author's citation for his interest; and on their resumption, if he appeared and admitted his *auctoritas*, he was formally made a party to the action.

The proceedings had now reached the sacramental stage proper. The first challenge came from the vindicant,—"Since you have vindicated unrightfully, I challenge you with a sacrament of 500 *asses*," to which the counter-vindicant responded,—"And I you." This was technically the *sacramento provocatio*. The magistrate thereupon remitted the matter for trial to the centumviral court, or possibly, in certain cases, to a single judge, and in the presence of witnesses called by the parties (*litis contestatio*) declared what exactly was the question put in issue which the court or judge was to decide. At the same time, according to Gaius's account of the procedure, he required sureties from the parties for the eventual payment by him who was unsuccessful of the sacrament he had offered to stake, and which became a forfeit to the exchequer. (The original practice was for the stake to be deposited by both parties in the hands of the pontiffs before they were heard by the centumviral court; after judgment that of the gainer was reclaimed by him, while that of the loser was retained for religious uses.) The magistrate also made arrangements for the interim possession of the land by one or other of the litigants, taking security from him that, if he was eventually unsuccessful, it should be returned to his opponent, along with all the fruits and profits drawn in the interval. At the trial, as both parties were vindicants, there must have been a certain burden of proof upon both sides. The vindicant, one may believe, must have been required to establish in the first instance that the thing he claimed had at some time been his; and then, but probably not till then, the counter-vindicant would have to prove a later title in his person sufficient to exclude that of his opponent. The judgment, as already observed, necessarily involved a finding on the main question; but in form it was a declaration as to the sacrament: that of the party who prevailed was declared to be just, and that of his unsuccessful opponent unjust.

Looking at this ritual as a whole the conviction is irresistible that it could not have been so devised by one brain. It reveals and combines three distinct stages in the history of procedure,—appeal to arms and self-help, appeal to the gods and the spiritual power, appeal to the civil magistrate and his judicial office. As Gellius says, the real and substantial fight for might, that in olden days had been maintained at the point of the spear, had given place to a civil and festucarian combat in which words were the weapons, and which was to be settled by the interposition of the prætor. But this does not explain the *sacramentum*. Very various theories have been proposed to account for it. According to Gaius, it was nothing more than the sum of money staked by each of the parties, which was forfeited originally to sacred and afterwards to public uses by him who was unsuccessful, as a penalty for his rashly running into litigation; and substantially the same explanation is given by Festus in one of his definitions of the word. But this is far from satisfactory; for it involves the absurdity of declaring that a penalty imposed by law could be unjust (*injustum*) in any case, and the still greater absurdity of declaring it just in the case of the party who was in the right, and unjust in the case of him who was in the wrong. There is another definition in Festus—"a thing is said to be done *sacramento* when the sanction of an oath is interposed"—which lends support to the opinion that there was a time when parties to a question of right were required to take an oath to the verity of their respective assertions; that they were also required concurrently to deposit five bullocks or five sheep, according to the nature or value of the thing in dispute, to abide the issue of the inquiry;[1] that the question for determination was whose oath was just and whose unjust; and that he who was found to have sworn unjustly forfeited his cattle or sheep as a *piamentum*—a peace-offering to the outraged deity—while the other party reclaimed his from the repository in which they had been detained in the interval.[2]

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[1] It was the *Lex Aternia Tarpeia* of the year 300 U.C. that commuted the five bullocks and five sheep into 500 and 50 ℔ of copper respectively (Cic., *De Rep.*, ii. 35, § 60, where the words usually printed "de multae sacramento" should read "de multa et sacramento"); Fest., s.v. "Peculatus" (Bruns, *Fontes*, p. 279). For the pounds' weight of raw metal the XII. Tables substituted the same number of *asses*, declaring that 500 should be the *summa sacramenti* when the cause of action was worth 1000 *asses* or more, 50 when worth less or the question one of freedom or slavery (Gai., iv. 14).

[2] Varro, *De L. L.*, v. 180 (Bruns, p. 303), says that, even after the *summa sacramenti* had been converted into money, it was deposited *ad pontem*,—some bridge, he does not say which, where there was a sacred "pound." (Curiously enough, the Irish spelling of "pound" is "pont"; Skeat's *Etym. Dict.*, s.v. "Pound.") A most ingenious and plausible explanation was suggested by Danz in 1867, in the *Zeitschr. f. Rechtsgesch.*, vol. vi. p. 359. Recalling the facts that there had been discovered in the Tiber Island *sacella* of Jupiter Jurarius and Dius Fidius, the two deities to whom solemn oaths were usually addressed, and that the island was spoken of as "inter duos pontes," because connected with both banks of the river by bridges bearing no particular names, he suggested that the island may have been the place to which disputants resorted to make their *sacramenta*, and that the cattle, sheep, or money were deposited in a place for the purpose before the bridge was crossed. Much the same explanation was offered by Huschke two years later in his book *Das alte römische Jahr* (Breslau, 1869), p. 360, apparently without being aware of Danz's speculation. He adds, on the authority of the Iguvine Tables, that, while bullocks were offered to Jupiter, only sheep were offered to Dius Fidius. The island, he thinks, must have been selected as neutral ground to which all parties might have access, and which obviated intrusion into the temples of the two gods on the Capitol and Quirinal respectively. And it is to its use as the scene of the sacramental procedure that he attributes its name of "holy island," rather than to the fact of its having been the seat of the temple of Æsculapius. Huschke recurs to and enforces this view in his *Multa und Sacramentum* (1874), p. 410, where he does refer to Danz's paper.

The writers who adopt this view are far from being unanimous as to details. But there seems to be enough to render it more than probable that, at an intermediate stage between the *vera solida vis* of ancient times and the *vis civilis et festucaria* which Gellius and Gaius depict, there was a procedure by appeal to the gods through means of oaths of verity sworn by the parties, in the manner and with the consequences that have been indicated. That in time it should have dropped out of the ritual is quite in the order of things. Its tendency was to become a mere form, imposing no real restraint on reckless litigation. The restraint was rather in the dread of forfeiture of the sacramental cattle, sheep, or money that would follow a verdict that an oath had been unjust. And it must have been felt besides that it was unfair to brand a man as a false-swearer, needing to expiate his offence by an offering to the gods, whose oath had been perfectly honest. That he should suffer a penalty for his imprudence in not having taken more care to ascertain his position, and for thus causing needless annoyance to others, was reasonable, but did not justify his being dealt with as one who had knowingly outraged the deity to whom he had appealed. So the oath—the original *sacramentum*—disappeared, the name passing by a natural enough process to the money which had been wont to be deposited before the oath was sworn, but which now ceased to be an offering in expiation by a false-swearer, and became a mere penalty of rash litigation (*poena temere litigantis*).

It may be assumed that in most cases the finding of the centumvirs as to the justness or unjustness of the respective sacraments of the parties was the end of the case,—that it was at once accepted and loyally given effect to. Festus, however, preserves a law of the XII. Tables which, according to Mommsen's rendering, declared that, when it turned out that interim possession had been awarded to the wrong party, it was to be in the latter's power to demand the appointment of three arbiters who should ascertain the value of the object of vindication and its fruits, and assess the damages due for non-restitution at double the amount. This provision seems to have been intended to afford the wrongful interim possessor, who was not in a position to make specific restitution to his successful opponent, a means of avoiding the apprehension and imprisonment which were the statutory consequences of failure to implement a judgment. It is probable that in time this duplicated money payment came to be regarded as the satisfaction to which the successful party in a vindication was entitled in every case in which, no matter for what reason, he was unable to obtain the thing itself and its fruits from their interim possessor; that consequently an *arbitrium litis aestimandae*, or reference to arbiters to assess their value, resulted in every such case; and that it was to assure its payment that the prætor required the party to whom the interim possession was awarded to give to his opponent the sureties (*praedes litis et vindiciarum*) to whom Gaius alludes.

After this explanation of the procedure in the sacramental action for vindication of land it is unnecessary to enter into any detail of what was done when it was a movable that was being vindicated, or when the action was a personal one for payment of money. The real action about a movable was of course simpler than that described; for the thing was always *in praesentia*. As regards personal actions, the ordinarily received opinion, which rests, however, on slender foundations, is that from the first the parties met on equal terms; that, if it was a case of money debt, the creditor commenced the proceedings with the averment that the defendant owed him the sum in question,—"I say that you ought to pay me (*dare oportere*) 1000 *asses*"; that this was met with a denial; and that a sacramental challenge followed on either side. All are agreed that the remit was to a single *judex* after an interval of thirty days from the proceedings *in jure*; that where the claim was for a definite sum the plaintiff had to establish his case to the letter; and that his sacrament was necessarily declared unjust if he failed to prove his claim by a single penny. But there is considerable diversity of opinion as to whether by this form of process a claim of uncertain amount could be insisted on,—as, for example, for damages for breach of a warranty of acreage of lands sold, or of their freedom from burdens. If it could, then probably the question raised and dealt with *sacramento* was the abstract one of liability,—Was the warranty given, and has it failed? the sum due in respect of the breach being left to be dealt with in a subsequent arbitral process (*arbitrium litis aestimandae*).

The Legis Actio per Judicis Postulationem.[1]—The defects of the Verona MS. have deprived us of Gaius's account of this *legis actio*. There is little elsewhere that can with any certainty be said to bear upon it. The most important is a note in Valerius Probus—*T.PR.I.A.V.P.V.D.*, which is generally interpreted—*te, praetor, judicem arbitrumve postulo uti des*. This petition to the magistrate—king, consul, prætor—to appoint a judge, arbiter, or arbiters (as the case might be) in all probability was part of the procedure in the action, and that from which it derived its distinctive name. Beyond this all is conjecture, alike as to the nature and form of the action and the cases to which it was applicable. Gaius says of the *legis actio sacramento* that it was general, and that it was the procedure that was to be resorted to where no other was prescribed by statute. The extant fragments of the XII. Tables contain no such indications as this would lead us to expect; there is not a hint in them of an express instruction that proceedings in any particular case were to be *per judicis postulationem*.

While it is impossible with certainty to trace the history of this procedure to its first beginnings, yet the impression is general that it must have originated in the regal period. There were three different positions in which an appeal for aid might be made to a court of justice,—(1) when it was a question of civil right that had to be decided in terms directly affirmative or directly negative of the contention of the raiser of the action, and one in which questions of both law and fact were involved; (2) when it was only a question of fact that had to be ascertained,—the legal result of the fact, if established, being known beforehand; (3) when facts had to be set against facts, and a result arrived at that in the judgment of those who had to balance them was fair and reasonable in the circumstances. In the first case, as when the contention was *meum esse* or *dari oportere* (otherwise than under an obligationary *nexum*), the procedure was *sacramento* and the reference originally (in all probability) to the pontiffs, although afterwards to the centumviral court or to a *judex*; in the second, as when the question was—had or had not the defendant assaulted the plaintiff, and so incurred the invariable statutory penalty, the reference was probably to a *judex* without the intervention of a sacrament; in the third, as when the matter in hand was the partitioning of an inheritance amongst co-heirs, or the determining whether operations of the defendant were interfering with the natural drainage of the plaintiff's land and how the mischief was to be abated, or the assessment of damages for injury to property, or of the sum sufficient to relieve from talion or the statutory penalty of theft, the reference was to an arbiter or arbiters. In the procedure *sacramento* the pleadings opened directly with an averment of right—"I say that this is mine," "I say that the defendant is bound to pay me so much"; but in that *per judicis arbitrive postulatio* there is reason to surmise that they commenced with an averment of fact, followed by the resulting demand of the plaintiff. The details, however, are quite uncertain, with the exception that in some *arbitria* the plaintiff expressly threw himself upon the discretion of the arbiters—*quantum aequius melius est ob eam rem mihi dari*.

The Legis Actio per Condictionem.—This the youngest "action of the law" was introduced, Gaius says, by the Silian law as a means of recovering a liquid money debt (*certa pecunia*), and afterwards made available by the Calpurnian law for enforcing personal claims (as distinguished from real rights) for anything else definite and certain (*omnis res certa*), and in both its forms, therefore, essentially an action of debt. The date of both enactments is matter of controversy, although there is no question that the Silian was the earlier. Gaius says of it that its purpose was far from obvious, as there was no difficulty in recovering money either by a sacramental action or one *per judicis postulationem*. He overlooks the fact that money due under a nexal contract was recoverable by neither of these processes, but by the much more summary one of *manus injectio*. By the Pœtilian law of 428 this was declared unlawful. We are disposed to regard the *Lex Silia* and the new procedure it authorized as a result of the change. To have put off a creditor for money lent either with a sacramental action or one *per judicis postulationem* would have been to deprive him of the advantages of *manus injectio* to a greater extent than was called for. So it was provided by the Silian law that, when a man disputed his liability for what was called *pecunia certa credita*, and forced his creditor to litigation, not only was the defendant bound in the first place either to deny his liability under oath or else to pay the sum claimed; but if he did deny it the plaintiff was entitled to require from him an engagement to pay one-third more by way of penalty in the event of judgment being against him, while the *soi-disant* creditor had to give an engagement to pay as penalty the same amount in case of judgment in favour of the alleged debtor. These engagements (*sponsio et restipulatio tertiae partis*) were not allowed in every case in which a definite sum of money was claimed *per condictionem*, but only when it was technically *pecunia credita*. In Cicero's time *creditum* might arise either from loan, stipulation, or literal contract (*expensilatio*); but the last dated at soonest from the beginning of the 6th century, and stipulation apparently was a result of the Silian law itself, so that the *pecunia credita* of this enactment can have referred only to borrowed money. The same phrase, according to Livy, was employed in the Pœtilian law; it was thereby enacted, he says, that for *pecunia credita* the goods, not the body of the debtor, ought to be taken in execution. A connexion, therefore, between the Pœtilian law and the abolition of the *nexum* on the one hand, and the Silian law and the introduction of the *legis actio per condictionem* on the other, can hardly be ignored, and raises more than a probability that the latter statute was a consequence of the former, and must have been passed immediately or soon after the year 428. In the action for a money debt that was not technically *pecunia credita*, and in the action on the Calpurnian law, it is probable that the defendant could be required to negative the claim under oath (*jusjurandum in jure delatum*) on pain of being held as confessed; but there was no penalty of a third part on either side.

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[1] To the literature on p. 681, note 1, add Baron, "Zur leg. act. per judicis arbitrive postulationem," in the *Festgabe für Aug. W. Heffter*, Berlin, 1873, p. 29 *sq.*; Huschke, *Multa*, &c., p. 394 *sq.*; Adolf Schmidt, "Ueber die l. a. per jud. post.," in the *Zeitschr. d. Sav. Stift.*, vol. ii. (1881), *Röm. Abtheil.*, p. 145 *sq.*; Voigt, *XII. Tafeln*, vol. i. § 61.

Little is known of the procedure [1] in this *legis actio*, for, in consequence of the loss of a leaf in the Verona MS., we are without part of Gaius's account of it. It got its distinctive name, he says, from the *condictio* or requisition made by the plaintiff on the defendant, whom he had brought into court in the usual way, to attend again on the expiry of thirty days to have a judge appointed. It was probably only on the reappearance of the parties, and after the defendant had had time for looking into the facts, that the latter could be required to make oath as to his defence of non-indebtedness. In the action for *pecunia credita* it would be then also, and after the oath, if demanded, had been given, that the *sponsio et restipulatio tertiae partis* were exchanged; and it is probable that, if either party refused on the prætor's command so to oblige himself towards the other, judgment was at once pronounced in favour of the latter without any remit to a *judex*. How the issue was adjusted when the sponsion and restipulation were duly given we are not informed; but, judging by analogy from the procedure in an action for breach of interdict under the formular system, and on the broader ground that there must have been machinery for a condemnation of the plaintiff on his restipulation in the event of his being found in the wrong, it may reasonably be concluded that there were in fact three concurrent issues sent to the same *judex*,—the first on the main question, the second on the defendant's sponsion, and the third on the plaintiff's restipulation. When a sum of money other than *pecunia credita* or a thing or quantity of things other than money was sued for, those subsidiary issues were unnecessary, as there was neither sponsion nor restipulation.

As Baron has demonstrated, it was not the usual practice to introduce any words explanatory of the ground of indebtedness when the action was either for money (other than *pecunia credita*) or for a thing or quantity of things. It might be loan, or bequest, or sale, or purchase, or delict, or unjustifiable enrichment, or any of a hundred *causae*; it would have to be condescended on of course before the judge; but in the initial stage before the prætor and in the issue all that was necessary was the averment that the defendant was owing such a sum of money or such a thing. It was for the judge to determine whether or not the averment was established and, in certain cases, that non-delivery was due to the fault of the defendant; the plaintiff, however, was bound to make his averment good to the letter of his claim. In the event of the plaintiff being successful in an action for *certa pecunia*, but delay was made by the defendant in satisfying the judgment, execution followed in ordinary form. How the matter was arranged in an action on the Calpurnian law for a *certa res* is not so obvious. What the plaintiff wanted was specific delivery or damages, and by some the opinion is entertained that he formulated his claim alternatively. Of this there is no evidence; and Gaius's statement that under the system of the *legis actiones* condemnation was always in the *ipsa res, i.e.*, the specific thing sued for, leads to the assumption that a judgment for the plaintiff, on which specific implement failed, must have been followed by an *arbitrium litis aestimandae* for assessment of the damages in money, and that execution proceeded thereon as if the judgment had been for a sum of money in the first instance. The general opinion, however, is that the judge to whom the issue was remitted assessed the damages himself and as a matter of course,—that the instruction to him was *quanti res erit, tantam pecuniam condemnato*.

The Legis Actio per Manus Injectionem.[2]—This "action of the law" was ordinarily employed as a means of execution against the body of a judgment-debtor or one who had confessed liability in the first stage of a process. But, in certain cases in which it was thought proper that a creditor should have a more summary remedy than was afforded by a sacramental action or one *per judicis postulationem*, he was allowed to apprehend his debtor without any antecedent judgment; and, if the debtor disputed liability, the question could be tried only in proceedings at his instance, or sometimes at that of a third party on his behalf, for a stay of execution. It will simplify matters, however, to confine our attention to it in the meantime as a means of execution against the body of a judgment-debtor.

Gaius's description of it is very general; for details we are indebted principally to the *Noctes Atticae* of Aulus Gellius, in an account which he gives (put into the mouth of Sext. Cæcilius Africanus, a well-known jurist of about the same time as Gaius, and a contemporary of his own) of the provisions of the XII. Tables in reference to it. Africanus is made to say that according to his belief (*opinor*) the words of the statute were these:—"For admitted money debts and in causes that have been regularly determined by judgment (*aeris confessi rebusque jure judicatis*) there shall be thirty days' grace. After that there may be *manus injectio*. The apprehending creditor shall then bring his debtor before the magistrate. If he still fail to satisfy the judgment, and no *vindex* come forward to relieve him, his creditor may carry him home and put him in chains. He may live at his own cost; if not, his creditor must give him daily a pound of spelt, or more if he please." Africanus continues *narrativè*: "There was still room for the parties to come to terms; but, if they did not, the debtor was kept in chains for sixty days. Towards the end of that time he was brought before the prætor in the comitium on three consecutive market-days, and the amount of the judgment-debt proclaimed. After the third *capite poenas dabat*,"—what these words mean will be considered in the sequel,—"or else he was sent across the Tiber to be sold to a foreigner. And this capital penalty, sanctioned in the hope of deterring men from unfaithfulness to their engagements, was one to be dreaded because of its atrocity and of the new terrors with which the decemvirs thought proper to invest it. For, if it was to more creditors than one that the debtor had been adjudged, they might, if they pleased, cut up and divide his body. Here are the words of the statute,—'Tertiis nundinis partis secanto. Si plus minusve secuerunt, se fraude esto.'"

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[1] To the literature on p. 681, note 1, add Asverus, *Die Denunciation d. Römer*, Leipsic, 1843, p. 129 *sq.*; Mommsen (rev. Asverus), in Richter's *Krit. Jahrbuch*, vol. ix. (1845), p. 875 *sq.*; Bekker, *Aktionen*, vol. i. cap. 4-7; Voigt, *Jus naturale, &c., d. Römer*, 4 vols., Leipsic, 1856-75, vol. iii. §§ 98, 99. and vol. iv. Beilage xix. Nos. 1, 2, 7; Baron, *Die Condictionen*, Berlin, 1881, §§ 15, 16.

[2] To the literature on p. 681, note 1, may be added Huschke, *Nexum*, 1846, p. 79 *sq.*; Savigny, "Das altrom. Schuldrecht," in his *Verm. Schriften*, vol. ii., 1850, p. 369 *sq.*; Hoffmann, *Die Forcten u. Sanaten, nebst Anhang über d. altröm. Schuldrecht*, Vienna, 1866, p. 54 *sq.*; Unger, in the *Zeitschr. f. Rechtsgesch.*, vol. vii. (1868), p. 192 *sq.*; Vainberg, *Le nexum et la contrainte par corps en droit Rom.*, Paris, 1874, p. 36 *sq.*; Bruns, in the *Zeitschr. f. Rechtsgesch.*, vol. xii. (1876), p. 128 *sq.*; Exner, in the *Zeitschr. f. Rechtsgesch.*, vol. xiii. (1878), p. 392 *sq.*; Voigt, "Ueber d. Gesch. d. röm. Executionsrechtes," in the *Berichte d. k. sächs. Gesellsch. d. Wissenschaften* (Phil.-Hist. Cl.), vol. xxxiv. (1882), p. 76 *sq.*; Voigt, *XII. Tafeln*, vol. i. §§ 63-65; Ihering (as on p. 681, note 2), pp. 196 *sq.*, 232 *sq.*

Such is Gellius's account of the provisions of the XII. Tables in reference to this *legis actio*. But it is to be borne in mind that he does not vouch for its accuracy; the Tables were already in his time matter of antiquity, and even the jurists knew nothing of them beyond what was still in observance. That he has reproduced them only partially seems almost beyond question; for in another chapter he himself quotes a couple of sentences that are to all appearance from the same context. We have to face, therefore, the extreme probability that the record is incomplete and the possibility besides that it is not literally accurate. There is room for error, consequently, in two directions; but the nature and effect of the procedure in its main features may be gathered from the texts as they stand with reasonable certainty.

It was competent only after thirty days from the date of judgment or confession. It was apprehension of the debtor by the creditor himself,—in its first stage, at least, an act of pure self-help. The debtor had at once to be brought before the magistrate, in order that his creditor might obtain authority to carry him away and provisionally confine him in the domestic lock-up. Such a course, however, was avoided either (1) by instant payment or other implement of the judgment, or (2) by the intervention of a *vindex* or champion. The position taken by the latter was not exactly that either of a surety or of an attorney for the *judicatus* demanding a rehearing of the case: he appeared rather as a controverter in his own name of the right of the creditor to proceed further with his execution, on the ground that the judgment was invalid. This necessitated an action between the *vindex* and the creditor, in which the former was plaintiff, but to which the debtor was not a party. If it failed, then the *vindex* was liable for double the amount of the original debt, as a penalty on him for having improperly interfered with the course of justice; but on payment he had relief against the original debtor who had been liberated through his intervention. Failing a *vindex* and failing payment, the creditor took his debtor home and incarcerated him, dealing with him for sixty days in the manner above described. On their expiry, without any arrangement, there was a magisterial decree (*addictio*) awarding the debtor to his creditor.

What right did this *addictio* confer upon the creditor? The debtor, says Gellius, "capite poenas dabat," which he interprets as meaning that his creditor might put him to death, the alternative being his sale as a slave beyond the Roman frontier. According to this view a man sentenced to twenty-five *asses* for a petty assault, which he could not pay, might have to suffer death instead. Manifest theft was considered a greater offence, or at least to merit a heavier punishment, than non-manifest,—slavery for the former, a pecuniary penalty for the latter; but, if it had been the case that every *judicatus* who failed within three months to satisfy his creditor might be put to death, then the non-manifest thief against whom a judgment had been obtained must often in the end have suffered a penalty more serious than that which overtook him whose theft had been manifest,—slavery for the graver offence, death for the lighter. *Capite poenas dabat*, therefore, cannot have meant death. But it is just as impossible that it can have meant slavery. And there is abundant evidence that the *addictus*, even after the completion of his two months of provisional detention, was still *de jure* free,—that he was not *capite minutus* even as regarded citizenship or family rights, and that any property he had still remained his own. The only other explanation is that "he paid the penalty with his person," in contradistinction to "his means." *Caput* is used in opposition to *bona*. Under the law of the Tables, when the *manus injectio* was at the instance of one creditor only, the extent of the latter's right was to detain his debtor in free bondage, making what use he could of his services, and exercising discipline over him as if he were a slave. But for the mistaken notion that a creditor was entitled after the expiry of the three months to put his debtor to death—of which there is not a single instance on record—it is unlikely that any one would have thought of imputing to the *partis secanto* such an inhuman meaning as that a plurality of creditors might cut the body of their *addictus* in pieces and each take a share.

The opinion is entertained by many jurists that the *partis secanto* of the Tables referred not to the body but to the belongings of the debtor,—that when there were concurrent creditors they shared his *familia* amongst them. There are two difficulties to face,—(1) that, once a debtor was in the hands of a creditor, even provisionally, *manus injectio* by a second creditor was impossible; and (2) that the debtor's estate did not fall within the power of the incarcerating creditor. The first is removed by a suggestion of Voigt's, that the plurality of creditors Gellius speaks of may have referred to the case of co-heirs taking proceedings against a debtor of their ancestor's. The second disappears on a slight rearrangement of the words of the Tables as Gellius records them.[1] The result to which it brings us is this: where there was but one creditor concerned, and the two months of provisional detention expired without payment, or intervention of a *vindex*, or compromise of some sort, the debtor definitively became his creditor's free bondman in virtue of the magisterial *addictio*; but, where co-heirs were concerned, as bondage and service to all of them would have been inconvenient if not impossible when they were not to continue to possess the inheritance in common, the debtor was sent across the Tiber and sold as a slave, and the *price got for him* divided among them. If one or other got more than his fair share, no harm was done; for the disproportion could eventually be redressed in an action of partition (*actio familiae erciscundae*).

The disgraceful cruelties and indignities to which creditors subjected both their judgment and nexal debtors led to many a commotion in the first two centuries of the republic. The latter were probably much more numerous than the *judicati*, and, being in great part the victims of innocent misfortune, it was the sufferings they endured at the hands of relentless creditors that so often roused the sympathies and indignation of the populace. But the judgment-debtors had suffered along with them; and some of the provisions of the Pœtilian law of 428 were meant to protect them against the needless and unjustifiable severity that had characterized their treatment. The *manus injectio* itself was not abolished, nor the possible intervention of a *vindex*; neither were the *domum ductio* that followed, and the provisional imprisonment with the light chains, authorized by the Tables while it lasted; nor was the formal *addictio* of the debtor to his creditor when the sixty days had expired without arrangement. But after addiction, if it was for nothing more than civil debt, there were to be no more dungeons and stripes, fetters and foot-blocks; the creditor was to treat his debtor and his industry as a source of profit that would in time diminish and possibly extinguish his indebtedness, rather than as an object upon which he might perpetrate any cruelty by way of punishment. Although the edict of P. Rutilius of 647 U.C. provided a creditor with machinery for attacking the estate of his debtor, he had still the alternative of incarceration. This might be avoided under the Julian law of *cessio* by the debtor's making a complete surrender of his goods to his creditor; but, failing such surrender, incarceration continued to be resorted to even under the legislation of Justinian. Latterly, however, it was not by *manus injectio* that the incarceration was effected; for it went out of use with the definitive establishment of the formular system of procedure.

It was as directed against judgment and nexal debtors (see *infra*, p. 693) that *manus injectio* was of most importance and chiefly made its mark in history. But there were other cases in which it was resorted to under special statutory authority, where a remedy seemed advisable more sharp and summary than that by ordinary action. In some of these it was spoken of as *manus injectio pro judicato* (*i.e.*, as if upon a judgment), in others as simple *manus injectio* (*manus injectio pura*). In the first the arrestee was not allowed to dispute his alleged indebtedness in person; he could do so only through a *vindex*; and, if no one intervened for him in that character he was carried off and dealt with by his arresting creditor as if a judgment had been obtained against him. In the second he was not required to find a *vindex*, but might himself dispute the verity of the charge made against him, under penalty, however, of a duplication of his liability if he failed in his contention. By a *Lex Vallia*, probably in the latter half of the 6th century of the city, this *manus injectio pura* was substituted for that *pro judicato* in all cases in which the ground of arrest was neither judgment nor *depensum*, *i.e.*, payment by a surety or other party on account of the true debtor, who failed to relieve the former within six months thereafter.

The Legis Actio per Pignoris Capionem.[2]—In the ritual of the *actio sacramenti* the *vis civilis et festucaria* was a reminiscence of the *vera solida vis* with which men settled their disputes about property in the earliest infancy of the commonwealth. *Manus injectio* was a survival from times when the wronged was held entitled to lay hands upon the wrongdoer, and himself subject him to punishment; custom and legislation intervened merely to regulate the conditions and mode of exercise of what essentially was still self-help. In *pignoris capio* self-help was likewise the dominant idea. It may be fairly enough described by the single word distress,—the taking by one man of property belonging to another in satisfaction of or in security for a debt due by the latter which he had failed to pay. The taking did not proceed upon any judgment, nor did it require the warrant of a magistrate; it might be resorted to even in the absence of the debtor; but it required to be accompanied by certain words of style, spoken probably in the presence of witnesses. It was only in a few exceptional cases that it was competent, in some by force of custom, in others by statute. What was the procedure, and what its effects, are far from certain. Ihering, founding on some expressions of Cicero's, conjectures that, whether the debt was disputed or not, the distrainer could neither sell nor definitely appropriate his *pignus* without magisterial authority,—that in every case he was bound to institute proceedings in justification of his caption, and to take in them the position of plaintiff. The idea is ingenious, and puts the *pignoris capio* in a new and interesting light. It makes it a summary means of raising a question of right for whose judicial arbitrament no other process of law was open,—with the additional advantage that it secured instant satisfaction to the raiser of it in the event of the question being determined in his favour. If against him, the inevitable result, in substance at least, must have been a judgment that he had no right to retain his pledge, with probably a finding that he was further liable to its owner in the value of it, as a punishment for his precipitancy.[1]

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[1] Reconstructions are always hazardous. But, on the footing above explained, the provision of the Tables may have been something like this: "Tertiis nundinis addicitor. Capite poenas dato. Si plures sunt, trans Tiberim peregre venum danto, partis secanto. Si plus minusve secuerunt, se fraude esto"—"On the third market-day there shall be decree of addiction. The *addictus* shall then pay the penalty with his person. If there be several creditors to whom he is awarded, let them sell him beyond Tiber and divide the price. If any of them have got more or less than his fair share, no harm shall result."

[2] To the literature on p. 681, note 1, add Degenkolb, *Die Lex Hiero*

Procedure outside legis actiones.

Judicial or Quasi-Judicial Procedure outside the Legis Actiones.—Whatever may have been the extent of the field covered by the actions of the law, they did not altogether exclude other judicial or quasi-judicial agencies. The supreme magistrate every now and then was called upon to intervene in matters brought under his cognizance by petition or complaint, in which his aid was sought not so much to protect a vested right of property or claim as to maintain public order, or to prevent the occurrence or continuance of a state of matters that might prove prejudicial to family or individual interests. The process was not an action, with its stages *in jure* and *in judicio*, but an inquiry conducted from first to last by the magistrate himself; and his finding, unless it was a dismissal of the complaint or petition, was embodied in an order (*decretum, interdictum*) which it was for him to enforce by such means as he thought fit,—*manu militari* or by fine or imprisonment. Some jurists are disposed to give a very wide range to this magisterial intervention. One of its most important manifestations was in connexion with disputes about the occupancy of the public domain lands. These did not belong in property to the occupants, so that an action founded on ownership was out of the question. But, as the occupancy was not only recognized but sanctioned by the state, it was right, indeed necessary in the interest of public order, that it should be protected against disturbance. In the measures resorted to for its protection Niebuhr recognized the origin of the famous possessory interdict *uti possidetis*; and, although opinions differ as to whether protection of the better right or prevention of a breach of the peace was what primarily influenced the magistrate's intervention, there is a pretty general accord in accepting this view. Another illustration of this magisterial intervention is to be found in the interdiction of a spendthrift,—a decree depriving of his power of administration a man who was squandering his family estate and reducing his children to penury; a third presents itself in the removal of a tutor from office on the ground of negligence or maladministration, brought under the notice of the magistrate by any third party in what was called *postulatio suspecti tutoris*; and a fourth in the putting of a creditor in possession of the goods of an insolvent debtor, which must have been common enough even before the general bankruptcy regulations of the Rutilian edict. These are to be taken merely as examples of this magisterial intervention, which manifested itself in very various directions; and it is easy to see how largely such procedure might be utilized for remedying the grievances of persons who, from defect of complete legal title, want of statutory authority, or otherwise, were not in a position to avail themselves of the "actions of the law."

In one of the Valerio-Horatian laws consequent on the second secession of the plebeians there was mention of ten judges (*judices decemviri*), whose persons were declared as inviolable as those of the tribunes of the people and the plebeian ædiles. These were a body of judges elected to officiate on remit from a tribune or ædile in questions arising between members of the plebeian body. We are without details as to the institution of this plebeian judicatory, the questions that fell under its cognizance, the forms of process employed, the law administered by it, and the effect of its judgments. It is not much referred to by the historians; and its decadence has been attributed to the fact that the *Lex Hortensia* of 468 made the *nundinae* lawful court days (*dies fasti*), and so made it possible for the country folks coming to the city to market to carry on their processes before the prætor.

As all in a manner exercising judicial or quasi-judicial functions must also be mentioned the pontiffs, the consuls, and afterwards the censors as *magistri morum*, the chiefs of the *gentes* within the gentile corporations, and heads of families within their households. While it may be the fact that with the enactment of the XII. Tables the jurisdiction of the pontiffs[2] was materially narrowed, it certainly did not disappear,—witness the famous case in which Cicero made before them the oration of which he was so proud, *Pro domo sua*. The action of the consuls and afterwards of the censors as guardians of public morals, and the social and political disqualifications and pecuniary penalties with which they visited persons who had been guilty of perjury or gross perfidy, did not a little to foster fidelity to engagements. Through the same agency the exercise of a variety of rights whose abuse could not be made matter of action—the husband's power over his wife, the father's over his children—was controlled and kept within bounds. It was not on light grounds, indeed, that the majesty of the *paterfamilias* within the household could be called in question; it was only when he forgot that in the exercise of serious discipline within his family he was bound to act judicially. For he also was a judge—*judex domesticus*, as he is often called, though in all cases of gravity he was required to invoke the advice of his kinsfolk in a family council. On him lay the duty of controlling his family; if he failed to do so he was himself in danger of censorial animadversion. That his *gens* also, if he were a patrician, had some supervision and power of calling him to account is extremely probable; every corporation had it more or less over its members; but neither historians nor jurists give us any definite information.

Between citizens and foreigners with whom Rome was in alliance by a treaty conferring reciprocal right of action the proceedings took the form known as *recuperatio*.[3] It was an international process, modelled to some extent upon, and deriving some of its technical terms from, the fetial *clarigatio*. The action was always raised in the *forum contractus*. The magistrate ordinarily presiding there heard what parties had to say in plaint and defence, and then put in simple shape the points of fact arising on them, authorizing the recuperators to whom the matter was remitted to find for plaintiff or defendant according to circumstances. The recuperators were sometimes three, sometimes five, sometimes still more numerous, but always in odd number; whether the nationality of both parties required to be represented we are not told. Expedition being in most cases a matter of importance, recuperators were required to give judgment within ten days. How execution proceeded upon it, if it were for the plaintiff, does not clearly appear;

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nica, Berlin, 1861, p. 95 *sq.*; Ihering, *Geist d. röm. Rechts*, vol. i. § 11*c*; Voigt, *XII. Tafeln*, vol. i. p. 502 *sq.*

[1] This was according to the spirit of the early system, which endeavoured to check reckless or dishonest litigation by penalties,—*e.g.*, forfeiture of the *summa sacramenti* and duplication of the value of unrestored property and profits in the sacramental procedure; duplication of the value of the cause when judgment was against the defendant in an action upon an engagement embodied in a *lex mancipii* or *lex nexi*; duplication against a *vindex* who interfered ineffectually in *manus injectio* against a judgment-debtor; duplication against an heir who refused without judicial compulsitor to pay a legacy bequeathed *per damnationem*; the addition of one-third more by way of penalty against a debtor found liable in an *actio certae creditae pecuniae*, &c.

[2] See Hullmann, *Jus pontificium der Römer*, Bonn, 1837; Cauvet, *Le droit pontifical chez les anciens Romains*, Caen, 1869; Bouché-Leclerq, *Les pontifes de l'anc. Rome*, Paris, 1871; Marquardt, *Röm. Staatsverwalt.*, vol. iii. p. 290 *sq.*

[3] See Collman, *De Romanor. jud. recuperatorio*, Berlin, 1835; Carl Sell, *Die recuperatio der Römer*, Brunswick, 1837; Huschke (rev. Sell), in Richter's *Krit. Jahrbücher*, vol. i. (1837), pp. 868-911; Voigt, *Jus naturale*, &c., vol. ii. §§ 28-32; Karlowa, *Röm. Civilprocess*, pp. 218-230.

Voigt, founding on a few words in Festus, concludes it must have been by something like *pignoris capio*. This recuperatory procedure in time came to be resorted to in some cases even where both parties were citizens. There are numerous instances of it in Cicero; and it is remarkable that in most of the prætorian actions *ex delicto* the remit was not to a *judex* but to recuperators. The explanation may be in the comparative summariness of the remedy.

III. Development of the Substantive Institutions of the Law.

The Citizen and his "Caput."—The early law of Rome was essentially personal, not territorial. A man enjoyed the benefit of its institutions and of its protection, not because he happened to be within Roman territory, but because he was a citizen,—one of those by whom and for whom its law was established. The theory of the early *jus gentium* was that a man sojourning within the bounds of a foreign state was at the mercy of the latter and its citizens, that he himself might be dealt with as a slave, and all that belonged to him appropriated by the first comer; for he was outside the pale of the law. Without some sort of alliance with Rome a stranger had no right to claim protection against maltreatment of his person or attempt to deprive him of his property; and even then, unless he belonged to a state entitled by treaty to the international judicial remedy of *recuperatio*, it was by an appeal to the good offices of the supreme magistrate, or through the intervention of a citizen to whom he was allied by the (frequently hereditary) bond of *hospitium*, and not by means of any action of the *jus civile* set in motion by himself. A non-citizen—originally *hostis*, and afterwards usually called *peregrinus*[1]—in time came to be regarded as entitled to all the rights the *jus gentium* recognized as belonging to a freeman, and to take part as freely as a Roman in any transaction of the *jus gentium*; but that was not until Rome, through contact with other nations and the growth of trade and commerce, had found it necessary to modify her jurisprudence by the adoption of many new institutions of a more liberal and less exclusive character than those of the *jus civile*.

A citizen's civil personality was technically his *caput*. The extent of it depended on his family status. It was only among citizens that the supremacy of the *paterfamilias* and the subjection of those *in manu*, *potestate*, or *mancipio* were recognized,—only among them therefore that the position of an individual in the family was of moment. While in public life a man's supremacy or subjection in the family was immaterial, in private life it was the *paterfamilias* alone who enjoyed full jural capacity. Those subject to him had a more limited personality; and, so far as capacity to take part in transactions of the *jus civile* was concerned, it was not inherent in them but derived from their *paterfamilias*: they were the agents of his will, representatives of his *persona* in every act whereby a right was acquired by them for the family to which they belonged.

Whenever a citizen either ceased altogether to be a member of a Roman family or passed from one family into another, there was technically *capitis minutio* or *deminutio*, except in the cases of *filiifamilias* and *filiaefamilias* becoming flamens or vestals; for, though they changed their family, yet it was by passing from a human into a divine one. When a citizen forfeited his freedom, his *capitis deminutio* was said to be *maxima*; he lost all capacity, whether under the *jus civile* or the *jus gentium*. When, retaining freedom, he went into exile or joined a Latin colony, or otherwise became a peregrin, the diminution of his capacity was only *media* or *minor*; it was his rights and privileges under the *jus civile* that alone were affected. When both freedom and citizenship remained, and no more occurred than the severance of his connexion with a particular family (*familiae mutatio*), the diminution was said to be *minima*. Very simple illustrations present themselves in the case of a *paterfamilias* becoming *filiusfamilias* by adrogation, or a *materfamilias* passing into the hand of a husband by confarreation or coemption; in both cases he or she who had been *sui juris* thereby became *alieni juris*. This was descent in the family scale. It almost appears as if some of the later Roman jurists assumed, as do many moderns, that such descent or degradation was essential to the idea of *minutio capitis*; for Paul accounts for its presence in the case of emancipation—which converted a *filiusfamilias* into a *paterfamilias*, and thus manifestly improved his status—by the observation that in the process of release from his father's *potestas* a child had to pass, for however brief a period, through a condition of quasi-slavery (*mancipium*). But in reality degradation had nothing to do with it. It was immaterial whether the change was from a higher family position to a lower, or from a lower to a higher,[2] or to the same position in the new family that had been held in the old,—as when a *filiusfamilias* was transferred by his father into the *potestas* of an adopter, or when the *filiifamilias* of a person giving himself in adrogation passed with him into the *potestas* of the adrogator: in every case there was *capitis minutio*. It was not the change of family position that caused it, but the change of family itself,—the change from one family to another. The civil personality of Titius while a *filiusfamilias* in the *potestas* of Sempronius,—the expectancy of succession, the agnatic relationships, the derivative capacity for being a party to a mancipation or a *sponsio* that resulted from the relationship,—all came to an end through the severance of the family tie. He might acquire a new and independent capacity on becoming *sui juris* by emancipation, or a new derivative capacity on passing into the *potestas* of Mævius by adoption; but his old personality *quoad civilia* was extinguished. This is what some of the jurists mean when they say that *capitis deminutio* was civil death.

The most important consequence of *minima capitis deminutio* was that it not only extinguished *patria potestas* where it existed, but severed the bond of agnation between the *capite minutus* and all those who had previously been related to him as agnates. There was no longer any right of succession between them on intestacy; their reciprocal prospective rights of tutory were defeated, and the *minutio* of either tutor or ward put an end to a subsisting guardianship, assuming always that it was a *tutela legitima* or agnatic *cura furiosi*. Very remarkable, yet quite logical, was the doctrine that the *minutio* extinguished the claims of creditors of the *minutus*; their debtor, the person with whom they had contracted, was civilly dead, and dead without an heir, and therefore there was no one against whom an action of the *jus civile* could be directed in order to enforce payment. But equity eventually provided a remedy, by giving the creditors a prætorian action in which the *minutio* was held as rescinded, and which the new *paterfamilias* was bound to defend on pain of having to give up all the estate he had acquired through the adrogation or *in manum conventio*.

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[1] Neither "alien" nor "foreigner" is an adequate rendering of *peregrinus*. For *peregrini* included not only citizens of other states or colonies, independent or dependent, but also ἀπόλιδες,—men who could not call themselves citizens (*cives*) at all, as, for example, the *dediticii* whom Rome had vanquished and whose civic organization she had destroyed, offenders sent into banishment, &c.; and until Caracalla's general grant of the franchise the greater proportion of her provincial subjects were also spoken of as peregrins. This, though linguistically objectionable, is a safer word than "non-citizen"; for the latter would include the Junian Latins of the early empire, who, though not citizens, yet were not reckoned as *peregrini*.

[2] Children who became *sui juris* by their parent's death did not change their family; the change was not in them, but in the disappearance of the family head: therefore they were not regarded as *capite minuti*.

The Law of the Family Relations.—So far as appears no serious inroad was made by the XII. Tables on the law affecting husband and wife, unless in the recognition of the legality of marriage entered into without any solemnity, and not involving that subjection of the wife to the husband (*manus*) which was a necessary consequence of the patrician confarreation and plebeian coemption. These were left untouched. But it seems to have become a practice with some of the plebeians to tie the marriage bond rather loosely in the first instance,—possibly (as became quite general at a later period) in consequence of objection by the women to renounce their independence and right to retain their own property and earnings, more probably because taking a woman to be merely the mother of their children (*matrimonium*) had been forced upon them before coemption had been introduced as a means of making her a lawful wife, and so they had become in a manner habituated to it. But there seems also to have been an idea that, as a man might acquire the ownership of a thing to which his legal title was defective by prolonged possession of it, so he might acquire *manus*, with all its consequences, over the woman with whom he had thus informally united himself by prolonged cohabitation with her as his wife. This had become customary law. The Tables accepted it; all that was needed was to define the conditions under which *manus* should be held to have been superinduced, and the wife converted from a doubtful *uxor* into a lawful *materfamilias*. Hence the provision that, if a woman, married neither by confarreation nor coemption, desired to retain her independence, she must periodically absent herself for three nights from her husband's house (*trinoctialis usurpatio*),—twelve months' uninterrupted cohabitation being required to give him that power over her which would have been created instantly had the marriage been accompanied by either of the recognized solemnities.

Amongst the fragments of the Tables so industriously collected there is none that refers to a wife's marriage portion (*dos*); but it is hardly conceivable that it was as yet unknown. Justinian says that in ancient times it was regarded as a donation to the husband with his wife, rather than as a separate estate that was to be used by him while the marriage lasted but to revert to her or her representatives on its dissolution. And it is easy to see that, where there was *manus*, the wife becoming a member of her husband's family and everything of hers becoming his, such must originally have been its character. But even then, when a man gave his daughter (*filiafamilias*)—who could have nothing of her own—in marriage, and promised her husband a portion with her, there must have been some process of law for compelling him to pay it; and Voigt's conjecture that an *actio dictae dotis* was employed for the purpose has much in its favour. As regards divorce, Cicero alludes vaguely to a provision in the Tables about a man depriving his wife of the house-keys and turning her out of doors, with some such words as "take what is thine and get thee gone." This cannot have applied to confarreate marriages, which could be dissolved only by the religious ceremony of diffarreation. And even as regards other marriages the statement of the historians is that divorces were few and far between until the 6th century of the city, and that, until the same date, any man who turned his wife away, however serious the ground, without the cognition of the family council was liable to penalties at the hands of the censors.

Of the two or three provisions of the Tables that affected details of the *patria potestas*, which itself was assumed to be so well established by customary law as to need no statutory sanction or definition, one was in the words "si paterfamilias ter filium venum duit, a patre filius liber esto." This came to be construed by the jurists as meaning that so powerful was the bond of the *potestas* that it could not definitively be loosed until the father had three times gone through the process of fictitious sale by which emancipation was effected. But the conception of the law seems to indicate that its original purpose must have been rather to confer a benefit on a son *in potestate*, by declaring him *ipso jure* free from it on a certain event, than to place difficulties in the way of his emancipation. "If a house-father have thrice sold his son, the latter shall be free from his father." It reads as if the intention were to rescue the son from what, by its frequent repetition, was suggestive of a total absence of parental affection rather than reluctant obedience to overwhelming necessity. May not its object have been to restrain the practice, which prevailed to a late period in the empire, of men giving their children to their creditors in security for their loans,—a process that, at the time of the Tables, could be effected only by an actual transfer of the child *per aes et libram* as a free bondman (*mancipii causa*), under condition of reconveyance when the loan was repaid?

The nature of the relation between master and slave, like that of *manus* and *patria potestas*, seems also to have been too notorious to require exposition in the Tables. We find recorded only two references to it, one dealing with the case of a slave who had a conditional testamentary gift of freedom (*statu liber*), the other with noxal surrender (*noxae deditio*). The provision about noxal surrender in all probability was not limited to a slave; it was to the effect that, if a member of a man's family (*familiaris*, *i.e.*, a son or a daughter *in potestate* or a slave) committed a theft from or did mischief to property belonging to a third party, or a domestic animal belonging to one man did harm to another, the father of the delinquent child, or the owner of the slave or animal, should either surrender him or it to the person injured or make reparation in damages. In course of time the surrender came to be regarded as a means of avoiding the primary obligation of making reparation. But comparative jurisprudence recognizes in the enactment of the Tables a modified survival of the ancient right of an injured party to have the delinquent *corpus*,—man, beast, or thing,—given up to him to wreak his revenge upon it privately, the modification consisting in the alternative of reparation offered to the owner. This noxal surrender, failing reparation, had gone out of use in the case of daughters *in potestate* before the time of Gaius, and in the case of sons before that of Justinian; but the law remained unchanged so far as slaves and domestic animals were concerned even in that emperor's legislation.

Gentile guardianship.

Guardianship and the Introduction of the Order of Agnates.—So long as Rome was patrician the *gens* charged itself with the guardianship of a clansman's orphaned pupil children and his widow and unmarried daughters above pupilarity after his decease (*tutela*), as well as with that of male members of his family who were *sui juris*, but above the age of pupilarity, when they chanced to be lunatic, imbecile, prodigal, or helplessly infirm (*cura, curatio, curatela*). That was on the supposition, as regarded children, widow, and unmarried daughters above pupilarity, that no testamentary appointment of tutors by their deceased parent had displaced the *gens*, though whether testamentary nominations were then held competent it is impossible to say. The *gens* in council, in all probability, appointed one of its members to act as tutor or curator as the case might be, itself prescribed his duties, and itself called him to account for any failure in his administration.

But, as this gentile tutory could not be extended to the plebeians, among whom some law of guardianship was as much required as among their fellow-citizens of the higher order, the decemvirs found it expedient to devise a new one of universal application. The Tables contained no express authority for testamentary nomination of tutors to the widow of the testator, or to his pupil children and grown-up unmarried daughters; but such appointment, if unknown previously, was soon held to be justified by a liberal interpretation of the very inclusive provision, "uti legassit suae rei, ita jus esto." In the absence of testamentary appointment the nearest male agnates of lawful age were to be tutors. This tutory of agnates was an invention of the decemvirs, just as was the agnates' right of succession on intestacy. The plebeians had no *gentes*, at least until a much later period; so, to make the law equal for all, it was necessary to introduce a new order of heirs and tutors. "Tutores . . . ex lege XII. Tabularum introducuntur . . . agnati" is the very notable language of Ulpian. And his words are very similar in speaking of their right of succession; for, while he says of testamentary inheritances no more than that they were *confirmed* by the XII. Tables, he explains that the *legitimae hereditates* of agnates and patrons were *derived* from them.[1] The phrases *legitima cognatio*, *legitima hereditas*, *legitimi heredes*, *tutela legitima*, *tutores legitimi* themselves proclaim the origin of agnation, agnatic inheritance, and agnatic tutory; for, though the word *legitimus* might be applied to any institution based on statute, yet in the ordinary case it indicated one introduced by the XII. Tables, the law of laws.

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[1] Ulp., *Frag.*, xxvii. 5, "legitimae hereditatis jus . . . ex lege Duodecim Tabularum descendit." This derivation of agnatic inherit-

A man's agnates were those of his kinsmen who were subject to the same *patria potestas* as himself, or would have been had the common ancestor been still alive. A man's sons and daughters *in potestate*, therefore, whether the relationship was by birth or adoption, and his wife *in manu* (being *filiae loco*) were each other's agnates. But a wife not *in manu* was not their agnate; nor were children who had been emancipated or otherwise *capite minuti* the agnates of either their brothers and sisters or their mother *in manu*. A man was an agnate of his brother's children, assuming always that there had been no *capitis deminutio* on either side; but he was not an agnate of his sister's children, for they were not *ejusdem familiae*: they were agnates of their father's family, not of their mother's. In like manner, and again assuming the absence of *minutio capitis*, the children of brothers were each other's agnates, but not the children of a brother and a sister or of two sisters. Brothers and sisters were agnates of the second degree;[1] a man and his brother's children were of the third, the children of two brothers (*consobrini*) of the fourth, and so on,—it being a condition, however, that the kinship should always result either from lawful marriage or from adoption in one or other of its forms.

When, therefore, a man died leaving pupil male descendants or unmarried female descendants who by his death became *sui juris*, they got their brothers of lawful age as their tutors; if he was survived by his wife, and she had been *in manu*, her sons, or it might be stepsons, acted for her in the same capacity; in either case they took office as the nearest qualified male agnates. If the widow had no sons or stepsons of full age, and the children consequently no brothers, the tutory devolved on the agnates next in order,—*i.e.*, the brothers germane and consanguinean of the deceased husband and father; for they were agnates of the third degree. And so with agnates of the fourth and remoter degrees. Failing agnates who could demonstrate their propinquity, the tutory probably passed to the *gens* when the ward happened to belong to one. This is nowhere expressly stated; but Cicero gives what he represents to be an enactment of the Tables, making the fellow-gentiles of a lunatic his guardians on failure of agnates; and analogy seems to justify the extension of the same rule to the case of sane pupil and female wards.

The curatory of minors above pupilarity was of much later date than the Tables. The only curatories they sanctioned were those of lunatics and spendthrifts. A lunatic (*furiosus*) was committed to the care of his agnates, and, failing them, of his fellow-gentiles; and a few words in Festus seem to suggest that arrangements had to be made by them for his safe custody.

Ownership in res mancipi and res nec mancipi.

Mancipation and the Law of Property.—In the early law there was no technical word for ownership of things; it was an element of the house-father's *manus*. In time, although it is impossible to say when, the word *dominium* came into use; but, so far as can be discovered, it did not occur in the XII. Tables, and must have been of later introduction. In those days, when a man asserted ownership of a thing, he was content to say, "It is mine," or, "It is mine according to the law of the Quirites." The distinction was this, that, while the first was sufficient to entitle a man *de facto* holding a thing as his own to protection against a thief or any one attempting forcibly to dispossess him, the second was necessary when he appealed to a court of law to declare the legality of his title and his right to oust an individual withholding the possession neither theftuously nor by force. It is said by some jurists of eminence that under the law of the Tables what afterwards came to be called "dominium ex jure Quiritium" was competent only in the case of *res mancipi*,—of a man's house and farm, and the slaves and animals with which he worked them. But the usucapion (or acquisition by prolonged possession) which they confirmed and regulated undoubtedly conferred quiritarian right; and, as it applied to all things ownable without exception, it seems impossible to maintain that *res nec mancipi* could not then be held in quiritarian ownership as fully as *res mancipi*.

The modes in which these two classes of things might be acquired in property were very various. But there was this important difference,—that, while a natural mode of acquisition sufficed in the case of *res nec mancipi*, some civil one was necessary for the derivative acquisition, at all events, of *res mancipi*. The most important were mancipation, surrender in court, usucapion, and bequest as singular modes, and inheritance, *in manum conventio*, adrogation, and purchase of a confiscated estate as universal modes. All these, with the exception of mancipation, applied equally to *res nec mancipi*. But the commonest of all the modes of transferring things of the latter class was simple tradition. If the transfer was by the owner, with the intention of passing the property, then the simple delivery of possession was enough, unless it was in virtue of a sale; in such a case, and because a vendor had as yet no action for the price, the Tables provided that the ownership should remain with him, notwithstanding the change of possession, until the price was paid or security given for it.

Mancipation.

The origin of the distinction between mancipable and non-mancipable things, and of the form of conveyance by mancipation applicable to the first, has been explained in connexion with the reforms of Servius Tullius (*supra*, p. 676).[2] As he introduced it, mancipation (then called *mancipium*) was not the imaginary sale that Gaius speaks of, but as real a sale as could well be conceived,—the weighing in scales, held by an official, of the raw metal that was to be the consideration for the transfer of a *res mancipi*, and the handing of it by the transferee to the transferrer, with the declaration that thereby and therewith the thing in question became his in quiritary right,—and all this in words of style, and in the presence of certain witnesses who represented the people, and thus fortified the conveyance with a public sanction. As already shown, there is some reason to believe that, when large quantities of metal had to be weighed, the practice crept in of having this done before the witnesses had assembled; and in the formal act only a single pound was weighed as representing the whole amount. This paved the way for the greater change that resulted from the introduction by the decemvirs of coined money. From that moment weighing became unnecessary. The price was counted out before the ceremony, and sometimes left to be done afterwards; and, though, in that spirit of conservatism that was so marked in the adhesion to time-honoured forms after their *raison d'être* was gone, the scale-bearer and the scales were still retained as indispensable elements of the mancipation, yet the scales were simply touched by the purchaser with a single coin, in order that he might be able to recite the old formula—"I say that this slave is mine in quiritary right, and that by purchase (for such and such a price?) with these scales and this bit of copper:" And that one coin, says Gaius, was then handed by the transferee to the transferrer, as if it were in fact the price of the purchase (*quasi pretii loco*). Thus transformed, the mancipation was undoubtedly an imaginary sale; for the real price might have been paid weeks or months before, or might not be paid until weeks or months afterwards. The mancipation had become nothing more than a conveyance, and in this form it continued down to the end of the 3d century of the empire to be the appropriate mode of transfer of a *res mancipi*, or at least of conferring on the transferee of such a thing a complete legal title (*dominium ex jure Quiritium*). After that, however, it seems gradually to have gone into disuse, being inapplicable to lands out of Italy that did

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ance from the XII. Tables was specially noticed by Danz in his *Gesch. d. röm. Rechts*, 2d ed., Leipsic, 1871-73, vol. ii. p. 95, but is generally ignored.

[1] To determine the degree of propinquity between two persons it was necessary to count the generations upwards from the first to the common ancestor and downwards from him to the second. Consequently brothers were related in the second degree, uncle and nephew in the third, first cousins in the fourth, and so on: "tot gradus quot generationes."

[2] *Literature*:- Leist, *Mancipation und Eigenthumstradition*, Jena, 1865; Ihering, *Geist d. röm. Rechts*, vol. ii. § 46; Bechmann, *Geschichte d. Kaufs im röm. Recht*, Erlangen, 1876, pp. 47-299; Voigt, *XII. Tafeln*, vol. i. § 22, vol. ii. §§ 84-88.

not enjoy what was called *jus Italicum*; and long before the time of Justinian it had entirely disappeared.

The effects of a mancipation, provided the price had been paid or security given for it, were that the property passed instantly to the purchaser, and that the transferrer was held to warrant the transferee against eviction from the moment the price was received. In the absence of either payment or sureties for it, the title still remained with the vendor, so that it was in his power, by means of a real action, to get back what had been mancipated, even though it had passed into the possession of the vendee. The vendor's liability to the vendee in the event of eviction is usually supposed to have arisen *ipso jure*, that is to say, without anything expressly said about it; the acceptance by the transferrer of the coin with which the scales had been struck was held to have imposed upon him an obligation to maintain the transferee in possession, under a penalty of double the amount of the price, recoverable by the latter by what is usually called an *actio auctoritatis*. But this *ipso jure* obligation did not arise when the mancipation was either really or fictitiously gratuitous,—really, in the case of donations, &c., fictitiously, when, on purpose to exclude the warranty, the recital of the transferee was that the price was a single sesterce.

The right of a vendee to sue an *actio auctoritatis* arose only when eviction resulted from a decree in a regular judicial process at the instance of a third party disputing his title, and was conditional on his having done all that was necessary on his part to bring his vendor (*auctor*) into the field to defend his own interests. And the duration of the *auctoritas* was limited by statute to two years in the case of lands and houses, to one year in the case of other things. As possession for those periods was sufficient to cure any defect in the vendee's title, it was but reasonable that with their expiry the vendor's liability on his warranty should be at an end.

By a provision of the Tables in the very inclusive terms, "cum nexum faciet mancipiumque, uti lingua nuncupassit, ita jus esto," the importance of mancipation was immensely increased; for any sort of qualification germane to the transaction might be superinduced upon it, and the range of its application thus greatly extended. Such qualifications were spoken of as *leges mancipii*,—self-imposed terms, conditions, or qualifications of the conveyance, which, as integral parts of the transaction *per aes et libram*, partook of its binding character and were law between the parties. The matter of oral declaration might be the acreage of lands, their freedom from burdens or right to easements, reservation of a usufruct, limitation of their mode of use, undertaking to reconvey on a certain event, or what not; the result was just so many obligations created *per aes et libram*, whose contravention or denial (Cicero tells us) was punished with a twofold penalty. Ordinarily the words spoken in the hearing of the witnesses fixed the beginning and the end of the liability; it was enough that they were literally complied with, however much the other party might be injured by something inconsistent with their spirit, or which he had not taken the precaution to require should be made matter of declaration. But there was an exception (although possibly not introduced until long after the Tables) in the case of that particular mancipatory agreement which was known by the name of *fiducia*, *i.e.*, where the mancipation was to a creditor in security or to a friend for safe-custody, and the engagement was to return the thing mancipated in the one case when the debt secured by it was paid and in the other on demand. In such cases the transferee took the conveyance more in the transferrer's interest than his own; he became a trustee, entitled to be treated with consideration, and neither mulcted in a twofold penalty when his inability to reconvey was due to no fault of his, nor forced to reconvey until relieved of charges incurred by him in reference to the property. Accordingly it became the practice to import into the mancipation a reference to *fides*—"fidei fiduciae meum esse aio," with explanation of the purpose, &c., of the *fiducia* in the relative *lex mancipii*; this had the effect of freeing alike the right of the vendor and the obligation of the vendee from the hard-and-fast lines of the *jus strictum*, and subordinating them to the principles of *bona fides*.

Of the civil modes of acquiring property on singular title applicable to both *res mancipi* and *res nec mancipi* surrender in court (*in jure cessio*) was just a *rei vindicatio* arrested in its initial stage. The parties, cedent and cessionary, appeared before the magistrate; the cessionary, taking the position of plaintiff, declared the thing his in quiritary right; the cedent, as defendant, was asked what he had to say in answer; and, on his admission or silence, the magistrate at once pronounced a decree (*addictio*) which completed the transfer, but which might be subject to a condition or other limitation, or even to a fiduciary reservation. It was probably more resorted to for the constitution of servitudes, both real and personal, and transfer of such rights as *patria potestas*, tutory-at-law of a woman, or an inheritance that had already vested, than for conveyance of property For it was not only inconvenient, inasmuch as it required the parties to appear before the supreme magistrate in Rome, and could not be carried through by a slave on his owner's behalf (as mancipation might), but it had the serious disadvantage that it did not *ipso jure* imply any warranty of title by the cedent or afford the cessionary any action against him in the event of eviction. The reason was that in form the right of the cessionary flowed from the magisterial decree,—"Since you say the thing is yours, and the cedent does not say it is his, I declare it yours,"—and not from any act or word of the cedent's, who was passive in the matter.

Adjudication was the decree of a judge in a divisory action, such as one for partition of an inheritance amongst co-heirs; it conferred upon each of them a separate and independent right in a part of what as a whole had previously been joint property.

Usucapion,[1] regulated by the XII. Tables, but not improbably recognized previously in a vague and uncertain way, converted uninterrupted possession (*usus*) into quiritary property by efflux of time. The provision in the Tables was to this effect—"usus auctoritas fundi biennium esto, ceterarum rerum annuus esto." The relation in which the words *usus* and *auctoritas* stand to each other has been a subject of much discussion: the prevailing opinion amongst modern civilians is that the first alone refers to usucapion, and the second to the warranty of title incumbent on the vendor in a mancipation, and that both were limited to two years in the case of lands (and, by extensive interpretation, houses), and to one year in the case of anything else. In the later jurisprudence the possession required to be based on a sufficient title and the possessor to be in good faith. But the decemviral code, as is now generally admitted, contained no such requirements; any citizen occupying immovables or holding movables as his own, provided they were usucaptible and he had not taken them theftuously, acquired a quiritary right in two years or one, as the case might be, simply on the strength of his possession. Originally, therefore, it was simply the conversion of *de facto* possession, no matter how acquired so long as not by theft, into legal ownership when prolonged for the statutory period,—too often the maintenance of might at the cost of right. But in time it came to be regarded rather as a remedy for some defect of title, arising either from irregularity of conveyance or incapacity of the party from whom a transfer had been taken; and with the progress of jurisprudence it developed into the carefully regulated positive prescription which has found a place in every modern system.

Jura in re aliena.

The conception of the abstract notion of a real right in (or over) the property of another person (*jus in re aliena*) is not to be looked for at so early a period in the history of the law as that now under consideration. The rural servitudes of way and water were no doubt very early recognized, for they ranked as *res mancipi*, and the XII. Tables contained various regulations in reference to the former. Usufruct, too, was probably not unknown; but the urban prædial servitudes bear the impress of a somewhat later jurisprudence. Pignorate and hypothecary rights were unknown as rights protected by action at the time now being dealt with.[2] Between private parties the only thing legally recognized of the nature of a real security was the *fiducia* that is described above. Approaching more nearly to the modern idea of a mortgage was the security *praedibus praediisque* required by the state from those indebted to it in assurance of their obligations. Here there was the double guarantee of sureties (*praedes*) and mortgaged lands of theirs (*praedia subsig-*

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[1] *Literature*:—Stintzing, *Das Wesen von* bona fides *und* titulus *in d. röm. Usucapionslehre*, Heidelberg, 1852; Schirmer, *Die Grundidee d. Usucapion im röm. Recht*, Berlin, 1855; Pernice, *Labeo*, vol. ii. pp. 152 *sq.*; Voigt, *XII. Tafeln*, vol. ii. § 91; Esmein, "Sur l'histoire de l'usucapion," in the *Nouv. Rev. Hist.*, &c., vol. ix. (1885), p. 261 *sq.*

[2] Hypothecary rights were certainly unknown until near the end of the republic. But Festus (s.v. "Nancitor;" see Bruns, *Fontes*, p. 274) speaks of a provision in the Cassian league between Rome and the Latin states of the year 262 u.c.—"Si quid pignoris nasciscitur, sibi habeto"—which makes it difficult to believe that the Romans were altogether unacquainted with pledge or pawn of movables as a transaction of some value *de facto* if not *de jure*.

nata); but how they were dealt with when the debtor made default is by no means clear.

Forms of testament.

Changes in the Law of Succession.—The two forms of testament of the regal period (*supra*, p. 674) still remained in use in the early republic; but in course of time they were displaced by the general adoption of that executed with the copper and the scales (*testamentum per aes et libram*). It seems to be the general opinion that it was to the first two that the words applied which stood in the forefront of the provisions of the XII. Tables about inheritance,—"uti legassit suae rei, ita jus esto." Whether resort was to the comitia or to the army, the testator's own will in the matter was henceforth to be supreme. There was to be no more reference to the pontiffs as to the expediency of the testament in view of the interests of the family *sacra* and of creditors of the testator's; from legislators, sanctioning a departure from the ordinary rules of succession, the assembled Quirites became merely witnesses,—recipients of the oral declaration of the testator's will in regard to his inheritance.

Testament per aes et libram

The testament with the copper and the scales is depicted by Gaius as a written instrument. But he presents it in what was apparently the third stage of its history. Its probable origin has been explained in describing the result of the Servian reforms upon the private law. It was then not a testament but only a makeshift for one. A plebeian was not qualified in the regal period to make a testament in the comitia; so, instead, he transferred his estate to a friend on whom he could rely with instructions how to distribute it on his death. The transferee was called *familiae emptor*, because the conveyance was in form a mancipation for a nominal price.

It is not at all unlikely that the same device may occasionally have been resorted to by a patrician who had neglected to make a regular testament, and was seized with mortal illness before he had an opportunity of appealing to the curies. But such a disposition was not a testament, and may not have been so called. A testament was the nomination of a person as the testator's heir,—sometimes the substitution of an individual of the testator's choice for the heir assigned to him by law, sometimes the acceptance of the latter but in the character of testamentary heir, so that the testator might be able to impose upon him what burdens he pleased as the tacit condition of heirship. It made the person instituted as fully the representative of the testator after his death as his heir-at-law would have been had he died intestate. The *mortis causa* mancipation that opened the way for the testament *per aes et libram* conferred upon the *familiae emptor* no such character. Gaius says that he stood in place of an heir (*heredis loco*), inasmuch as he had such of an heir's rights and duties as the *familiae venditor* had it in his power to confer and impose; but the transaction was but a conveyance of estate, with a limitation of the right of the grantee. It has been argued that, as the law did not recognize conditional mancipation, the conveyance must have operated as a complete and immediate divestiture of the grantee. But this does not follow. For it was quite competent for a man, in transferring property by mancipation, to reserve to himself a life interest; and apparently it was equally competent for him to postpone delivery of possession, without infringing the rule that the mancipation itself could not be *ex certo tempore*. So far as one can see, therefore, there was nothing to prevent the grantee of the conveyance (or quasi-testator) bargaining that he was to retain the possession till his death; and, as the *familia* was an aggregate of estate (*universitas rerum*) which retained its identity notwithstanding any change in its component elements, he must in such case have been as free to operate on it while he survived as if he had never conveyed it by mancipation.

Cicero incidentally remarks—what indeed the nature of the business of itself very distinctly suggests—that the true testament with the copper and the scales had its statutory warrant, not in the *uti legassit suae rei* of the XII. Tables, but in the provision contained in the words,—"cum nexum faciet mancipiumque, uti lingua nuncupassit, ita jus esto." Reflexion on the import and comprehensiveness of these words led the interpreters to the conclusion that there was nothing in them to prevent the direct institution of an heir in the course of the *verba nuncupata* engrafted on a mancipation. From the moment this view was adopted and put in practice the *familiae mancipatio* ceased to be a transfer of the testator's estate to the *familiae emptor*; the latter's purchase was now for form's sake only though still an indispensable form, since it was it alone that, according to the letter of the statute, imparted efficacy to the *nuncupatio*. But it was the *nuncupatio*—the oral declaration addressed to the witnesses—that really contained the testamentary disposition, *i.e.*, the institution of an heir, with such other provisions as the testator thought fit to embody in it. This was the second stage in the history of the testament *per aes et libram*. The third was marked by the introduction of tablets in which the testamentary provisions were set out in writing, and which the testator displayed to the witnesses, folded and tied up in the usual manner, declaring that they contained the record of his last will.

Gaius narrates the words spoken by the *familiae emptor* and addressed to the testator as follows:—"Your estate and belongings *familia pecuniaque tua*), be they mine by purchase with this bit of copper and these copper scales, subject to your instructions, but in my keeping, that so you may lawfully make your testament according to the statute (*quo tu jure testamentum facere possis secundum legem publicam*)." The meaning of the words "in my keeping (*endo custodelam meam*)" is not quite obvious; they may have been remnants of an older style, or may be due to a clerical error of the writer of the Verona MS. Certain it is that they no more imported a real custody than a real property in the *familiae emptor*; for the testator remained so entirely master of his estate that the very next day if he pleased he might mancipate it anew to a different purchaser, and nuncupate fresh testamentary writings. The nuncupation was in these terms · "As is written in these tablets so do I give, so do I legate, so do I declare my will; therefore, Quirites, grant me your testimony", and, adds Gaius, "whatever the testator had set down in detail in his testamentary tablets he was regarded as declaring and confirming by this general statement." To the appeal of the testator the witnesses responded by giving their testimony in words which unfortunately are not preserved; and then the testament was sealed by testator, officials, and witnesses. the seals being outside according to the early fashion.

Although this testament with the copper and the scales was justified in the first instance by the provision of the XII. Tables as to the effect of nuncupative words annexed to a mancipation, yet in course of time it came to be subordinated to that other one which dealt directly with testamentary dispositions,—*uti legassit suae rei, ita jus esto*. Upon the words *uti legassit* the widest possible meaning was put by the interpreters: not only was a testator held entitled on the strength of them to appoint tutors to wife and children, to enfranchise slaves, and make bequests to legatees, but he might even disinherit his proper heir (*suus heres*) in favour of a stranger, so long as he did so in express terms. Institution of a stranger without mention of the proper heir, however, was fatal, at least if the latter was a son; for without express disherison (*exheredatio*) his father could not deprive him of the interest he had in the family property as in a manner one of its joint owners. It can hardly be supposed that disherison was contemplated by the compilers of the Tables: it was foreign to the traditional conception of the family and the family estate. But it was a right whose concession could not be resisted when claimed as embraced in the *uti legassit*, although generally discountenanced, and as far as possible restrained by the strictness of the rules imposed on its exercise.

Intestate succession.

In the absence of a testament, or on its failure from any cause, the succession opened to the heirs *ab intestato*. So notoriously were the *sui heredes* entitled to the first place—and that not so much in the character of heirs as of persons now entering upon the active exercise of rights hitherto existing, though in a manner dormant—that the compilers of the XII. Tables thought it superfluous expressly to declare it. "If a man die intestate, leaving no *suus heres*, his nearest agnate shall have his estate. If the agnate also fail, his gentiles shall have it." It has been pointed out, in dealing with the tutory of agnates, that the notion of agnation, as a bond distinct from that which connected the gentile members of a clan, was due to the decemvirs. They had to devise a law of intestate tutory and succession suitable alike to the patricians who had *gentes* and to the plebeians who had none. To put the latter in exactly the same position as the former was beyond their power; for the fact had to be faced that the plebeians had no gentile institutions, and to create them was impossible.

The difficulty was overcome by accepting the principle of agnation upon which the patrician *gens* was constructed, and establishing an agnatic circle of kinsmen within the sixth degree, to which the *gens* as a corporation should be postponed in the case of the patricians, and which should come in place of it in the case of the plebeians. It was not perfect equalization, but the nearest approach to it that the circumstances permitted. The difference was that, when the agnates of a plebeian intestate failed, his inheritance was vacant, whereas, on failure of those of a patrician, there was devolution to his *gens* in its collective capacity. And this devolution was rendered all the more frequent by two "interpretations" put upon the statute,—(1) that, if the nearest agnates in existence declined the succession, those next in degree were not allowed to take it; and (2) that no female agnate could take it except a sister of the deceased intestate. The division among two or more agnates was always *per capita*, not *per stirpes*.

The order of intestate succession thus established by the XII. Tables, which prevailed until amended by the prætors probably in the 8th century of the city, was first to the *sui heredes* of the deceased, next to his nearest agnate or agnates, and finally, if the deceased was a patrician, to his *gens*. His *sui heredes* included those of his descendants in his *potestas* when he died who by that event (or even after it, but before his intestacy became manifest) became *sui juris*, together with his wife *in manu* (who, as regarded his succession, was reckoned as a daughter); but they did not include children whom he had emancipated or daughters who had passed *in manum* of a husband. Emancipated children did not even come in as agnates on failure of *sui*; for emancipation severed the tie of agnation as well as that of *potestas*. For the same reason no kinsman who had been emancipated, and so cut off from the family tree, could claim as an agnate; for those only were agnates who were subject to the same *patria potestas*, or would have been had the common family head been still alive.

Position of heirs.

The opening of a succession (technically *delatio hereditatis*) in favour of *sui heredes*, whether in virtue of a testamentary institution or by operation of law on intestacy, at once invested them with the character, rights, and responsibilities of heirs. No acceptance was necessary, nor, according to the rules of the *jus civile*, was any declinature competent. They had been all along in a manner joint owners with their parent of the family estate, which by his death had become, nominally at least, an inheritance; and, as he had not thought fit to terminate their interest in it by emancipating or disinheriting them, they were not now allowed to disown it. Hence they were spoken of as necessary heirs (*heredes sui et necessarii*). A slave, too, whom his owner had instituted in his testament was a necessary heir: he could not decline, and was invested with the character of heir the moment the testator died. Not so with stranger institutes or agnates taking on intestacy: they were free to take or reject the inheritance as they saw fit; consequently an act of acceptance (*aditio*) was necessary on their part to make them heirs. It was not unusual for a testator, in instituting an heir, to require that he should make a formal declaration of acceptance within a limited time, failing which his right should pass to a substitute, who in turn was required to enter within a certain time; and so on with any number of substitutes, the series ending with one of his slaves, who became heir without entry, and thus saved the testator from the disgrace of *post mortem* bankruptcy in the event of the inheritance proving insolvent. The *uti legassit* of the Tables, as already remarked, conferred upon a testator very great latitude of testamentary disposition, even to the extent of disherison of *sui heredes*. This was a course, however, that was rarely resorted to unless when a child had been guilty of gross ingratitude, or when the parent had reason to believe his estate was insolvent and desired to protect his children from the responsibilities of inheritance. Usually his *sui*, if he had any, would be his institutes, and the purpose of the testament either to apportion the estate amongst them as he thought expedient, or to give him an opportunity of appointing tutors, bequeathing legacies, or enfranchising slaves. On intestacy the *sui* took equally, but *per stirpes*; that is to say, grandchildren by a son who had predeceased or been emancipated, but who themselves had been retained in their grandfather's *potestas*, took amongst them the share to which their father would otherwise have been entitled, instead of taking equal shares with their surviving uncles. It was by no means uncommon, when the whole inheritance descended to sons, for them to hold it in common for many years as partners (*consortes*); but any one of them was entitled at any moment to claim a partition, which was effected judicially, by an arbitral procedure introduced, termed a *judicium* (or *arbitrium*) *familiae erciscundae*. Where two or more strangers were instituted testamentarily, whether to equal or unequal shares, if one of them failed either by predecease or declinature his share accrued *ipso jure* to the others; for it was a rule that very early became proverbial that a man could not die partly testate and partly intestate. There was the same accrual among agnates on intestacy; and both they and stranger testamentary institutes had the same action for division of the inheritance that was made use of by *sui heredes*.

According to Gaius it was as a stimulus to heirs to enter as soon as possible to an inheritance that had opened to them, and thus make early provision alike for satisfying the claims of creditors of the deceased and attending to his family *sacra*, that the law came to recognize the somewhat remarkable institution of usucapion or prescriptive acquisition of the inheritance in the character of heir (*usucapio pro herede*). Such usucapion was impossible—there was no room for it—if the deceased had left *sui heredes*; for the inheritance vested in them the moment he died. But, if there were no *sui heredes*, then any person taking possession of the property that had belonged to the deceased, and holding it for twelve months without interruption, thereby acquired it as if he were heir: in fact, according to the views then held, he acquired the inheritance itself. Gaius characterizes it as a dishonest acquisition, inasmuch as the usucapient knew that what he had taken possession of was not his. But, as already explained, the usucapion of the XII. Tables did not require *bona fides* on the part of the usucapient; he might acquire ownership by prolonged possession of what he knew did not belong to him so long as he did not appropriate it theftuously, *i.e.*, knowing that it belonged to another. But an inheritance unappropriated by an heir who had nothing more than a right to claim it belonged in strictness to no one; and there was no theft, therefore, when a person took possession of it with a view to usucapion in the character of heir. There can be little doubt that on the completion of his possession he was regarded as heir just as fully as if he had taken under a testament or as heir-at-law on intestacy,—that is to say, that he was held responsible to creditors of the deceased and required to charge himself with the family *sacra*. Gaius does not say as much; but both the Coruncanian and the Mucian edict imposed the latter burden upon him who had usucapted by possession the greater part of a deceased person's estate; and it is but reasonable to suppose that the burden of debts must in like manner have fallen on the usucapient or usucapients in proportion to the shares they had taken of the deceased's property.

Law of obligations.

The Law of Obligations.—The jurists of the classical period attribute obligation either to contract, or delict, or miscellaneous causes (*variae causarum figurae*); and those arising from contract fill a place in the later jurisprudence vastly greater than those arising from delict. In the XII. Tables it was very different. In them delicts were much more prominent than contracts,—wrongs entitling the sufferer to demand the imposition of penalties upon the wrongdoer that in most cases covered both reparation and punishment. The disproportion in the formulated provisions in reference to the two sources of obligation, however, is not surprising. For, first of all, the purpose of the decemviral code was to remove uncertainties and leave as little as possible to the arbitrariness of the magistrates. In nothing was there more scope for this than in the imposition of penalties; and, as different offences required to be differently treated, the provisions in reference to them were necessarily multiplied. In the next place, the intercourse that evokes contract was as yet very limited. Agriculture was the occupation of the great majority; trade and commerce were more backward than in the later years of the regal period; coined money was just beginning to be used as a circulating medium. Lastly, the safeguards of engagement then lay to a great extent in the sworn oath or the plighted faith, of which the law had hardly begun to take cognizance, but which found a protection quite as potent in the religious and moral sentiments that had so firm a hold on the people.

Contract in general.

It may be asked—If a man purchased sheep or store-cattle, a plough, a toga, a jar of wine or oil, had he no action to compel delivery, the vendor no action for payment of the price? Did the hire of a horse or the loan of a bullock create no obligation? Was partnership unknown and deposit and pledge and suretyship in any other form than that of *vadimonium*? One can have no hesitation in answering that, as transactions of daily life, they must all have been more or less familiar. It does not follow, however, that they were already regulated by law and protected by the ordinary tribunals. The historical jurists are pretty well agreed that not only the real contracts of loan (*mutuum* and *commodatum*), deposit, and pledge, but also the consensual ones of sale, location, partnership, and mandate, and the verbal one of suretyship, were as yet very barely recognized by law. Sale was the offspring of barter,—of instant exchange of one thing for another. With such instant exchange there was no room for obligation to deliver on either side, even when the ware (*merx*) given by one of the parties was so much rough copper weighed in the scales. The substitution of coined money for the raw metal can hardly have effected any radical change: the ordinary practice of those early times must still have been ready-money transaction,—an instant exchange of ware for price; and it can only have been when, for some reason or other, the arrangement was exceptionally for delivery or payment at a future date, say next market day, that obligation was held to have been created. Was that obligation enforceable by the civil tribunals? Some jurists hold that it was,—that at no time were the *jus gentium* contracts outside the protection of judicial remedies, although by a simpler procedure than that resorted to for enforcement of the contracts of the *jus civile*. But two provisions in the XII. Tables seem to prove very clearly that it was not so enforceable. The first is one recorded by Justinian,—that, where a thing was sold and delivered, the property, nevertheless, was not to pass until the price had been paid or sureties (*vades*) for it accepted by the vendor. Far from being a recognition of the obligatory nature of the transaction, this provision is really a recognition of the inability of the law to enforce payment of the price by the vendee; it is a declaration that, on the latter's failure to pay, the vendor, unprotected by any personal action, should be entitled to get back the thing sold as still his own, no matter in whose hands he found it. The second related to the case of a person who had bought a victim for sacrifice, but had failed to pay for it. A real action for its revindication by the seller after it had been consumed on the altar was out of the question; so he was authorized by the Tables, by the process of *pignoris capio* (*supra*, p. 686), at his own hand to appropriate in satisfaction a sufficient equivalent out of the belongings of the purchaser, against whom he had no personal action.

It was a principle of the law of Rome through the whole of its history, though in course of time subject to an increasing number of exceptions, that mere agreement between two persons did not give him in whose favour it was conceived a right to demand its enforcement. To entitle a man to claim the intervention of the civil tribunals to compel implement of an engagement undertaken by another, it was necessary (subject to those exceptions) either that it should be clothed in some form prescribed or recognized by the law, or that it should be accompanied or followed by some relative act which rendered it something more than a mere interchange of consent. Under the jurisprudence of the XII. Tables the formalities required to elevate an agreement to the rank of contract and make it civilly obligatory sometimes combined ceremonial act and words of style, sometimes did not go beyond words of style, but in all cases took place before witnesses. *Dotis dictio*, the undertaking of a parent to provide a dowry with his daughter whom he was giving in marriage, and *vadimonium*, the guarantee of a surety for the due fulfilment of the undertaking either of a party to a contract or a party to a litigation, probably required nothing more than words of style before persons who could if necessary bear witness to them; whereas an engagement incident to a mancipation, or an undertaking to repay borrowed money, required in addition a ceremony with the copper and the scales. This undertaking to repay arose from the contract of *nexum*, which was older than the Tables; both it and the verbal contract by *sponsio* or stipulation, which was younger, merit further consideration.

The Nexal Contract.[1]—The tumults and seditions so frequent in Rome during the first two centuries of the republic are more frequently attributed by the historians to the abuses of the law of debt than to any other cause, social or political. The circumstances of the poorer plebeians were such as to make it almost impossible to avoid borrowing. Their scanty means were dependent on the regular cultivation of their little acres, and on each operation of the agricultural year being performed in proper rotation and at the proper season. But this was every now and again interfered with by wars which detained them from home at seed-time or harvest, practically rendering their farms unproductive and leaving them and their families in straits for the commonest necessaries of life. A poor peasant, in such a case, had no alternative but to apply to a capitalist for a loan. But it was not to be had without security, and rarely without interest. It was not that the lender doubted the borrower's honesty and willingness to repay his debt; it was rather that there was every chance that next year a fresh war might again interfere with the latter's agricultural operations, leave him again without a crop, and thus render repayment impossible. And so, while interest accumulated and was periodically added to capital, new loans had year after year to be contracted as long as any acres remained that could serve as a security; failing all things, the debtor had to impledge or hypothecate *himself*;[2] for, phrase it how we may, this was substantially the result of the contract of *nexum*.

Nexal contract

The practice of lending *per libram* was doubtless of great antiquity,—indeed the intervention of the scales was a necessity when money or what passed for it had to be weighed instead of counted; and not improbably old custom conceded to a lender who had thus made an advance in the presence of witnesses some very summary and stringent remedy against a borrower who failed in repayment. How Servius subjected it to much the same formalities as he appointed for mancipation—the state scales, the official *libripens*, the five witnesses representing the nation—has been shown already. With the introduction of a coinage the transaction, instead of being *per libram* simply, became one *per aes et libram*; the scales were touched with a single piece, representing the money which had already been or was about to be paid, a formula recited whereby the obligation of repayment was imposed on the borrower, and an appeal made to the witnesses for their testimony. Unfortunately this formula is nowhere preserved. Huschke and Giraud, assuming that the lender was the only speaker, formulate it thus—"quod ego tibi mille libras hoc aere aeneaque libra nexas dedi, eas tu mihi post annum jure nexi dare damnas esto"—"whereas with this coin and these copper scales I have given thee a thousand *asses*, be thou therefore bound *jure nexi* to repay them to me a year hence." The phrase *damnas esto*, like the rest of the formula, is unsupported by any conclusive authority; but, as it was that most frequently employed in the republic for imposing by a public act liability to pay a fixed and definite sum, it may not be wide of the mark.

What was the effect of this procedure? The question is one not easily answered. Brinz has expressed the opinion that the creditor was entitled in virtue of the *nexum* to take his debtor into custody at any time when he considered such a course necessary for his own protection, even before the conventional term of repayment,—that the debtor was in bonds, virtually a pledge, from the very first, and the tightness or looseness of them a matter in the discretion of his creditor.[1] Voigt holds that the *nexum* did not give the creditor any peculiar hold over his debtor, and that on the latter's failure to repay an ordinary action was necessary, to be followed by the usual proceedings in execution if judgment was in favour of the former. These views may be said to be the two extremes; and between them lie a good many others, more or less divergent. The difficulty of arriving at a conclusion is caused to some extent by the ambiguity of the words *nexus* and *nexum*. The transaction itself was called *nexum*; the money advanced was *nexum aes* (hence *nexi*, *i.e.*, *aeris datio*); the bond was *nexus* (of the fourth declension); and the debtor on whom the bond was laid was also *nexus* (of the second). All this is simple enough. But we find the same word *nexus* employed by the historians as almost synonymous with *vinctus*,—to denote the condition of a debtor put in fetters by his creditor. That might be the condition either of a nexal borrower or of an ordinary judgment-debtor. The former in such a case was doubly *nexus*; he was at once in the bonds of legal obligation and in those of physical constraint. In many passages in which Livy and others speak of the *nexi* it is extremely difficult, sometimes impossible, to be sure in which sense they use the word. It is therefore not surprising that there should be considerable diversity of opinion on the subject, and such frequent identification of the legal status of a nexal debtor (*nexus*) with that of a judgment-debtor (*judicatus*).

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[1] *Literature*:—Savigny, "Ueber d. altrom. Schuldrecht," in his *Verm. Schriften*, vol. ii. p. 396 *sq.*; Scheurl, *Vom Nexum*, Erlangen, 1839; C. Sell, *De juris Rom. nexo et mancipio*, Brunswick, 1840; Van Heusde, *De Lege Poetilia Papiria*, Utrecht, 1842; Bachofen, *Das Nexum*, &c., Basel, 1843; Huschke, *Ueber d. Recht des Nexum*, Leipsic, 1846; Giraud, *Des Nexi ou de la condition des débiteurs chez les Romains*, Paris, 1847; Bekker, *Die Aktionen des röm. Privatrechts*, vol. i., Berlin, 1871, cap. 2; Vainberg, *Le Nexum . . . en droit Romain*, Paris, 1874; Brinz, "Der Begriff *obligatio*," in Grünhut's *Zeitschr.*, vol. i. (1874), p. 11 *sq.*; and Voigt, *XII. Tafeln*, vol. i. §§ 63-65. There is a *résumé* of the principal theories (down to 1870) in Danz, *Gesch. d. röm. Rechts*, vol. ii., 2d ed., Leipsic, 1873, § 146.

[2] "He told them how he had been obliged to borrow money, because, when he had been away fighting against the Sabines, his farm had remained uncropped, his house had been burned, his cattle driven off, everything plundered, and at the same time, unhappily for him, a tribute imposed; how first his ancestral lands had gone, then his other property, and at last, like a wasting disease, it had come to his body; how his creditor, instead of putting him to work (*in servitium*), had thrown him into a dungeon and a torture-chamber" (Liv., ii. 23).

Almost all writers—Voigt[2] is a distinguished exception—concur in opinion that the nexal contract entitled the creditor, after expiry of thirty days from the conventional date of repayment of the loan, to proceed against his debtor by *manus injectio* without any antecedent action or judgment, and failing settlement to detain him, and put him to servile labour and subject him to servile treatment, until the loan was repaid. The parallel of such a course is to be met with amongst all ancient nations,—Jews, Greeks, Scandinavians, Germans, &c.[3] And it was not altogether unreasonable. If a borrower had already exhausted all available means of raising money, had sold or mortgaged everything he possessed of any value, what other course was open to him in his necessity except to impledge himself? That the creditor should have been entitled to realize the right he had thus acquired without the judgment on it of a court of law is equally intelligible. The nexal contract was a public act, carried out in the presence of the representatives of the people, who were witnesses alike of the acknowledgment of indebtedness and of the tacit engagement of the debtor. The only valid objection that could be stated against the creditor's apprehension of his debtor in execution was that the indebtedness no longer existed,—that the loan had been repaid. But a nexal debt could be legally discharged only by *nexi liberatio*, which also was a solemn procedure *per aes et libram* in the presence of five citizen witnesses. What need for a judicial inquiry in the presence of facts so notorious? A creditor would rarely be daring enough to proceed to *manus injectio* if his loan had been repaid; if he did, the testimony of the witnesses to the discharge would at once procure the release of his alleged debtor. It was probably to give opportunity for such proof, if there was room for it, that the XII. Tables required that a creditor who had apprehended a nexal debtor should bring him into court before carrying him off into detention.

But there was no room for the intervention of a *vindex* or champion, for there was no judgment whose regularity he could impugn. Nor was there any room for a magisterial *addictio* of the debtor to his creditor; for the latter's right of detention was founded on contract, and needed no decree to strengthen it. The creditor was entitled at once, after apprehension of his debtor and production of him in court in terms of the statute, to carry him home with him, take such steps as were necessary to ensure his safe custody, and employ his services in profitable industry. But that he could kill him or sell him, as some suppose, is a proposition that is destitute of any authority to support it. Equally untenable is the notion that the *nexus* became a slave, or that, while retaining his freedom, his wife, children, and belongings fell with him into the hands of his creditor. He certainly was not in a worse position than an *addictus*, of whom Quintilian states distinctly that he still retained his position in the census and in his tribe. Many a time, when the exigencies of the state required it, were the *nexi* temporarily released in order to obey a call to arms,—to fulfil the duty incumbent on them as citizens. In fact a nexal debtor suffered no *capitis deminutio* at all because of his detention. If he was a house-father he still retained his *manus* over his wife and *potestas* over his children. But they did not share his quasi-servitude. Their earnings legally belonged to him, but were no doubt retained by them with his consent for their own support. They certainly did not fall to his creditor. It was the body of his debtor that he was entitled to, and too often he wreaked his vengeance on it by way of punishment; there was as yet no machinery for attaching the debtor's goods in substantial reparation for the loss caused by his breach of contract.

Pœtilian law.

The abuses to which the system gave rise alike in the case of nexal and of judgment debtors have already been alluded to. In the year 428 a more than ordinarily flagrant outrage committed by a creditor upon one of his young *nexi*, who, Livy says, had given himself up as responsible for a loan contracted by his deceased father, roused the populace to such a pitch of indignation as to necessitate instant remedial legislation. The result was the Pœtilian law (*Lex Poetilia Papiria*). So far as can be gathered from the meagre accounts of it we possess, it contained at least these three provisions—(1) that fetters and neck, arm, or foot blocks should in future be applied only to persons undergoing imprisonment for crime or delict; (2) that no one should ever again be the *nexus* of his creditor in respect of borrowed money; and (3) that all existing *nexi qui bonam copiam jurarent* should be released. The first was intended to prevent unnecessary restraint upon judgment-debtors formally given over to their creditors. The second did not necessarily abolish the contract of loan *per aes et libram*, but only what had hitherto been an *ipso jure* consequence of it,—the creditor's right to incarcerate his debtor without either the judgment of a court or the warrant of a magistrate. For the future, execution was to be done against a borrower only as a judgment-debtor formally made over to his creditor by magisterial decree, and under the restrictions and limitations imposed by the Pœtilian law itself. This very soon led to the disuse of nexal obligation; once it was deprived of its distinctive processual advantages it rapidly gave place to the simpler engagement by stipulation enforceable *per condictionem*. As for the release of the then existing *nexi*, Cicero, Livy, and Dionysius say nothing of any condition annexed to the boon the statute conferred upon them; it is only Varro who limits it to those *qui bonam copiam jurarunt*,—those apparently who were able to declare on oath that they had done their best and could do no more to meet their creditors' claims. Such a limitation can hardly be called unreasonable, even were we to assume—as probably we ought to do—that the release spoken of was only from the bonds of physical restraint, not from those of legal obligation.

Stipulation.

Introduction of the Stipulation.[4]—Few events in the history of the private law were followed by more far-reaching consequences than the introduction of the stipulation. It exercised an enormous influence on the law of contract; for by means of it there was created a unilateral obligation that in time became adaptable to almost every conceivable undertaking by one man in favour of another. By the use of certain words of style in the form of question and answer any lawful agreement could thereby be made not only morally but legally binding, so that much which previously had no other guarantee than a man's sense of honour now passed directly under the protection of the tribunals. Stipulations became the complement of engagements which without them rested simply on good faith, as when a vendor gave his stipulatory promise to his vendee to guarantee peaceable possession of the thing sold or its freedom from faults, and the vendee in turn gave his promise for payment of the price. The question and answer in the form prescribed by law made the engagement fast and sure. Hence the generic name of the contract; for Paul's derivation of it from *stipulum*, "firm," is much to be preferred to the earlier and more fanciful ones from *stips* or *stipula*. It was round the stipulation that the jurists grouped most of their disquisitions upon the general doctrines of the law of contract,—capacity of parties, requisites of consent, consequences of fraud, error, and intimidation, effects of conditions and specifications of time, and so forth. It may well be said, therefore, that its introduction marked an epoch in the history of the law.

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[1] Brinz, in Grünhut's *Zeitschr.*, vol. i. p. 22. He likens the position of the *nexus* to that of a thing—land, say—mortgaged to a creditor in security of a claim. Such security the Roman jurists constantly speak of as *res obligata*, and sometimes as *res nexa*. As Brinz observes, the thing was *obligata* from the first, and continued so as long as the debt it secured was unpaid, even though the creditor found it unnecessary to reduce it into possession or interfere with it in any way.

[2] He holds that there was nothing peculiar in the obligation created *nexo*, *i.e.*, that it did not impose any immediate liability on the borrower which the lender could enforce without judicial intervention, but that the latter required to proceed against the former in ordinary course, by what he calls an *actio pecuniae nuncupatae*.

[3] See authorities in Brinz's paper in Grünhut's *Zeitschr.*, vol. i. p. 25. The Greek phrase was ἐπὶ σώματι δανείζειν. There is a curious style in Marculfus (*Form.*, ii. 27), in which a borrower engages that, until he shall have repaid his loan, his creditor shall have right to his services so many days a week, and shall have power to inflict corporal punishment if there be dilatoriness in rendering them.

[4] *Literature*:—Liebe, *Die Stipulation u. das einfache Versprechen*, Brunswick, 1840; Schmidt (rev. Liebe), in Richter's *Krit. Jahrb.*, vol. v. pp. 869 *sq.*, 961 *sq.*; Gneist, *Die formellen Verträge d. röm. Rechts*, Berlin, 1845, p. 113 *sq.*; Heimbach, *Die Lehre vom Creditum*, Leipsic, 1849; Danz, *Der sacrale Schutz im röm. Rechte*, Jena, 1857, pp. 102-142, 236 *sq.*; Schlesinger. *Zur Lehre von den Formalcontracten*, Leipsic, 1858, § 2; Voigt, *Jus nat., &c., d. Röm.*, vol. ii. § 33, vol. iv., Beilage xix.; Girtanner, *Die Stipulation*, Kiel, 1859; Bekker, *Aktionen*, vol. i. pp. 382-401; Karsten, *Die Stipulation*, Rostock, 1878.

There is, however, no certainty either as to the time or as to the manner of its introduction. So far as appears it was unknown at the time of the compilation of the XII. Tables, at least in private life; one of the first unmistakable allusions to it is in the Aquilian law of 476 U.C. The mention of it in that enactment, however, is with regard to a phase of it which cannot have been reached for many years after it had come into use; and the probability is that it originated before the middle of the 5th century, its first statutory recognition being in the Silian law introducing the *legis actio per condictionem* (*supra*, p. 683). In its earliest days it bore the name not of *stipulatio* but of *sponsio*, for the reason that the interrogatory of the party becoming creditor was invariably formulated with the word *spondes*—*e.g.*, *centum dare spondes?*—while the answer was simply *spondeo*.

rigin

There has been much speculation as to the origin of the contract. Modern criticism has three theories,—(1) that it was the verbal remnant of the *nexum*, after the business with the copper and the scales had gone into disuse; (2) that it was evolved out of the oath at the great altar of Hercules and the appeal to Fides (*supra*, p. 675); (3) that it was imported from Latium, which it had reached from some of the Greek settlements farther south. The last view is the most probable. Verrius Flaccus, as quoted by Festus, connects it with the Greek *σπένδειν* and *σπονδή*; and Gaius incidentally observes that it was said to be of Greek origin. A libation (*σπονδή*) is frequently referred to by Homer and Herodotus as an accompaniment of treaties and other solemn covenants,—a common offering by the parties to the gods which imparted sanctity to the transaction. Leist[1] is of opinion that the practice passed into Sicily and Lower Italy, but that gradually the libation and other religious features were dropped, although the word *σπονδή* was retained in the sense of an engagement that bound parties just as if the old ritual had been observed, and that it travelled northward into Latium and thence to Rome under the name of *sponsio*, being used in the first instance in public life for the conclusion of treaties, and afterwards in private life for the conclusion of contracts. The meaning of *spondes* as a question by a creditor to his debtor (although latterly, we may well believe, unknown to them) thus came to be—"Do you engage as solemnly as if the old ceremonial were gone through between us?" There are many examples of such simplification of terms, none more familiar than when a man says—"I give you my oath upon it," without either himself or the individual addressed thinking it necessary to go through the form.

It is not a little remarkable that, although the idea was derived from abroad, the use of the words *spondes* and *spondeo* in contracting were, down at least to the time of Gaius, confined in Rome to Roman citizens. The *sponsio* as a form of contract was essentially *juris civilis*. So at first were the later and less solemn forms of stipulation,—*promittisne? promitto, dabisne? dabo*, and the like. Gaius speaks of these as *juris gentium*, *i.e.*, binding even between Romans and peregrins. Such they became eventually, but not until towards the end of the republic. Yet, although *juris civilis*, both the *sponsio* and the later forms were from the first free from many of the impediments of the earlier *actus legitimi*. No witnesses were required to assist at them; and they were always susceptible of qualification by conditions and terms. It was very long, however, before parties had much latitude in their choice of language; *spondeo* was so peculiarly solemn that no equivalent could be admitted; and even the later styles may be said to have remained stereotyped until well on in the empire. And it was the use of the words of style that made the contract. It was formal, not material; that is to say, action lay upon the promise the words embodied, apart from any consideration whether or not value had been given for it. In time this serious disadvantage was abated; first by introducing in certain cases words that excluded action in presence of fraud, antecedent or subsequent, on the part of the creditor, and afterwards by prætorian exceptions, such as a plea of "no value," or by having the contract set aside on the motion of the nominal debtor before proceedings had been taken upon it by the creditor. Originally the stipulation was employed only in regard to engagements whose terms were in every respect definite and certain, and was enforced by the *legis actio per condictionem*. But in time it came to be employed in engagements that were from the first indefinite. This seems to have been due to the intervention of the prætors, and to have originated after the system of the *legis actiones* had begun to give place to that *per formulas*. The remedy in such a case was not spoken of as a condiction but as an *actio ex stipulatu*.

CHAPTER III.—THE JUS GENTIUM AND JUS HONORARIUM.

(*Latter half of the Republic.*)

I. INFLUENCES THAT OPERATED ON THE LAW.

Influx of foreigners.

Growth of Commerce and Influx of Foreigners.—While it may be admitted that commerce was beginning to take root in Rome in the 5th century, yet it was not until the 6th that it really became of importance. The campaigns in which Rome was engaged until the end of the First Punic War absorbed all its energies. But after that time the influx of strangers, and their settlement in the city for purposes of trade, became very rapid,—first Latins and other allies, and afterwards Greeks, Carthaginians, and Asiatics. For them and the regulation of their affairs the *jus civile*—the law peculiar to Rome and its citizens—was applicable only if they were members of allied states to which *commercium* and *recuperatio* were guaranteed by treaty. But multitudes were not in this favoured position; and even those who were soon found the range of Roman modes of acquiring property and contracting obligations too narrow for their requirements. Hence a *jus gentium* was gradually developed[2] which very early in its history drove treaty covenants for *recuperatio* out of use; its application may for a time have been limited to transactions between non-citizens or between citizens and non-citizens, but it was eventually accepted in the dealings of citizens *inter se* and became part and parcel of the *jus Romanorum*. Gaius and Justinian speak of it as "the common law of mankind," "the law in use among all nations"; but the language must not be taken too literally. The Roman *jus gentium* was not built up by the adoption of one doctrine or institution after another that was found to be generally current elsewhere. In the earliest stages of its recognition it was "an independent international private law, which, as such, regulated intercourse between peregrins or between peregrins and citizens on the basis of their common *libertas*";[3] during the republic it was purely empirical and free from the influence of scientific theory, but its extensions in the early empire were a creation of the jurists,—a combination of comparative jurisprudence and rational speculation. To say that it was *de facto* in observance everywhere is inaccurate; on the contrary, it was Roman law, built up by Roman jurists, though called into existence through the necessities of intercourse with and among non-Romans.

It may be a little difficult for a modern jurist to say with perfect precision what were the doctrines and institutions of the *jus gentium* as distinguished from the *jus civile*. But the distinction must have been very familiar to the Romans; otherwise we should not have had the statement of Marcian in reference to the ἀπόλιδες,—that they enjoyed all the rights competent to a man under the former, but none of those competent to him under the latter.

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[1] *Græco-Italische Rechtsgeschichte*, Jena, 1884, pp. 465-470. Upon the *sponsionis vinculum* internationally, see Livy, ix. 9

[2] On the Roman *jus gentium*, see Voigt, *Das jus naturale, aequum et bonum, und jus gentium d. Römer*, 4 vols., Leipsic, 1856-75; Nettleship, in the *Journal of Philology*, vol. xiii. (1885), p. 169 *sq.*

[3] Voigt, *Jus nat.*, vol. ii. 661. He distinguishes the *jus civile*, *jus gentium*, and *jus naturale* as the systems which applied respectively to the citizen, the freeman, and the man.

The peregrin prætor.

Institution of the Peregrin Prætorship.—The prætorship[1] was an outcome of the Licinian laws of the year 387 U.C. Down to the end of the 5th century the prætor then appointed superintended single-handed the administration of justice, alike between citizens and foreigners. But with the altered condition of things in the beginning of the 6th century, and the influx of strangers which has already been alluded to, the work seems to have been found too onerous for a single magistrate, and a second prætor was appointed. The date is not absolutely certain, although generally assumed to have been about the year 512 U.C.; but Pomponius says distinctly that the creation of the new office was rendered necessary by the increase of the peregrin population of Rome, and that the new magistrate got the name of *praetor peregrinus* because his principal duty was to dispense justice to this foreign element. After the submission of Sicily and Sardinia the number of the prætors was increased to four and after the conquest of Spain to six; Sulla raised the number to eight, and Cæsar eventually to sixteen. But all the later creations were for special purposes; the ordinary administration of justice within the city was left with the representatives for the time of the two earliest, who came to be distinguished as *praetor urbanus* (*qui jus inter cives dicit*) and *praetor peregrinus*. It would be going too far to speak of the latter as the principal author of the *jus gentium*; for a large proportion of the actions for enforcing *jus gentium* rights were civil, not honorary,—a fact which proves that the rights they were meant to protect and enforce had their origin in the *jus civile*, although moulded to meet new requirements by tacit consuetude and the agency of the jurists. But even in this view the peregrin prætor must have had a powerful influence in giving shape and consistency to the rising jurisprudence, by means of the *formulae* he adjusted for giving it practical effect.

Reforms of Æbutian law.

Simplification of Procedure and Introduction of New Remedies under the Æbutian Law.—The *Lex Aebutia* is only twice mentioned by ancient writers, and we know neither its precise date nor its specific provisions. And yet, to judge by its effects, it must have been one of the most important pieces of comitial legislation in the latter half of the republic; for Gellius speaks of it as having given the deathblow to many of the institutions of the XII. Tables, and Gaius couples it with two Julian laws as the statutory instruments whereby the formular system of procedure was substituted for that *per legis actiones*. The probability is that it was enacted immediately or soon after the institution of the peregrin prætorship. Its purpose, whatever may have been its terms, seems to have been to empower the prætors to adapt existing remedies to altered circumstances, and to fashion new actions on the *jus civile* for the use of the peregrins to whom the procedure of the *legis actiones* was incompetent; while it may possibly at the same time have expressly authorized the insertion in the styles to be devised by them of clauses that would give protection when required against claims that in law were well founded but in fact inequitable. But, whatever may have been the actual provisions of the statute, the result was the introduction of a procedure which gradually supplanted that by the "actions of the law," which was much more pliant than the latter, and whose characteristic was this,—that, instead of the issue being declared by word of mouth by the parties, and requiring in many cases to embody with perfect accuracy the statutory provision upon which it was based, it was now formulated in writing by the prætor, in the shape of an instruction to the judge to inquire and consider, with power to condemn or acquit according to his finding (see *infra*, p. 707).

Effects of provincial administration.

Provincial Conquests.—The growth of commerce and the enormous increase of wealth, which made great capitalists and enabled them through the agency of freedmen and slaves to carry on trade on a scale hitherto unknown, and which thus helped to foster the *jus gentium*, was no doubt due to a large extent to provincial conquests. But these operated also in other directions. The authorities who proceeded to the conquered provinces as governors found themselves face to face with laws and institutions in many respects differing from those of Rome. Political considerations dictated how far these were to be respected, how far subverted. In some provinces, more especially the Eastern ones, it was thought unnecessary to do more than supplement the existing system by the importation of doctrines of the *jus gentium* and the procedure of the prætor's edicts; while in others, in which it was deemed expedient to destroy as rapidly as possible all national feeling and every national rallying point, a Romanizing of all their institutions was resorted to, even to the extent of introducing some of the formal transactions which previously had been confined to citizens. But in either case there was a reflex action. The native institution had to be studied, its advantages and disadvantages balanced, the means considered of adapting it to the prætorian procedure, and the new ideas so presented as to make them harmonize as far as possible with the old. All this was a training of no small value for those who, on their return to Rome, were to exercise an influence on legislation and the administration of the law. They brought back with them not merely an experience they could not have obtained at home, but sometimes a familiarity with foreign institutions that they were very willing to acclimatize in Italy. Rome thus enriched its law from the provinces, deriving from them its emphyteutic tenure of land, its hypothec, its Rhodian law of general average, and a variety of other features that were altogether novel. Some of them were sanctioned by tacit recognition, others by edicts of the prætors; but, in whatever way received, they were indirectly fruits of provincial conquest.

Influenc of literature an philosophy

Spread of Literature and Philosophy.—The effect on Roman civilization of the addiction of educated men in the later republic to literature and philosophy is a matter for consideration in connexion with Rome's general history. It is not proposed to consider here the question how far specific doctrines of Roman law bear the impress of the influence of the schools, especially that of the Stoics; it is a subject much too large to be disposed of in a few lines.[2] The matter is mentioned simply for the sake of noting that the spirit of critical inquiry aroused and fostered by literary and philosophical study, seriously and conscientiously undertaken, contributed greatly to promote a new departure in jurisprudence that became very marked in the time of Cicero—the desire to subordinate form to substance, the word spoken to the will it was meant to manifest, the abstract rule to the individual case to which it was proposed to apply it. This was the first effort of what then was called equity to temper and keep within bounds the rigour of the *jus strictum*. The prætors, the judges, and the jurisconsults all had their share in it. Although modern jurists are prone to speak of prætorian equity as if it were a thing apart, yet the same spirit was leavening the law in all directions and in the hands of all who had to deal with it, the difference being that the form and publicity of the edict gave to its applications by the prætors a more prominent and enduring record than was found in the decisions of private *judices* or the opinions of counselling jurisconsults.

Decline of religion an morals.

Decline of Religion and Morals.—It would be equally out of place to enlarge here on the causes and manifestations of that decline in religious sentiment and public and private virtue which was fraught with such disastrous results in the later days of the republic. The private law was influenced by it to a considerable extent, alike in those branches which regulated the domestic relations and those which dealt with property and contract.

The ever-increasing disregard of the sanctity of the marriage tie is one of those features in the history of the period which strikes even the most unobservant. While from the first the law had denounced causeless separation and visited it with penalties, in principle it maintained the perfect freedom of divorce,—that it was improper to force persons to continue in the bonds of matrimony between whom matrimonial affection no longer existed. With the simple and frugal habits of the first five centuries of Rome, and the surveillance of the *consilium domesticum*, the recognition of this principle produced no evil results; family misunderstandings were easily smoothed over, and divorces were of rare occurrence. But from the time of the enactment of the Mænian law in 586 there seems to have been a change for the worse. It *inter alia* displaced the family council as a divorce court and transferred its functions in that matter to a *judicium de moribus*,—a court of inquiry nominated by the prætor, and having as its duty to decide to what extent there should be forfeiture of the nuptial provisions in case of separation or repudiation. The motives of the statute may have been of the best; but its tendency was injurious, for not only did it indirectly facilitate divorce, but it rendered the idea of it familiar, and overthrew that respect for the domestic council which had hitherto been a check upon it. What wonder that with increasing luxury and licentiousness divorce became so common!

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[1] See Labatut, *Histoire de la Prêture*, Paris, 1868; Mommsen, *Röm. Staatsrecht*, vol. ii. p. 176 *sq.*; Karlowa, *Röm. Rechtsgeschichte*, vol. i. p. 217 *sq.*

[2] It is one that was discussed with much greater fervour a century ago than it is now. Of the later literature may be mentioned—Van Vollenhoven, *De exigua vi quam philosophia Græca habuit in efformanda jurisprudentia Romana*, Amsterdam, 1834; Ratjen, *Hat die Stoische Phil. bedeutenden Einfluss gehabt, &c.?* Kiel, 1839; Voigt, *Jus nat.*, &c., vol. i. §§ 49-51; Laferrière, *De l'influence du Stoïcisme sur la doctrine des jurisconsultes Romains*, Paris, 1860; Hildenbrand, *Gesch. u. System d. Rechts- und Staats-Philosophie*, Leipsic, 1860, vol. i. §§ 141, 142. The earlier literature is given in Hildenbrand, p. 593.

This looseness of the marriage bond, as was naturally to be expected, had its effect on the other family relations. The obligation of a father to provide for his children began to be lightly esteemed. The law—possibly only the interpretation put upon the *uti legassit* of the XII. Tables—had empowered him testamentarily to disinherit them, or in instituting them to limit their right to a mere fraction of the inheritance; but it was assumed that this power would be exercised with discretion and only when justified by circumstances. But in the latter days of the republic, amid the slackened ties of domestic life, paternal as well as conjugal duty seems to have often been lost sight of, and children disinherited or cut off with a nominal share of the inheritance in order that a stranger might be enriched. This led to the introduction by the centumviral court, without any legislative enactment or prætor's edict to warrant it, of what was called the *querela inofficiosi testamenti*,—challenge of a testament by a child whose natural claims had been capriciously and causelessly disregarded. While the practice may for a time have been hesitating and uncertain, yet before long, through means of this *querela*, the rule came to be established that every child was entitled, notwithstanding the terms of his father's testament, to at least a fourth (*portio legitima*, *quarta legitima*, the legitim of the law of Scotland and various Continental countries) of what would have come to him had his parent died intestate, unless it appeared that the latter had had adequate grounds for excluding him or limiting him to a smaller share. A parent might in like manner challenge an undutiful testament made by his child to his prejudice; and in certain cases so might brothers and sisters *inter se*.

The decline of morals had an equally marked effect on the transactions of daily life, calling for precautions and remedies that had not been found requisite in the hey-day of the πίστις τῶν Ῥωμαίων. Men no longer relied on each other's good faith unless backed by stipulations, cautions (*cautiones*), and guarantees. The Rutilian bankruptcy arrangements and the *actio Pauliana* for setting aside alienations in fraud of creditors indicate a laxity in mercantile dealings that was perhaps an inevitable consequence of the growth of trade and commerce. But, that such remedies as, for example, the *exceptio rei venditae et traditae* or the *exceptio non numeratae pecuniae* should have been found necessary—the one an answer to a vendor (with the price in his pocket) who attempted to dispossess his vendee because some of the formalities of conveyance had been neglected, the other an answer to an action on a bond for repayment of money that by some accident had never been advanced—proves that the law had now to encounter fraud in all directions, and that *Graeca fides* had to a great extent displaced the old Roman probity.

II. Factors of the Law.

Legislation.—It cannot be said that during the period of nearly two centuries and a half embraced within the present chapter the private law owed much to legislation. The vast majority of the enactments of the time referred to by the historians dealt with constitutional questions, municipal and colonial government, agrarian arrangements, fiscal policy, sumptuary prohibitions, criminal and police regulations, and other matters that affected the public law rather than the private. Those of the latter class mentioned by Gaius and Ulpian in their institutional works barely exceed a score in number; and of these not above half a dozen can be said to have exercised a permanent influence on the principles (as distinguished from the details) of the law. Most of them were enactments of the *concilium plebis* or of the comitia of the tribes, to which ordinary legislation had passed as more readily convened and more easily worked than the comitia of the centuries.

Edicts of the Magistrates.[1]—The practice of propounding edicts was very ancient, and had been followed by kings and consuls long before the institution of the prætorship. It was one of the most obvious ways of exercising the *imperium* with which the supreme magistrate was invested,—to lay an injunction upon a citizen and enforce his obedience, or to confer upon him some advantage and maintain him in its enjoyment. It was one of the ways in which public order was protected where there had been no invasion of what the law regarded as a right, and where, consequently, there was no remedy by action. That the earlier edicts of the prætors were of this character—issued, that is to say, with reference to particular cases, and what afterwards came to be called *edicta repentina* or *prout res incidit posita*—there is little reason to doubt. In time a new class of edicts appeared which got the name of *edicta perpetua* (or *perpetuae jurisdictionis causa proposita*),—announcements by the prætor, published on his album (as the white boards displayed for the purpose in the forum were called), of the relief he would be prepared to grant on the application of any one alleging that the state of facts contemplated had arisen. The next year's prætor was free to adopt the edicts of his predecessor or not; but it was usual for him to do so if they had been found beneficial in practice, he adding to them new provisions suggested by demands made upon past prætors for *edicta repentina* but which they had not generalized, or even proposing for acceptance some remedy entirely of his own devising. As each new prætor entered upon office he announced his jurisdictional programme,—his *lex annua*, as it was called from this particular point of view, by far the greater part of it *tralaticium*, *i.e.*, transmitted from his predecessors, and only a few paragraphs, diminishing in number as time progressed, representing his own contribution. And so it went on in the first years of the empire, until the prætorian function was eclipsed by the imperial; and at last, after having, by instruction of Hadrian, been subjected to revision, and consolidated with the edicts of the peregrin prætors and provincial governors, it was sanctioned as statute law for the empire through the medium of a senatusconsult.

There is some reason for supposing that the edict attained considerable proportions in the time of Cicero; for he mentions that, whereas in his youth the XII. Tables had been taught to the boys in school, in his later years these were neglected, and young men directed instead to the prætor's edicts for their first lessons in law. Of a few of them the date and authorship are known with tolerable precision; but of the history of the majority, including some of the most important, such as those introducing *restitutio in integrum* on the ground of lesion through error, absence, minority, and the like, and those revolutionizing the law of succession, we are to a great extent in the dark. It is not necessary to assume either that the Julian consolidation exhibits all the provisions that from first to last appeared on the album, or that those preserved in it were originally in the shape in which they are there presented. It is much more likely that we have in it only those that had stood the test of generations, and that many of them are the result of the combined wisdom and experience of a series of prætors. It was one of the great advantages the edicts had over legislative enactments that they might be dropped, resumed, or amended by a new prætor according to his judgment of public requirements. For the edict was *viva vox juris civilis*,—intended to aid, supplement, and correct it in accordance with the ever-changing estimate of public necessities; and this would have been impossible had its provisions from the first been as stereotyped as they became by the consolidation in the time of Hadrian.

The *Edict* seems to have contained two parts,—the first what may be called the edict or edicts proper, and the second an appendix of styles of actions, &c., whether derived from the *jus civile* or from the *jus praetorium*. The contents of the edict proper were in detail very various, but all devoted to an exposition of the ways in which the prætor meant to exercise his jurisdiction during his year of office. They were not didactic or dogmatic formulations of law, but rather announcements or advertisements of what remedy he would grant in such and such circumstances, or direct orders to do or prohibitions against doing certain things. A party claiming an action or whatever else it might be under any of them did so not of right, as he would have done had his claim had a statutory or customary foundation, but of grace,—on the strength of the prætor's promise to grant him what he claimed and make the grant effectual. That was why originally such an action had to be raised and concluded within the particular prætor's year of office,—a rule which in time, by abuse, was converted into the somewhat different one that a purely prætorian action (*i.e.*, not originally of the *jus civile*, even though remodelled and regulated by the prætor) had to be raised within a year of the occurrence to which it referred.

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[1] See Lenel, *Beiträge zur Kunde des praetorischen Edicts*, Stuttgart, 1878, and the introductory chapters in his *Das Edictum Perpetuum*, Leipsic, 1883; Karlowa, *Röm. Rechtsgesch.*, § 60.

As already observed, the prætors' edicts proceeded to a greater extent than the earlier legislation of the comitia upon lines of equity; that is to say, they set themselves against the strictness and formalism of the jurisprudence of the XII. Tables. Such may be said to have been the general tendency of the edicts as a whole. But it was the tendency of the whole jurisprudence of the time, and by no means peculiar to the prætorian creation. Nowhere in the texts are the prætors spoken of as the mouthpieces of equity as distinguished from law. Such a distinction recurs frequently in Cicero; he identifies *aequitas* with the spirit of a law or agreement, and *jus* with its letter, but it is in order to sing the praises not of the prætors but of the pleaders who maintained the former as against the latter, and of the judges who were persuaded by their arguments. Much of what was contained in the *Edict* might quite as well have been embodied in statute, and we know that in time statute came to its aid; witness a very remarkable provision of it,—"I will give *bonorum possessio* as may be enjoined by statute, whether comitial enactment or senatusconsult."

Of the edicts of the peregrin prætor and their relation to that of his urban colleague little is known. That they differed in some respects there can be no doubt, for in the *Lex Rubria* (of 706?) for settling the government of Cisalpine Gaul the magistrates are directed, with reference to a certain action, to formulate it in the way prescribed in the edict of the peregrin prætor. The latter, therefore, must to some extent have been in advance of that of the urban prætor, probably in this respect, that, being prepared primarily for the regulation of questions affecting non-citizens, it more thoroughly than the other avoided formalities that were competent only to citizens, and thus to a greater extent simplified procedure. The edicts of the provincial governors must have varied according to circumstances, being in all cases composites of provisions, more or less numerous, borrowed from the edicts of the prætors and additions suggested by the peculiar wants of the different provinces for which they were framed (*provinciale genus edicendi*). As for those of the curule ædiles, who amongst other duties were charged with the supervision of markets, their range was very limited, their most important provisions having reference to open sales of slaves, horses, and cattle, and containing regulations about the duties of vendors exposing them, and their responsibility for latent faults and vices.

Consuetudo, Professional Jurisprudence, and Res Judicatae.—Great as may be the difficulty experienced by philosophical jurists in defining the ground of the authority of consuetudinary law, there is no room to dispute the importance of its contributions to every system of jurisprudence ancient and modern. The men who first drew, accepted, and endorsed a bill of exchange did as much for the law as any lawgiver has ever accomplished. They may or may not have acted on the advice of jurists; but, whether or not, they began a practice which grew into custom, and as such was recognized by the tribunals as a law-creating one,—one conferring rights and imposing obligations. There is much of this—far more probably than is commonly imagined—in the history of every system of law.

In Rome the process was sometimes wonderfully expeditious; witness what Justinian narrates of the introduction and recognition of testamentary trusts and of codicils to last wills, both in the time of Augustus. It can hardly be doubted that the literal contract *per expensilationem* originated in the same way, probably in the end of the 5th or the beginning of the 6th century. The keeping of domestic account-books may have been enjoined and enforced by the censors; but it was custom, and neither statute nor prætor's edict, that made an entry in them to another person's debit creative of a claim against the latter for *certa pecunia credita*, that might be made effectual by an action under the Silian law. It must have been in exactly the same way that *mutuum*, formless loan of money, came to be regarded as the third variety of *certa credita pecunia*, and to be held recoverable under the same action. True, this could not have been attained without the co-operation of the courts. But then those courts were composed each of a single private citizen, whose office ended with his judgment in the particular case remitted to him, and who was untrammelled by the authority of any *series rerum judicatarum*.[1] He had simply to decide whether in his view expensilation or formless loan created such an obligation as was covered by the words *pecuniam dari oportere*. There may for a time have been a divergent practice, contradictory findings, as Cicero says there were in his day upon the question whether *aequitas* or *jus strictum* was to be applied to the determination of certain matters; but the gradual ascendency and eventual unanimity of judicial opinion in the affirmative was but the expression of the general sentiment of the citizens, of whom the *judices* were the representatives.

These are but examples of the way in which consuetudinary law was constructed. It required the combined action of the laity and the *judices*, both at times acting under professional advice; in some cases even that of the prætors was necessary. It would have been impossible, for instance, to have introduced the consensual contracts into the Roman system and determined what were the obligations they imposed on either side, without magisterial co-operation in framing the *formulae* that were to be submitted to the judges. Taking the action on sale as an illustration, the formula substantially was this:—"It being averred that the defendant sold such or such a thing to the plaintiff, whatever, judge, it shall appear that the defendant ought in good faith to give to or do for the plaintiff in respect thereof, in the money equivalent thereof condemn the defendant; otherwise, acquit him." It is very manifest that the free hand here given to the judge must immensely have facilitated the reception of customary doctrine into the law. The judge was to a great extent the spokesman of the forum; his judgment was formed in accordance with current public opinion, which he had ample opportunity of gauging; it was the reflexion of that general sentiment of right, which, phrase it how we may, is the real basis of all customary law. And so in an action for establishing a right of property in a *res nec mancipi*. The formula was very simple:—"If it appear that such or such a thing belongs to the plaintiff in quiritary right, then, judge, whatever be its value for the plaintiff, in that condemn the defendant; should it appear otherwise, acquit him." The primary duty of a judge on such a remit was to determine whether the title on which the plaintiff founded his pretensions gave him a right that came up to property; and it can hardly be disputed that it was by the decisions of a series of judges, in a series of such actions, that the long list of natural modes of acquiring property given by Justinian under technical names was gradually brought into view. Those decisions, whether upon the obligations of a vendor, direct or indirect, or upon the sufficiency of a title founded on by a party averring a right of property by natural acquisition, may in many cases have been arrived at under professional advice, and were in all cases embodied in judgments. But that does not in the least deprive the doctrine deduced from them of its character of customary law. It was not until the empire that the opinions of the jurists submitted to a judge (*responsa prudentium*, see p. 705) were invested with quasi-legislative authority. During the republic, if a judge deferred to them, it was simply because he regarded them as in consonance with well-qualified public opinion; and what a series of consistent judgments *of this sort* built up was in the strictest sense a law based on consuetude.[2]

Professional jurisprudence.

As regards the professional jurists in particular it has already been observed that, according to the testimony of the historians, the law was a monopoly of the patricians down at least to the middle of the 5th century of the city. Livy goes so far as to speak of it as *in penetralibus pontificum repositum*,—among the secrets of the pontifical college. It was so to a very great extent in the regal period. But after the publication of the XII. Tables this could be the case only in a qualified sense, the pontiffs becoming the official interpreters of that which in the letter was patent to the world. The *Jus Flavianum*, with its formulary of actions, in the year 450, the practice of giving advice in law in public adopted by Tib. Coruncanius in the beginning of the 6th century, and the *Jus Ælianum*, embodying the current *interpretatio*, some fifty years later, put an end not only to pontifical but to patrician monopoly. From this time onwards there was a series of jurists (*prudentes*), gradually increasing in number and eminence, of whom a list is given by Pomponius, and many of whom are signalized by Cicero, particularly in his *Orator* and *Brutus*. They occupied themselves in giving advice to clients (see PATRON AND CLIENT, vol. xviii. p. 412), teaching, pleading at the bar, framing styles of contracts, testaments, and various other deeds of a legal character, or writing commentaries or shorter treatises on different branches of the law.[3]

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[1] It was not until the empire that a "series rerum perpetuo similiter judicatarum," a uniform series of precedents, was held to be law. During the republic a judge was much freer, and not only entitled but bound to decide according to his own notion of what was right, taking the risk of consequences if his judgment was knowingly contrary to law.

[2] The doctrines of the classical jurists as to the necessity of *longa, inveterata consuetudo*, and so forth, had no application to the formative jurisprudence of the republic, and in fact refer not to general consuetude but to particular custom when founded on in derogation of the common law.

[3] Rudorff, *Rom. Rechtsgeschichte*, vol. i. §§ 62-65; Sanio, *Zur Geschichte der röm. Rechtswissenschaft*, Konigsberg, 1858; Grellet-Dumazeau, *Études sur le barreau Romain*, 2d ed., Paris, 1858; Danz, *Gesch. d. röm. Rechts*, vol. i. § 49; Karlowa, *Rom. Rechtsgesch.*, § 61.

III. SUBSTANTIVE CHANGES IN THE LAW DURING THE PERIOD.

The Publician Edict.—There were necessarily many changes during the period in the law of property and of minor real rights, several of them of no mean importance. But the greatest of all was that effected by the Publician edict,[1] indirectly recognizing the validity (1) of what Theophilus calls *dominium bonitarium* as an actual though inferior ownership of *res mancipi*, and (2) of what got the name of *bonae fidei possessio* as a fictitious ownership of either *res mancipi* or *res nec mancipi*, valid against all the world except the true *dominus*. The accounts we possess of this edict are somewhat inconsistent and even contradictory; the explanation may be that it went through a process of amendment and expansion at the hands of successive prætors, and that eventually it may have had more than one section, without our always being able to say to which of them the criticism of a particular commentator is directed. But there is no doubt of its general tendency,—of the defects it was meant to correct and of the way in which the correction was accomplished.

One of the defects was this: if a man had taken a transfer of a *res mancipi* from its rightful owner, but simply by tradition instead of by mancipation or cession in court, he did not acquire *dominium ex jure Quiritium*, and the transferrer remained undivested. The result was that the latter was in law entitled to raise a *rei vindicatio* and oust the transferee whose money he might have in his pocket, while if a third party had obtained possession of the thing, but in such a way as not to be amenable to an interdict, the transferee could have no effectual vindication against him, as he was not in a position to prove *dominium ex jure Quiritium*. The first difficulty was overcome by the *exceptio rei venditae et traditae*, also a prætorian remedy, and probably older than the Publician; to the transferrer's vindication on the strength of his unextinguished quiritary right the transferee pleaded sale and delivery as an effectual prætorian defence. But, when a third party was in possession, and the transferee by simple delivery had to take the initiative, the position was more complicated. Such third party might be in perfect good faith; he might even have acquired from the original transferrer and fortified his acquisition with a formal conveyance. But that was no sufficient reason in equity why he should be allowed to defeat the prior right of the original transferee, who, if he had possessed for the requisite period of usucapion before the third party came upon the scene, would have cured the defect of the informal delivery and acquired an unassailable quiritary right. So the prætor announced in his edict that, if a man came to him and represented that he had bought a *res mancipi* from its owner, and had had it delivered to him, but had lost possession within the period of usucapion, he (the prætor) would allow him a vindication embodying a fiction of completed usucapion (*infra*, p. 708), with which he might proceed either against the transferrer or any third party withholding the thing in question.

The publication of such an edict and the formula of the action based upon it—which, though of prætorian origin, was in many respects dealt with as an *actio juris civilis* and just a variety of the *rei vindicatio*—had the same effect as if the legislature had directly enacted that in future delivery of a *res mancipi* in pursuance of a sale or other good cause would confer a right of ownership in it even before usucapion had been completed. Till completed, however, the transferee was not quiritary owner: the thing in question was only *in bonis*, "of his belongings," and the legal title, though a very empty one—*nudum jus Quiritium*—remained in the transferrer; it was only with the completion of the usucapion that it became the transferee's *pleno jure*. The inevitable result of the recognition of this tenure *in bonis* was that mancipation came to be regarded in many cases as an unnecessary formality; and the marvel is that it continued to hold its ground at all. The explanation may be that it afforded a substratum for and gave force of law to the *verba nuncupata* that accompanied the *negotium per aes et libram*; and, although many of these might quite well be thrown into the form of stipulations, yet there were others that it may have been thought safer to leave to take effect under the provisions of the earlier law.

The second case that was met by the Publician edict—whether as originally published or by an amendment of it cannot be determined—was that of the *bona fide* transferee of a thing by purchase or other sufficient title who, having lost possession of it before usucapion, found to his cost that the transferrer had not been its owner, that no ownership therefore had been transmitted to him (the transferee), and that consequently he was not in a position to raise a vindication with its averment of *dominium ex jure Quiritium*.[2] As against the true owner, whose property had been disposed of by a stranger behind his back, there would have been no equity in giving him an action; but as against all the world except the true owner his "better right" was recognized by the prætor, who accorded to him also a vindication proceeding on a fiction of completed usucapion, for usucapion cured the defect of *his* title, just as it did that of the bonitarian owner. In this way the prætors introduced that *bonae fidei possessio* which was worked out with much skill by the jurists of the early empire, and which assumed very large proportions in the Justinianian law when the term of prescription had been greatly extended, and the difficulty of proving property (as distinguished from *bona fide* possession) consequently very much increased.

Change in law of contract.

Development of the Law of Contract.[3]—It is impossible within the limits of an article such as this to indicate a tithe of the amendments that were effected on the law of obligations during the period whose distinguishing features were the rise of a *jus gentium* and the construction of the prætor's edict. In every branch of it there was an advance not by steps but by strides,—in that of obligations arising from contract, of those arising from delict, and of those arising from facts and circumstances, such as unjustifiable enrichment at another person's cost.[4] The law of suretyship, in its three forms of *sponsio*, *fidepromissio*, and *fidejussio*, received considerable attention, and formed the subject of a series of legislative enactments for limiting a surety's liability; while that of agency, which was sparingly admitted in Rome, had a valuable contribution from the prætorian edict in the recognition of a man's liability, more or less qualified, for the contractual debts of his *filiifamilias* and slaves, as also, and without qualification, for the debts properly contracted of persons, whether domestically subject to him or not, who were managing a business on his account, or whom he had placed in command of a ship belonging to him. The development of the law in the matter of obligations generally was greatly facilitated by the prætorian simplification of procedure and the introduction of new forms of actions,—the instruction to a judge, "Whatever in respect thereof the defendant ought to give to or do for the plaintiff, in that condemn him," preceded by a statement of the cause of action, giving wide scope for the recognition of new sources of liability.

Stipulation

The origin of the verbal contract of stipulation and its actionability under the Silian and Calpurnian laws have already been explained (pp. 694, 684). It was theoretically a formal contract, *i.e.*, creative of obligation on the strength of the formal question and answer interchanged by the parties, even though no substantial ground of debt might underlie it; but in time it became the practice to introduce words—the single word *recte* was enough—excluding liability in case of malpractice (*clausula doli*); and finally even that became unnecessary when the prætors had introduced the general *exceptio doli*, pleadable as an equitable defence to any personal action. And it was essentially productive only of unilateral obligation, *i.e.*, the respondent in the interrogatory alone incurred liability; if mutual obligations were intended it was necessary that each should promise for his own part, with the result that two contracts were executed which were perfectly independent. Originally the only words that could be employed were *spondes?* on the one side, *spondeo* on the other; and in this form the contract was *juris civilis* and competent only to citizens (and noncitizens enjoying *commercium*?). In time the words *promittis? promitto*, came to be used alternatively. They seem, eventually at least, to have been competent to peregrins as well as to citizens, although that may not have been until the stipulation had become of daily use amongst the former in the still simpler phraseology *dabis? dabo, facies? faciam*. Originally competent only for the creation of an obligation to pay a definite sum of money, and afterwards one for delivery of a specific thing other than money, the contract came in time, by the simplification of the words of interrogatory and response—the substitution of the conditions of the formular system for the *legis actiones* of the Silian and Calpurnian laws, and the introduction of the *actio ex stipulatu* to meet cases of indefinite promise—to be adaptable to any sort of unilateral engagement, whether initiated by it or only confirmed. It was of immense service too outside the ordinary range of contract in what were called necessary (in contradistinction to voluntary) stipulations, of which a variety of illustrations are given *infra*, p. 709. In all directions advantage was taken of it to bind a man by formal contract either to do or to refrain from doing what in many cases he might already be bound *ipso jure* to do or to abstain from doing, and that because of the simplicity of the remedy—an action on his stipulation—that would lie against him in the event of his failure.

A second form of contract that came into use to a considerable extent in the latter half of the republic is what is commonly called the literal contract, or, as Gaius phrases it with greater accuracy, the *nomen transscripticium.*[1] Notwithstanding the prolific literature of which it has been the subject, it must be admitted that in many points our knowledge of it is incomplete and uncertain. The prevalent opinion, formed before the discovery of the Verona MS. had made known Gaius's description of it, and almost universally adhered to ever since, is that such contracts were created by entries in the account-books which the censors insisted that all citizens of any means should keep with scrupulous regularity They are often alluded to by the lay writers; but the text principally relied on is what remains of Cicero's speech for the player Roscius. From the tenor of the argument in that case, and incidental remarks elsewhere, the conclusion has been formed that a citizen who made an entry in his *codex*—whether of the nature of a cash-book or a ledger is much disputed—to the debit of another, thereby made the latter his debtor for a sum recoverable by an *actio certae creditae pecuniae.* Gaius in his description of the contract does not mention the *codices*; but his account is not inconsistent with the notion that the entries (*nomina*) of which he speaks were made in them. He says that those entries were of two sorts, *nomina arcaria* and *nomina transscripticia.* The former were entries of cash advances; and of them he observes that they did not create obligation, but only served as evidence of one already created by payment to and receipt of the money by the borrower. Of the latter he says that there were two varieties, the entry transcribed from thing to person and that transcribed from one person to another, and that both of them were not probative merely but creative of obligation. The first was effected by a creditor (A) entering to the debit of his debtor (B) the liquidated amount of what the latter was already owing as the price of something purchased, the rent of a house leased, the value of work done, or the like. The second was effected by A transcribing B's debt to the debit of a third party (C), hitherto a debtor of B's, and who consented to the transaction,—A at the same time crediting B with the sum thus booked against C, and B in his books both crediting C with it (*acceptilatio*) and debiting A (*expensilatio*).

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[1] See Ribéreau, *Théorie de l'in bonis habere ou de la propriété prétorienne*, Paris, 1867; Voigt, *Jus naturale*, &c., vol. iv., App. xxi., p. 470 *sq.*; Huschke, *Das Recht der Publicianischen Klage*, Stuttgart, 1874; Schulin (rev. Huschke), in the *Krit. Vierteljahrschrift*, vol. xviii. (1876), p. 526 *sq.*; Lenel, *Beiträge zur Kunde d. praetorischen Edicts: I. Das Public. Ed.*, Stuttgart, 1878.

[2] This case is the only one alluded to by Justinian (*Inst.*, iv. 6, 4). He had abolished the distinction between quiritarian and bonitarian property, and so it was unnecessary for him to mention the other.

[3] See Bekker, *Aktionen*, vol. i. chaps. 5-8, and App. D, E, F, and vol. ii. chaps. 15, 16; Voigt, *Jus naturale*, &c., vol. iii. §§ 106-121, and vol. iv., App. xix., xxi.

[4] Such obligations—usually imposing the duty of restitution of unjustifiable gains—filled a considerable space in the practice and doctrine of the period, and early gave rise to a variety of brocards, *e.g.*, "Nemo cum alterius damno lucrari debet," "Nemo damnum sentire debet per lucrum alterius," &c.

All this at first sight seems just a series of bookkeeping operations. But it was much more than that for the Roman citizens who first had recourse to it. There was a time when sale, and lease, and the like, so long as they stood on their own merits, created no obligation enforcible at law, however much it might be binding as a duty to Fides or (as moderns would say) in the forum of conscience; to found an action it required to be clothed in some form approved by the *jus civile.* The *nexum* may have been one of those forms, the vendee or tenant being fictitiously dealt with as borrower of the price or rent due under his purchase or lease; the stipulation was another, the obligation to pay the price or rent being made legally binding by its embodiment in formal question and answer. But stipulation was competent only between persons who were face to face, whereas expensilation was competent also as between persons at a distance from each other. This of itself gave expensilation—which, originally at least, was as much a *negotium juris civilis* as the *sponsio*—an advantage in some cases over stipulation. But it had also a further advantage, which was not affected by the subsequent recognition of the real and consensual contracts as productive of legal obligation on their own merits: it paved the way for subsequent transcription from one person to another. This last must have been of infinite convenience in commerce, not only by enabling traders to dispense with a reserve of coin, but by obviating the risks attending the transit of money over long distances. It was this that led, as Theophilus says was the case, to the conversion even of stipulatory obligations into book-debts; it was not that thereby the creditor obtained a tighter hold over his debtor, but that an obligation was obtained from him which in a sense was negotiable and therefore more valuable.

The evolution of the four purely consensual contracts—sale, location, partnership, and mandate—supplies matter for one of the most interesting chapters in the whole history of the law. But, as it is impossible in such an article as this to attempt to mark the successive stages in the progress of all of them, we shall confine ourselves to sale. The others did not and could not follow identically the same course: location ran most nearly parallel with sale; but partnership and mandate, from their nature, not only started at a different point from the other two, but reached the same goal with them—that of becoming productive of obligation simply on the strength of consent interchanged by the parties—by paths that were sometimes far apart. Nevertheless a sketch of the history of the origin of the contract of sale may be sufficient to indicate generally some of the milestones that were successively passed by all four.[2]

Going back as far as history carries us we meet with it under the names of *emptio* and *venditio*, but meaning no more than barter; for *emere* originally signified simply "to take" or "acquire." Sheep and cattle (*pecus*, hence *pecunia*) may for a time have been a very usual article of exchange on one side, and then came raw metal weighed in the scales. But it was still exchange, instant delivery of goods on one side against simultaneous delivery of so many pounds weight of copper on the other. With the reforms of Servius Tullius came the distinction between *res mancipi* and *res nec mancipi*, and with it a regulated mancipation for sale and conveyance of the former. It was still barter; but along with it there arose an obligation on the part of the transferrer of the *res mancipi* to warrant the transferee against eviction,—a warranty that was implied in the mancipation. Whether this rule obtained from the first or was the growth of custom it is impossible to say; but it is in the highest degree probable that it was the XII. Tables which fixed that the measure of the transferrer's liability to the transferee in the event of eviction should be double the amount of the price. Equally impossible is it to say when the practice arose of embodying declarations, assurances, and so forth in the mancipation (*leges mancipii*), which were held binding on the strength of the *negotium juris civilis* in which they were clothed. They received statutory sanction in the Tables, in the words already referred to more than once—"cum nexum faciet mancipiumque, uti lingua nuncupassit, ita jus esto," substantially "whatever shall by word of mouth be declared by the parties in the course of a transaction *per aes et libram* in definition of its terms shall be law as between them."

The substitution by the decemvirs of coined money, that was to be counted for rough metal that had been weighed, converted the contribution on one side into price (*pretium*), as distinguished from article of purchase (*merx*) on the other; and sale thus became distinct from barter. In contemplation of the separation of the mancipation and the price-paying, and the degeneration of the former into a merely imaginary sale, they enacted that, mancipation notwithstanding, the property of what was sold should not pass to the purchaser until the price had been paid or security by sureties (*vades*) given for it to the vendor; and it was probably by the interpretation of the pontiffs that this was added to the rule,—that until the price was paid no liability for eviction should attach to the transferrer (or *auctor*). The reason of the provision in the XII. Tables was that a vendor who had mancipated or delivered a thing sold by him before receiving the price had no action to enforce payment of the latter; and in such circumstances it was thought but right to give him the opportunity of getting back the thing itself by a real action. It might be, however, that the price had been paid, and yet the vendor refused to mancipate. It was long, apparently, before the purchaser could in such a case compel him to do so. With the introduction of the *legis actio per condictionem* he (the purchaser) had undoubtedly the power to recover the money on the ground of the vendor's unjustifiable enrichment,—that the latter had got it for a consideration which had failed (*causa data, causa non secuta*); and it is possible that before that he had a similar remedy *per judicis postulationem.*

Down to this point, therefore, say the beginning of the 6th century, there were several obligations consequent on sale of a *res mancipi*; but not one of them arose directly out of the sale itself, or could be enforced simply on the ground that it had taken place. The vendor was bound to support the purchaser in any action by a third party disputing his right, and to repay him the price twofold in the event of that third party's success; and he was bound, moreover, to make good to him any loss he had sustained through a deficiency of acreage he had guaranteed, non-existence of servitudes he had declared the lands enjoyed, existence of others from which he had stated they were free,[3] incapability of a slave for labour for which he was vouched fit, and so on. But these obligations were binding, not in virtue of the sale *per se*, but of the transaction *per aes et libram* superinduced upon it; and, if the vendor had at any time to return the price on failure to mancipate what he had sold, it was not because he had committed a breach of contract, but because he had unjustly enriched himself at the purchaser's expense.

In sales of *res nec mancipi*, just as in those of *res mancipi*, a vendor who had been incautious enough to deliver his wares before he had been paid, or had got stipulatory security for the price, or had converted it into a book-debt, might recover them by a real action if payment was unduly delayed; while the purchaser who had paid in advance but failed to get delivery might also get back his money from the vendor on the plea of unwarrantable enrichment. But, as mancipation was unnecessary for carrying the property (and, as some think, incompetent), some other machinery had to be resorted to than that of the copper and the scales for imposing upon the vendor an obligation of warranty against eviction, defects, and so forth. It may be that, until trade began to assume considerable proportions, and when a transaction was between citizens, a purchaser was content to rely partly on the honesty of his vendor, partly on the latter's knowledge that he ran the risk of an action for theft if what he sold belonged to another,[1] and partly on the maxim common in all ages and climes, *caveat emptor*. When it was one between a citizen and a peregrin, a different set of rules may have come into play; for between them disputes were settled by recuperators whose decisions were arrived at very much on considerations of natural equity. It was the popularization of the stipulation that facilitated a further advance, rendered all the more necessary by the expansion of intercourse with foreigners and the cessation of recuperation.

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[1] *Literature*:—Savigny, "Ueber den Literalcontract der Romer" (originally 1816, with additions in 1849), in his *Verm. Schriften*, vol. i. p. 205 *sq.*; Keller, in Sell's *Jahrb. f. hist. u. dogm. Bearbeit. des rom. Rechts*, vol. i. (1841), p. 93 *sq.*; Gneist, *Die formellen Vertrage d. rom. Rechts*, Berlin, 1845, p. 321 *sq.*; Heimbach, *Die Lehre vom Creditum*, Leipsic, 1849, p. 309 *sq.*; Pagenstecher, *De literar. obligatione*, &c., Heidelberg, 1851; Danz, *Gesch. d. röm. Rechts*, vol. ii. p. 42 *sq.* (where there is a *résumé* of the principal theories); Gide, in the *Rev. de Législat.*, vol. iii. (1873), p. 121 *sq.*; Buonamici, in the *Archivio Giuridico*, vol. xvi. (1876), p. 3 *sq.*; Gide, *Études sur la Novation*, Paris, 1879, p. 185 *sq.*; Baron, *Die Condictionen*, Berlin, 1881, §§ 11, 12.

[2] The literature on the history of the contract of sale is profuse, but mostly scattered in periodicals and much of it very fragmentary. It may be enough to refer to Bechmann, *Gesch. d. Kaufs im röm. Recht*, Erlangen, 1876; three articles by Bicard, in the *Nouv. Rev. Hist.*, vol. vi. (1882), p. 180 *sq.*, vol. vii. (1883), p. 536 *sq.*, and vol. viii. (1884), p. 395 *sq.*; and Mommsen, "Die röm. Anfange von Kauf u. Miethe," in the *Zeitschr. d. Savigny Stiftung*, vol. vi. (1885), *Rom. Abtheil.*, p. 260 *sq.*

[3] Cicero says (*De Off.*, iii. 16, § 65) that, though by the XII. Tables it was enough if a vendor *per aes et libram* made good his positive assurances (*uti lingua nuncupassit, ita jus esto*), the jurists held him responsible for reticence about burdens or defects he ought to have revealed, and liable for a *poena dupli* exactly as if he had guaranteed their non-existence.

Confirmatory stipulations.

We read of a *satisdatio secundum mancipium*, a *stipulatio habere licere*, and a *stipulatio duplae*. The nature of the first is obscure; it seems to have been connected with mancipatory sales, and probably to have been the guarantee of a *sponsor* for the liabilities imposed upon the vendor by the transaction *per aes et libram* and the *verba nuncupata* that were covered by it. The stipulation *habere licere* occurs in Varro, in a collection of styles of sales of sheep, cattle, &c., some of which he says were abridgments of those of M. Manilius, who was consul in the year 605. It was the guarantee of the vendor of a *res nec mancipi*, or even of a *res mancipi* sold without mancipation, that the purchaser should be maintained in possession of what he had bought; it entitled him to reparation on eviction, measured not by any fixed standard but according to the loss he had sustained. It cannot have been introduced, therefore, until after the *Lex Aebutia* and the formulation by the prætor of the *actio ex stipulatu*. The idea of the *stipulatio duplae* may have been borrowed from the *duplum* incurred by a vendor on the eviction of a purchaser acquiring a thing by mancipation; for one of its earliest manifestations was in the edict of the curule ædiles, who insisted on it from persons selling slaves, probably because the dealers were for the most part foreigners, and therefore unable to complete their sales *per aes et libram*. Judging from Varro, it was a form of stipulation against eviction that in his time was used only in sales of slaves, although he adds that by agreement of parties it might be limited to a *simplum*.

We learn from the same writer—what is also indicated in various passages of Plautus—that the vendor at the same time and in the body of the same stipulation guaranteed that the sheep or cattle he was selling were healthy and of a healthy stock and free from faults, and that the latter had not done any mischief for which their owner could be held liable in a noxal action; and similarly that a slave sold was healthy and not chargeable for any theft or other offence for which the purchaser might have to answer. If any of these guarantees turned out fallacious the purchaser had an *actio ex stipulatu* against the vendor: "Whereas the plaintiff got from the defendant a stipulation that certain sheep he bought from him were healthy, &c. [repeating the words of guarantee], and that he, the plaintiff, should be free to hold them (*habere licere*), whatever it shall appear that the defendant ought in respect thereof to give to or do for the plaintiff, in the value thereof, judge, condemn him; otherwise, acquit him." It is an observation of Bekker's[2] that the *actio empti* in its original shape was just a simplification of the *actio ex stipulatu* on a vendor's guarantees; the stipulations to which we have been alluding had become such unfailing accompaniments of a sale as to be matters of legal presumption, the result being that the words "whereas the plaintiff *bought* from the defendant the sheep about which this action has arisen" were substituted in the *demonstratio* (as the introductory clause of the *formula* was called) for the detailed recital of what had been stipulated. Bekker justifies this by reference to the language of Varro, who seems to include under the words *emptio, venditio* not merely the agreement to buy and sell but also the stipulations that usually went with it.

Origin of actio empti.

The introduction of an *actio empti* in this shape, however, was far from the recognition of sale as a purely consensual contract. If the price was not paid at once, the purchaser gave his stipulatory promise for it, or got some one on whom the vendor placed more reliance to do so for him, or else made a book-debt of it; and, if it had to be sued for, it was in all these cases by a *condictio certi* and not by an action on the sale. If the price was paid but the thing purchased not delivered, the only remedy open to the purchaser was to get back his money by the same condiction, unless, indeed, the guarantee *habere licere* was held to cover delivery, in which case the purchaser might obtain damages in an *actio ex stipulatu* under the name of *actio empti*. But this *actio empti*, whether insisted on on the ground of non-delivery, eviction, or breach of some other warranty, was really an action on the verbal contracts that had accompanied the sale,—a *strictum jus* action in which the judge could not travel beyond the letter of the engagements of the purchaser. In the latter years of the republic, and probably from the time of Q. Mucius Scævola, it was a *bonae fidei* action. How had the change come about? A single case of hardship may have been sufficient to induce it, such as the defeat of a claim for damages for eviction on the ground that the stipulatory guarantee had been accidentally overlooked. Ulpian says, "As the *stipulatio duplae* is a thing of universal observance, action on the ground of eviction will lie *ex empto* if perchance the vendor of a slave have failed to give his stipulatory guarantee, for everything that is of general custom and practice ought to be in view of the judge in a *bonae fidei judicium*."[3]

Very little was required to convert the *stricti juris actio empti*, really nothing more than an *actio ex stipulatu*, into a *bonae fidei* one,—simply the addition by the prætor of the words "on considerations of good faith" (*ex fide bona*) to the "whatever the defendant ought to give to or do for the plaintiff." The effect, however, was immeasurable,—not that it did away with the practice of stipulatory guarantees, for Varro wrote after the time of Q. Mucius (who speaks of the action on sale as a *bonae fidei* one), and references to them are abundant in the pages of the classical jurists; but it rendered them in law unnecessary. It made sale a purely consensual contract in which, in virtue of the simple agreement to buy and sell, all the obligations on either side that usually attended it were held embodied without express formulation or (still less) stipulatory or literal engagement. And, in instructing the judges to decide in every case between buyer and seller suing *ex empto* or *ex vendito* on principles of good faith, it really empowered them to go far beyond "general custom and practice," and to take cognizance of everything that in fairness and equity and common sense ought to influence their judgment, so as to enable them freely to do justice between the parties in any and every question that might directly or indirectly arise out of their relation as seller and buyer.

Real contracts.

The history of the four nominate real contracts—*mutuum* (*i.e.*, loan of money or other things returnable generically), commodate (*i.e.*, loan of things that had to be returned specifically), deposit, and pledge—is more obscure than that of the consensual ones.[4] Down to the time of the Pœtilian law loan of money, corn, &c., was usually contracted *per aes et libram*; and it is probable that after the abolition of the *nexum* the obligation on a borrower to repay the money or corn advanced to him was made actionable, under the Silian and Calpurnian laws respectively, by a stipulation contemporaneous with the loan. With the rise of the *jus gentium* loan became actionable on its own merits,—that is to say, the advance and receipt of money as a loan of itself laid the borrower under obligation to repay it, even though no stipulatory engagement had intervened; the *res* (in this case the giving and receiving *mutui causa*) completed the contract. The obligation that arose from it was purely unilateral, and enforcible, where the loan was of money, by the same action as stipulation and literal contract; and so strictly was it construed that interest on the loan was not claimable along with it, the *res* given and received being the full measure of the obligation of repayment. The other three—commodate, deposit, and pledge—became independent real contracts very much later than *mutuum*, possibly not all at the same time, and none of them apparently until very late in the republic. All of them, of course, had been long known as transactions of daily life; the difficulty is to say when they first became actionable, and under what guise.

It is impossible within the space at our command to criticize the various theories entertained of their vicissitudes, for they necessarily vary to some extent in regard to each. We must content ourselves, therefore, with the simple statement that eventually, and within the period with which we are now dealing, they came to be recognized as independent real contracts, the *res* by which they were completed being the delivery of a thing by one person to another for a particular purpose, on the understanding that it was to be returned when that purpose was served. And it is to be noted that, while *mutuum* transferred the property of the money lent, the borrower being bound to return not the identical coins but only an equal amount, in pledge it was only the possession that passed, while in commodate and deposit the lender or depositor retained both property and (legal) possession, the borrower or depositary having nothing more than the natural detention. In all but *mutuum*, therefore, there was trust; the holder was bound, to an extent varying according to circumstances, to care for what he held as if it were his own, and entitled to be reimbursed for outlay on its maintenance,—bound to return it, yet excused if his failure to do so was due to a cause for which in fairness he could not be held responsible. Consequently the actions on these three contracts, differing from that on *mutuum*, were all *bonae fidei*, the judge being vested with full discretion to determine what was fair and equitable in each individual case.

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[1] "In rebus mobilibus . . . qui alienam rem vendidit et tradidit furtum committit" (Gai., ii. 50).

[2] Bekker, *Aktionen*, vol. i. p. 158.

[3] Ulp., "Lib. I. ad ed. aedil.," in *Dig.*, xxi. 1, fr. 31, § 20.

[4] See Heimbach, *Creditum*, pp. 498 *sq.*, 633 *sq.*; Bekker, *Loci Plautini de rebus creditis*, Greifswald, 1861; Demelius, in the *Zeitschr. f. Rechtsgesch.*, vol. ii. (1863), p. 217 *sq.*; Bekker, *Aktionen*, vol. i. p. 306 *sq.*; Ubbelohde, *Zur Gesch. d. benannten Realcontracte*, Marburg, 1870; Huschke, *Lehre vom Darlehn*, Leipsic, 1882.

Prætorian Amendments on the Law of Succession.—The most important change in the law of succession during the latter half of the republic was due to the prætors. They introduced, under the name of *bonorum possessio*,[1] what was really beneficial enjoyment of the estate of a deceased person without the legal title of inheritance. There is much to lead to the conclusion that the series of provisions in regard to it which we find in the Julian consolidation of the *Edict* were the work of a succession of prætors, some of them probably not under the republic but under the empire; but it will be convenient to give here a general view of the subject as a whole, disregarding the consideration that some of its features may not have been given to it within the period now under notice.

Justinian, speaking of the origin of *bonorum possessio*, observes that in promising it to a petitioner the prætors were not always actuated by the same motives; in some cases their object was to facilitate the application of the rules of the *jus civile*, in some to amend their application according to what they believed to be the spirit of the XII. Tables, in others, again, to set them aside as inequitable. It is not unreasonable to assume that it was with the purpose of aiding the *jus civile* that the first step was taken in what gradually became a momentous reform; and it is extremely probable that this first step was the announcement by some prætor that, where there was dispute as to an inheritance, and a testament was presented to him bearing not fewer seals than were required by law, he would give possession of the goods of the defunct to the heir named in it.[2] In this as it stands there is nothing but a regulation of possession of the *bona* of the inheritance pending the question of legal right. Just as between two parties contending about the ownership of a specific thing in a *rei vindicatio* the prætor first settled the question of interim possession, so did he promise to do here when a question was about to be tried about the right to an inheritance (*si de hereditate ambigitur*). It was a provisional arrangement merely, and very necessary in view of the state of the law which permitted a third party, apart from any pretence of title, to step in and complete a *usucapio pro herede* by a year's possession of the effects of the inheritance (*supra*, p. 692). Even at the time when the *Edict* was closed it was not necessarily more than a provisional grant; for, if heirs-at-law of the deceased appeared and proved that, although the testament bore on the outside the requisite number of seals, yet in fact some solemnity of execution, such as the *familiae venditio* or *testamenti nuncupatio*, had been omitted, the grantee had to yield them up the possession that had been given him pending inquiry. It was only by a rescript of Marcus Aurelius's that it was declared that a plea by the heir-at-law of invalidity of a testament on the ground of defect of formalities of execution might be defeated by an *exceptio doli*, on the principle that it was contrary to good faith to set aside the wishes of a testator on a technical objection that was purely formal. Thus was the *bonorum possessio secundum tabulas*, *i.e.*, in accordance with a testament, from being originally one in aid of the *jus civile*, in course of time converted into one in contradiction of it. That the motives and purposes of the series of prætors who built up the law of *bonorum possessio* must have varied in progress of years is obvious; and, once the machinery had been invented, nothing was easier than to apply it to new ideas. The prætor could not make a man heir,—that he always disclaimed; but he could give a man, whether heir or not, the substantial advantages of inheritance, and protect him in their enjoyment by prætorian remedies. He gave him possession of the goods of the deceased, with summary remedies for ingathering them, which, once in his hands, would become his in quiritarian right on the expiry of the period of usucapion; and, by interpolation into the *formula* of a fiction of heirship, he gave him effectual personal actions against debtors of the deceased, rendering him liable in the same way to the deceased's creditors.

Another variety of the *bonorum possessio* was that *contra tabulas*,—in opposition to the terms of a testament. If a testator had neither instituted nor expressly disinherited a son who was one of his *sui heredes*, then his testament was a nullity, and the child passed over had no need of a prætorian remedy. Where *sui heredes* other than sons were passed over the *jus civile* allowed them to participate with the instituted heirs by a sort of accrual. But the *Edict* went further; for, if the institute was a stranger, *i.e.*, not brother or sister of the child passed over, then, on the petition of the latter, the prætor gave him and any other *sui* concurring with him possession of the whole estate of the deceased, the institute being left with nothing more than the empty name of heir. Another application of the *bonorum possessio contra tabulas* was to the case of emancipated children of the testator's. By the *jus civile* he was not required to institute or disinherit them; for by their emancipation they had ceased to be *sui heredes*, and had lost that interest in the family estate which was put forward as the reason why they had to be mentioned in the testament of their *paterfamilias*. The prætors—although probably not until the empire, and when the doctrines of the *jus naturale* were being more freely recognized—put them on the same footing as unemancipated children, requiring that they also should be either instituted or disinherited, and giving them *bonorum possessio* if they were not. It was *contra tabulas* in the sense that it displaced the instituted heirs either wholly or partially,—wholly when the institutes were not children of the deceased, partially when they were. In the latter case, at least when *sui* were affected by it, the grant of *bonorum possessio* was under the very equitable condition that the grantees should collate or bring into partition all their own acquisitions since their emancipation.

The third variety of *bonorum possessio* was that granted *ab intestato*. As has been shown on a previous page (p. 692), the rules of the *jus civile* in reference to succession on intestacy were extremely strict and artificial. They admitted neither emancipated children nor agnates who had undergone *capitis deminutio*; they admitted no female agnate except a sister; if the nearest agnate or agnates declined, the right did not pass to those of the next degree; mere cognates, kinsmen of the deceased who were not agnates, *e.g.*, grandchildren or others related to him through females and agnates *capite minuti*, were not admitted at all; while a wife had no share unless she had been *in manu* of the deceased and therefore *filiae loco*. All these matters the prætors amended, and so far paved the way for the revolution in the law of intestate succession which was accomplished by Justinian.

Prætorian order of intestate succession.

The classes they established were four. (1) Displacing the *sui heredes* of the *jus civile*, they gave the first place to descendants (*liberi*), including in the term all those whom the deceased would have been bound either by the *jus civile* or the *Edict* to institute or disinherit had he made a will, *i.e.*, his wife *in manu*, his natural (as distinguished from adopted) sons and daughters whether *in potestate* at his death or emancipated, the representatives of sons who had predeceased him, and adopted children in his *potestas* when he died. (2) On failure of *liberi* the right to petition for *bonorum possessio* opened to the nearest collateral agnates of the intestate, under their old name of *legitimi heredes*. (3) Under the *jus civile*, on failure of agnates (and of the *gens* where there was one), the succession was vacant and fell to the fisc, unless perchance it was usucapted by a stranger possessing *pro herede*. The frequency of such vacancies was much diminished by the recognition by the prætors of the right of cognates to claim *bonorum possessio* in the third place. Who they had primarily in view under the name of "cognates" it is impossible to say. The epithet is most frequently applied by modern writers to kinsmen related through females; but in its widest sense it included all kinsmen without exception, and in a more limited sense all kinsmen not entitled to claim as agnates. There were included amongst them therefore—although it is very probable that the list was not made up at once, but from time to time by the action of a series of prætors—not merely kinsmen related through females (who were not agnates), but also agnates of a remoter degree who were excluded as such because the nearest agnates in existence had declined, persons who had been agnates but by reason of *capitis minutio* had lost that character, female agnates more distantly related than sisters, and children of the intestate's who at the time of his death were in an adoptive family. All these took according to proximity. (4) Finally, the claim passed to the survivor of husband and wife, assuming always that their marriage had not involved *manus*. This list constituted the prætorian order of succession on intestacy.

All these *bonorum possessiones* had to be formally petitioned for. In that *ab intestato* descendants were allowed a year for doing so, while other persons were limited to 100 days, the period for those entitled in the second place beginning when that of those entitled in the first had expired, and so on. The grant was always made at the risk of the petitioner; nothing was assured him by it; it might turn out real and substantial (*cum re*) or merely nominal (*sine re*), according as the grantee could or could not maintain it against the heir of the *jus civile*. For the latter was entitled to stand on his statutory or testamentary right, without applying for *bonorum possessio*, although in fact he often did so for the sake of the summary procedure it supplied him for ingathering the effects of the deceased.

Law of procedure.

The Law of Procedure.—The substitution of the formular system of procedure for that by the "actions of the law" commenced long before the end of the period now under consideration; and we have had occasion more than once to observe how greatly it facilitated the development of the institutions of property and contractual obligation. But as the change was only completed in the early empire it will be more convenient to defer explanation of the nature of the new procedure in the meantime. (See *infra*, p. 707 *sq.*)

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[1] For a *résumé* of the principal theories (down to 1870) about the origin of *bonorum possessio*, see Danz, *Geschichte d. röm. Rechts*, vol. ii. § 176. Of the later literature it is enough to mention Leist, in the first 4 vols. of his continuation of Gluck's *Pandecten-Commentar*, Erlangen, 1870-79.

[2] Cic., *In Verr.* II., i. 45, § 117. He says (writing in 684) that an edict to that effect was already *tralaticium*, *i.e.*, had been adopted year after year by a series of prætors. Gaius (ii. 119) speaks of seven at least as the requisite number of seals; *i.e.*, those of the *libripens* and the five citizen witnesses, and that of the *antestatus*, whose functions are not well understood, but whose official designation appended to his seal recurs so regularly in inscriptions as to leave no doubt that his was the seventh.

CHAPTER IV.—THE JUS NATURALE AND MATURITY OF ROMAN JURISPRUDENCE.

(*The Empire until the time of Diocletian.*)

I. Characteristics and Formative Agencies of the Law during the Period.

Characteristics generally and Recognition of a Jus Naturale in particular.—The first three centuries of the empire witnessed the perfection of Roman jurisprudence and the commencement of its decline. During that time the history of the law presents no such great landmarks as the enactment of the XII. Tables, the commencement of a prætor's edict, the recognition of simple consent as creative of a contractual bond, or the introduction of a new form of judicial procedure; the establishment of a class of patented jurists speaking as the mouthpieces of the prince, and the admission of all the free subjects of the empire to the privileges of citizenship, are about the only isolated events to which one can point as productive of great and lasting results. There were, indeed, some radical changes in particular institutions, such as the caduciary legislation of Augustus, intended to raise the tone of domestic morality and increase fruitful marriages, and the legislation of the same emperor and his immediate successor for regulation of the status of enfranchised slaves; but these, although of vast importance in themselves, and the first of them influencing the current of the law for centuries, yet left upon it no permanent impression. It was by much less imposing efforts that it attained the perfection to which it reached under the sovereigns of the Severan house,—a steady advance on the lines already marked out in the latter years of the republic. The sphere of the *jus Quiritium* became more and more circumscribed, and one after another of the formalities of the *jus civile* was abandoned. The *manus* of the husband practically disappeared; the *patria potestas* of the father lost much of its significance by the recognition, notwithstanding it, of the possibility of a separate and independent estate in the child; slaves might be enfranchised by informal manumission; *res mancipi* constantly passed by simple tradition, the right of the transferee being secured by the Publician action; servitudes and other real rights informally constituted were maintained as effectual *tuitione praetoris*; an heir's acceptance of a succession could be accomplished by any indication of his intention, without observance of the formal *cretio* of the earlier law; and many of the incidental bargains incident to consensual contract, but varying their natural import, that used to be embodied in words of stipulation, came to be enforcible on the strength of formless contemporaneous agreements.

The preference accorded by jurists and judges to the *jus gentium* over the *jus civile* is insufficient to account for these and many other changes in the same direction, as well as for the ever-increasing tendency evinced to subordinate word and deed to the *voluntas* from which they arose. They are rather to be attributed to the striving on the part of many after a higher ideal, to which they gave the name of *jus naturale*.[1] It is sometimes said that the notion of a *jus naturale* as distinct from the *jus gentium* was peculiar to Ulpian, and that it found no acceptance with the Roman jurists generally. But this is inaccurate. Justinian, indeed, has excerpted in the *Digest* and put in the forefront of his *Institutes* a passage from an elementary work of Ulpian's, in which he speaks of a *jus naturale* that is common to man and the lower animals, and which is substantially instinct. This is a law of nature of which it is quite true that we find no other jurist taking account. But many of them refer again and again to the *jus naturale*; and Gaius is the only one (Justinian following him) who occasionally makes it synonymous with *jus gentium*. There can be no question that the latter was much more largely imbued with precepts of natural law than was the *jus civile*, but it is impossible to say they were identical; it is enough to cite but one illustration, pointed out again and again in the texts: while the one admitted the legality of slavery, the other denied it. While the *jus civile* studied the interests only of citizens, and the *jus gentium* those of freemen irrespective of nationality, the law of nature had theoretically a wider range and took all mankind within its purview. We have no hint that the doctrine of the *jus gentium* differed in this respect from the *jus civile*—that a slave was nothing but a chattel; yet we find the latter, when tinctured with the *jus naturale*, recognizing many rights as competent to a slave, and even conceding that he might be debtor or creditor in a contract, although his obligation or claim could be given effect to only indirectly, since he could neither sue nor be sued.

Characteristics of jus naturale.

Voigt thus summarizes the characteristics of this speculative Roman *jus naturale*:—(1) its potential universal applicability to all men, (2) among all peoples, (3) at all times, and (4) its correspondence with the innate conviction of right (*innere Rechtsuberzeugung*).[2] Its propositions, as gathered from the pages of the jurists of the period, he formulates thus:—(1) recognition of the claims of blood (*sanguinis vel cognationis ratio*); (2) duty of faithfulness to engagements,—*is natura debet . . . cujus fidem secuti sumus*; (3) apportionment of advantage and disadvantage, gain and loss, according to the standard of equity; (4) supremacy of the *voluntatis ratio* over the words or form in which the will is manifested.[3] It was regard for the first that, probably pretty early in the principate, led the prætors to place emancipated children on a footing of perfect equality with unemancipated in the matter of succession, and to admit collateral kindred through females as well as those related through males; and that, in the reigns of Hadrian and Marcus Aurelius respectively, induced the senate to give a mother a preferred right of succession to her children, and *vice versa*. It was respect for the second that led to the recognition of the validity of what was called a natural obligation,—one that, because of some defect of form or something peculiar in the position of the parties, was ignored by the *jus civile* and incapable of being made the ground of an action for its enforcement, yet might be given effect to indirectly by other equitable remedies. Regard for the third was nothing new in the jurisprudence of the period; the republic had already admitted it as a principle that a man was not to be unjustifiably enriched at another's cost; the jurists of the empire, however, gave it a wider application than before, and used it as a key to the solution of many a difficult question in the domain of the law of contract. As for the fourth, it was one that had to be applied with delicacy; for the *voluntas* could not in equity be preferred to its manifestation to the prejudice of other parties who in good faith had acted upon the latter. We have many evidences of the skilful way in which the matter was handled, speculative opinion being held in check by considerations of individual interest and general utility.

A remark of Voigt's on the subject is well worthy of being kept in view, that the risk which arose from the setting up of the precepts of a speculative *jus naturale*, as derogating from the rules of the *jus civile*, was greatly diminished through the position held by the jurists of the early empire. Their *jus respondendi* (*infra*, p. 705) made them legislative organs of the state, so that, in introducing principles of the *jus naturale*, or of *aequum et bonum*, they at the same moment positivized them and gave them the force of law. They were, he says, "philosophers in the sphere of law, searchers after the ultimate truth; but, while they—usually in reference to a concrete case—sought out the truth and applied what they had found, they combined with the freedom and untrammelledness of speculation the life-freshness of practice and the power of assuring the operativeness of their abstract propositions."[4]

Position and character of jurists.

Influence of Constitutional Changes.—The changes in the constitution aided not a little the current of the law. Men of foreign descent reached the throne and recruited the senate,—proud indeed of the history and traditions of Rome, yet in most cases free from prejudice in favour of institutions that had nothing to recommend them but their antiquity. Military life had not the same attractions as during the republic; there was no longer a tribunate to which men of ambition might aspire; the comitia soon ceased to afford an outlet for public eloquence; so that men of education and position had all the more inducement to devote themselves to the conscientious study and regular practice of the law. This was greatly encouraged by the action of Augustus in creating a class of licensed or patented jurists, privileged to give answers to questions submitted to them by the judges, and that *ex auctoritate principis*, and still more so, perhaps, by Hadrian's reorganization of the imperial privy council, wherein a large proportion of the seats were assigned to jurists of distinction. With several of the emperors lawyers were amongst their most intimate and trusted friends. Again and again the office of prætorian prefect, the highest next the throne, was filled by them; Papinian, Ulpian, and Paul all held it in the reigns of Septimius Severus and Alexander. Jurisprudence, therefore, was not merely an honourable and lucrative profession under the new arrangements, but a passport to places of eminence in the state; and till the death of Alexander the ranks of the jurists never failed to be recruited by men of position and accomplishment.

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[1] See Voigt, *Das Jus naturale . . . der Römer*, particularly vol. i. §§ 52-64, 89-96; Maine, *Ancient Law*, chap. iii.

[2] Voigt, *l.c.*, p. 304.

[3] Voigt, pp. 321-23.

[4] Voigt, p. 341.

Extension of citizenship to whole empire.

Extension of Citizenship to the Empire generally.—It must have been between the years 212 and 217 that Caracalla published his constitution conferring citizenship on all the free inhabitants of the empire. Far-reaching as were its consequences, the primary purpose was purely fiscal. Augustus had imposed a tax of five per cent. on inheritances and bequests, except where the whole succession was worth less than 100,000 sesterces or the heir or legatee was a near kinsman of the deceased. It was continued by his successors, and was very profitable, thanks to the propensity of the well-to-do classes for single blessedness, followed by testamentary distribution of their fortunes amongst their friends. But it affected only the successions of Roman citizens, so that the great mass of the provincials escaped it. Caracalla, being needy, not only increased it temporarily to ten per cent., but widened the area of its operation by elevating all his free subjects to the rank of citizens. The words of Ulpian are very inclusive,—"in urbe Romano qui sunt . . . cives Romani effecti sunt"; but there is considerable diversity of opinion as to their meaning, caused by the fact that peregrins are still mentioned by some of Caracalla's successors. Limit the constitution, however, as we may, there can be no question of its immense importance. By conferring citizenship on the provincial peregrins it subjected them in all their relations to the law of Rome, and qualified them for taking part in many transactions both *inter vivos* and *mortis causa* which previously had been incompetent for them. It did away with the necessity for the *jus gentium* as a separate positive system. Its principles and its doctrines, it is true, survived, and were expanded and elaborated as freely and successfully as ever; but they were so dealt with as part and parcel of the civil law of Rome, which had ceased to be Italian and become imperial.

Enactments of Augustus;

Legislation of Comitia and Senate.—Augustus, clinging as much as possible to the form of republican institutions, thought it expedient not to break with the old practice of submitting his legislative proposals to the vote of the comitia of the tribes. Some of them were far from insignificant. Besides various measures for the amendment of the criminal law, three groups of enactments of considerable importance owed their authorship to him, the first to improve domestic morality and encourage fruitful marriage, the second to abate the evils that had arisen from the too lavish admission of liberated slaves to the privileges of citizenship, and the third to regulate procedure in public prosecutions and private litigations.

about marriage;

The first group included the *Lex Julia de adulteriis coercendis* of 736 and the *Lex Julia et Papia Poppaea*,—the latter a voluminous matrimonial code, which for two or three centuries exercised such an influence as to be regarded as one of the sources of Roman law almost quite as much as the XII. Tables or Julian's consolidated *Edict*. It was often spoken of as the *Lex Caducaria*, one of its most remarkable provisions being that unmarried persons (within certain ages and under certain qualifications) should forfeit entirely anything to which they were entitled under a testament, and that married but childless persons should forfeit one-half, the lapsed provisions (*caduca*) going to the other persons named in the will who were qualified in terms of the statute, and failing them to the fisc. However well intended, the language of Juvenal and others raises doubts whether the law did not really do more harm than good. By the Christian emperors many of its provisions were repealed, while others fell into disuse; and in the Justinianian books hardly a trace is left of its distinctive features.

about manumission.

The second group included the Ælia-Sentian law of the year 4 A.D., the Fufia-Caninian law of the year 8, and the Junia-Norban law of the year 19,—the last passed in the reign of Tiberius, but was probably planned by Augustus. The Ælia-Sentian law regulated the matter of manumission, with the result that a manumittee might on that event, and according to circumstances minutely described, become (1) either a citizen, or (2) a freedman with the possibility of attaining citizenship by a process indicated in the statute, or (3) a freedman who, because of his bad character, was forbidden to reside within a hundred miles of Rome and denied the hope of ever becoming a citizen (*libertus dediticius*). The Junian law was passed in order to define more precisely the status in the meantime of those freedmen who had a potentiality of citizenship. It did so by assimilating them to the colonial Latins, denying to them the rights of a citizen proper so far as concerned family and succession, but conceding to them all the patrimonial rights of a citizen and the fullest power of dealing with their belongings so long as not *mortis causa* and to the prejudice of their patrons. This was the Junian Latinity so prominent in the pages of Gaius, but of which our limits exclude any detailed description.

The third group of enactments referred to included the two *Leges Juliae judiciariae*, of which we know but little. That regulating procedure in private litigations is the same that is mentioned by Gaius as having completed the work of the Æbutian law in substituting the formular system for that *per legis actiones*. It must have been a somewhat comprehensive statute, as a passage in the *Vatican Fragments* refers to a provision of its 27th section; and our ignorance of its contents therefore, beyond one or two trifling details, is the more to be regretted.

From the time of Tiberius onwards it was the senate that did the work of legislation, for the simple reason that the comitia were no longer fit for it. And very active it seems to have been. This may have been due to some extent to the fact that so many professional jurists, aware from their practice of the points in which the law required amendment, possessed seats in the imperial council, where the drafts of the senatusconsults were prepared. It was the senatusconsults that were the principal statutory factors of what was called by both emperors and jurists the *jus novum*,—law that departed often very widely from the principles of the old *jus civile*, that was much more in accordance with those of the *Edict*, and that to a great extent might have been introduced through its means had not the authority of the prætors been overshadowed by that of the prince. In the end of the 2d and the beginning of the 3d century the supremacy of the latter in the senate became rather too pronounced, men quoting the *oratio* in which he had submitted to it a project of law instead of the resolution which gave it legislative effect. No doubt it must have been carefully considered beforehand in the imperial council, and rarely stood in need of further discussion; but the ignoring of the formal act that followed it tended unduly to emphasize the share borne in it by the sovereign, and made it all the easier for the emperors after Alexander Severus to dispense altogether with the time-honoured practice.

Julian Edicts

The Consolidated Edictum Perpetuum.—The edicts of the prætors, which had attained very considerable proportions before the fall of the republic, certainly received some additions in the early empire. But those magistrates did not long enjoy the same independence as of old; there was a greater *imperium* than theirs in the state, before which they hesitated to lay hands on the law with the boldness of their predecessors. They continued as before to publish annually at entry on office the edicts that had been handed down to them through generations; but their own additions were soon limited to mere amendments rendered necessary by the provisions of some senatusconsult that affected the *jus honorarium*. They ceased to be that *viva vox juris civilis* which they had been in the time of Cicero; the emperor, if any one, was now entitled to the epithet; the annual edict had lost its *raison d'être*. Hadrian was of opinion that the time had come for writing its "explicit," and giving it another and a more enduring and authoritative shape,—for so fashioning and so sanctioning it that it might be received as law, and not merely as edict, throughout the length and breadth of the empire. He accordingly commissioned Salvius Julianus, urban prætor at the time, to revise it, with a view to its approval by the senate as part of the statute law.

The revisal, unfortunately, like the XII. Tables, is no longer extant. It is only a very slight account we have of the revision,—a line or two in Eutropius and Aurelius Victor, and a few lines in two of Justinian's prefaces to the *Digest*. We may assume, from what is said there, that there were both abridgment and rearrangement of the edicts of the urban prætor; but the question remains how far Julian consolidated with them those of the peregrin prætor and other officials who had contributed to the *jus honorarium*. Those of the curule ædiles, we are told, were included; Justinian says that they formed the last part of Julian's work, and may have been a sort of appendix. There is reason to believe that so much of the edicts of the provincial governors as differed from those of the prætors were also incorporated in it, and that the edicts of the peregrin prætors, in so far as they contained available matter not embodied in those of their urban colleagues or the provincial governors, were dealt with in the same way. The consolidation got the name of *Edictum Perpetuum* in a sense somewhat different from that formerly imputed to *edicta perpetua* as distinguished from *edicta repentina*, and, after approval by Hadrian, seems to have been formally sanctioned by senatusconsult. It was thus a closed chapter so far as the prætors were concerned; for, though it may have continued for a time to hold its place on their album with its formularies of actions, they had no longer any power to alter or make additions to it. It had ceased to be a mere efflux of their *imperium* and had become matter of statute; and its interpretation and amendment were no longer in their hands but in those of the emperor.

The Julian *Edict* does not seem to have been divided into books, but only into rubricated titles; and the general impression is that the formularies of actions were split up and distributed in their appropriate places. The arrangement is not difficult to discover by comparison of the various commentaries upon it, particularly those of Ulpian and Paul, which each contained over eighty books. First came a series of titles dealing with the foundations and first steps of all legal procedure,—jurisdiction, summons, intervention of attorneys or procurators, &c.; secondly, ordinary process in virtue of the magistrate's *jurisdictio*; thirdly, extraordinary process, originally in virtue of his *imperium*; fourthly, execution against judgment-debtors, bankrupts, &c.; fifthly, interdicts, exceptions, and prætorian stipulations; and lastly, the ædilian remedies. From the quotations from the Julian *Edict* embodied in the fragments of the writings of the commentators preserved by Justinian repeated attempts have been made to reproduce it. Most of them are nothing more than transcripts or attempted reconstructions of passages in the *Digest* which are supposed to have been borrowed from it, and are of comparatively little value. The only really scientific and worthily critical efforts are those of Rudorff in 1869 and Lenel in 1883.[1]

The Responses of Patented Counsel.—The right of responding under imperial authority (*jus respondendi ex auctoritate principis*), first granted by Augustus and continued by his successors down to the time of Alexander Severus, did not imply any curtailment of the right of unlicensed jurists to give advice to any one who chose to consult them. What it did was to give an authoritative character to a response, so that the judge who had asked for it and to whom it was presented—for the judges were but private citizens, most of them unlearned in the law—was bound to adopt it as if it had emanated from the emperor himself. It may be that Augustus was actuated by a political motive,—that he was desirous by this concession to attach lawyers of eminence to the new *régime*, and prevent the recurrence of the evils experienced during the republic from the too great influence of patrons. But, whatever may have prompted his action in the matter, its beneficial consequences for the law can hardly be overrated. For the quasi-legislative powers with which they were invested enabled the patented counsel to influence current doctrine not speculatively merely but positively (*jura condere*), and so to leaven their interpretations of the *jus civile* and *jus honorarium* with suggestions of natural law as to give a new complexion to the system.

Instead of giving his opinion like the unlicensed jurist by word of mouth, either at the request of the judge or at the instance of one of the parties, the patented counsel, who did not require to give his reasons, reduced it to writing and sent it to the court under seal. Augustus does not seem to have contemplated the possibility of conflicting responses being tendered from two or more jurists equally privileged. It was an awkward predicament for a judge to be placed in. Hadrian solved the difficulty by declaring that in such a case the judge should be entitled to use his own discretion.[2] That on receiving a response with which he was dissatisfied he could go on calling for others until he got one to his mind, and then pronounce judgment in accordance with it on the ground that there was difference of opinion, is extremely unlikely. The more probable explanation of Hadrian's rescript is, that the number of patented responding counsel was very limited; that a judge, if he desired their assistance, was required by this rescript to consult them all (*quorum omnium si*, &c.); that, if they were unanimous, but only then, their opinion had force of statute (*legis vicem optinet*); and that when they differed the judge must decide for himself.

Constitutions of the Emperors.[3]—Gaius and Ulpian concur in holding that every imperial constitution, whether in the shape of rescript, decree, or edict, had the force of statute. It may be that by the time of Ulpian that was the prevailing opinion; but modern criticism is disposed to regard the *dictum* of Gaius, written in the time of Antoninus Pius, as coloured by his Asiatic notions, and not quite accurate so far as the edicts were concerned. As supreme magistrate the emperor had the same *jus edicendi* that kings, consuls, and prætors had had before him, and used it as they did to indicate some course of action he meant to adopt and follow or some relief he proposed to grant. His range, of course was much greater than that of the prætors had been; for his authority endured for life, and extended over the whole empire and every department of government. But originally, and in principle, his successor on the throne was no more bound to adopt any of his edicts than a prætor was to adopt those of his predecessors. That it was not unusual for an edict to be renewed, and that it occasionally happened that the renewal was not by the immediate successor of its original author, are manifest from various passages in the texts. Very frequently, when its utility had stood the test of years, it was transmuted into a senatusconsult; this fact proves of itself that an edict *per se* had not the effect of statute. But their adoption by a succession of two or three sovereigns, whose reigns were of average duration, may have been held sufficient to give them the character of consuetudinary law; and, by a not unnatural process unreflecting public opinion may have come to impute force of statute to the edict itself rather than to the *longa consuetudo* that followed on it, thus paving the way for the assertion by the sovereigns of the later empire of an absolute right of legislation, and for the recognition of the *lex edictalis* (*infra*, p. 710) as the only form of statute.

Rescripts and decrees.

The imperial rescripts and decrees (*rescripta, decreta*) had force of law (*legis vicem habent*) from the earliest days of the empire, and their operation was never limited to the lifetime of the prince from whom they had proceeded. But they were not directly acts of legislation. In both the emperor theoretically did no more than authoritatively interpret existing law, although the boundary between interpretation and new law, sometimes difficult to define, was not always strictly adhered to. The rescript was an answer by the emperor to a petition, either by an official or a private party, for an instruction as to how the law was to be applied to the facts set forth; when the answer was in a separate writing it was usually spoken of as an *epistula*; when noted at the foot of the application its technical name was *subscriptio* or *adnotatio*. The decree was the emperor's ruling in a case submitted to him judicially; it might be when it had been brought before him in the first instance *extra ordinem*, or when it had been removed by *supplicatio* from an inferior court in its earliest stage, or when it came before him by appeal. It was as a judge that the emperor pronounced his decree; but, proceeding as it did from the fountain of authoritative interpretation, it had a value far beyond that of the sentence of an inferior court (which was law only as between the parties), and formed a precedent which governed all future cases involving the same question. Those decrees and rescripts constituted one of the most important sources of the law during the first three centuries and more of the empire, and were elaborated with the assistance of the most eminent jurists of the day, the rescripts being the special charge of the *magister libellorum*. From the time of the Gordians to that of the abdication of Diocletian they were almost the only channel of the law that remained.

Professional Jurisprudence.—A sketch of the history of Roman law can hardly be considered complete without some account of the jurists of the first two centuries and a half of the empire, who contributed to it the great body of doctrine embalmed in the *Digest* of Justinian. But the exigencies of space compel us to refrain from entering upon a branch of our subject that cannot be satisfactorily treated without considerable detail, and to content ourselves with referring the reader to the recent work of Mr Roby, or the *Rechtsgeschichte* of Professor Karlowa of Heidelberg, where all will be found that the most inquisitive could desire.[4] For an account of the extant remains of their writings outside the Justinianian *Digest*, such as the *Institutes* of Gaius, the *Rules* of Ulpian, the *Sentences* of Paul, and a variety of minor pieces, we must likewise refer to Karlowa's book,[5] which promises to be the most elaborate history of Roman law as yet given to the public.

II. SUBSTANTIVE CHANGES IN THE LAW.

Concession of Peculiar Privileges to Soldiers.—While the period with which we are dealing saw the substantial disappearance of the distinction between citizen and peregrin, it witnessed the rise of another,—that between soldiers and civilians (*milites, pagani*). The most remarkable effluxes of the *jus militare* (as it is sometimes called) were the military testament and the *castrense peculium.* The first set at naught all the rules of the *jus civile* and the prætors' edict alike as to the form and substance of last wills. It might be in writing, by word of mouth, by the unspoken signs perhaps of a dying man; all that was required was the *voluntas* so manifested as not to be mistaken. More extraordinary still,—it was sustained even though its provisions ran counter to the most cherished rules of the common law. Contrary to the maxim that no man could die partly testate and partly intestate, a soldier might dispose of part of his estate by testament and leave the rest to descend to his heirs *ab intestato.* Contrary also to the maxim *semel heres semper heres*, he might give his estate to A for life or for a term of years, or until the occurrence of some event, with remainder to B. Contrary to the general rule, a Latin or peregrin, or an unmarried or married but childless person, might take an inheritance or a bequest from a soldier as freely as could a citizen with children. His testament, in so far as it disposed only of *bona castrensia*, was not affected by *capitis deminutio minima.* It was not invalidated by præterition of *sui heredes*, nor could they challenge it, because they had less under it than their "legitim"; nor could the instituted heir claim a Falcidian fourth, even though nine-tenths of the succession had been assigned to legatees. Finally, a later testament did not nullify an earlier one, if it appeared to be the intention of the soldier testator that they should be read together.

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[1] Rudorff, *De jurisdictione edictum: edicti perpetui quae reliqua sunt*, Leipsic, 1869, and rev. by Brinz in the *Krit. Vierteljahrschrift*, vol. xi. (1870), p. 471 *sq.*; Lenel, *Das Edictum Perpetuum: ein Versuch zu dessen Wiederherstellung*, Leipsic, 1883. The last gained the "Savigny Foundation Prize" offered by the Munich Academy in 1882 for the best restitution of the *formulae* of Julian's *Edict*, but goes far beyond the limited subject prescribed; see Brinz's report upon it to the Academy in the *Zeitschr. d. Sav. Stift.*, vol. iv. (1883), *Röm. Abtheil.*, p. 164 *sq.*

[2] Gaius, i. 7. Justinian, *Inst.*, i. 2, § 8, gives it somewhat differently.

[3] Gai., i. 5; Ulp., in *Dig.*, i. 4, fr. 1, § 1; Mommsen, *Röm. Staatsrecht*, vol. ii. p. 843 *sq.*; Wlassak, *Krit. Studien zur Theorie der Rechtsquellen im Zeitalter d. klass. Juristen*, Gratz, 1884; A. Pernice (crit. Wlassak), in *Zeitschr. d. Sav. Stift.*, vol. vi. (1885), *Röm. Abtheil.*, p. 293 *sq.*; Karlowa, *Röm. Rechtsgesch.*, vol. i. § 85.

[4] Roby, *Introduction to the Study of Justinian's Digest*, Cambridge, 1884, chaps. ix.-xv.; Karlowa, *Röm. Rechtsgeschichte*, vol. i. (*Staatsrecht und Rechtsquellen*), Leipsic, 1885, §§ 87-91. Karlowa's 2d vol. will contain the history of the private law, the criminal law, and civil and criminal procedure.

[5] Karlowa, *op. cit.*, § 92. An account of the jurists of the empire and their remains outside the *Digest* will be found in an expansion of the present article now in the press, under the title of *Historical Introduction to the Private Law of Rome*.

All this is remarkable, manifesting a spirit very different from that which animated the common law of testaments. True, it was a principle with the jurists of the classical period that the *voluntatis ratio* was to be given effect to in the interpretation of testamentary writings; but that was on the condition that the requirements of law as to form and substance had been scrupulously observed. But in the military testament positive rules were made to yield to the *voluntas* in all respects: the will was almost absolutely unfettered. Roman law in this matter gave place to natural law. One would have expected the influence of so great a change to have manifested itself by degrees in the ordinary law of testaments; yet it is barely visible. In a few points the legislation of Constantine, Theodosius II., and Justinian relaxed the strictness of the old rules; but there was never any approach to the recognition of the complete supremacy of the *voluntas.* In the *Corpus Juris* the contrast between the *testamentum paganum* and the *testamentum militare* was almost as marked as in the days of Trajan. The latter was still a privileged deed, whose use was confined to a soldier actually on service, and which had to be replaced by a testament executed according to the usual forms of law within twelve months after his retirement.

Peculium castrense.

The *peculium castrense* had a wider influence; for it was the first of a series of amendments that vastly diminished the importance of the *patria potestas* on its patrimonial side. It had its origin in the concession by Augustus to *filiifamilias* on service of the right to dispose by testament of what they had acquired in the active exercise of their profession (*quod in castris adquisierant*). But it soon went much further. Confined at first to *filiifamilias* on actual service, the privilege was extended by Hadrian to those who had obtained honourable discharge. The same emperor allowed them not merely to test on their *peculium castrense*, but to manumit slaves that formed part of it; and a little step further recognized their right to dispose of it onerously or gratuitously *inter vivos.* By and by the range of it was extended so as to include not only the soldier's pay and prize but all that had come to him, directly or indirectly, in connexion with his profession,—his outfit, gifts made to him during his service, legacies from comrades, and so on. All this was in a high degree subversive of the doctrines of the common law. It may almost be called revolutionary, for it involved in the first place the recognition of the right of a person *alieni juris* to make a testament as if he were *sui juris*, and in the second place the recognition of a separate estate in a *filiusfamilias* which he might deal with independently of his *paterfamilias*, which could not be touched by the latter's creditors, and which he was not bound to collate (or bring into hotch-pot) on claiming a share of his father's succession. The radical right of the parent, however, was rather suspended than extinguished; for, if the soldier son died intestate, the right of the *paterfamilias* revived: he took his son's belongings, not as his heir appropriating an inheritance, but as his *paterfamilias* reclaiming a *peculium.*[1]

Family relations.

The Family.—The legislative efforts of Augustus to encourage marriage, to which persons of position showed a remarkable distaste, have already been mentioned. The relation of husband and wife still in law required no more for its creation than deliberate interchange of nuptial consent, although for one or two purposes the bride's home-coming to her husband's house was regarded as the criterion of completed marriage. But it was rarely accompanied with *manus.* So repugnant was such subjection to patrician ladies that they declined to submit to confarreate nuptials; and so great consequently became the difficulty of finding persons qualified by confarreate birth to fill the higher priesthoods that early in the empire it had to be decreed that confarreation should in future be productive of *manus* only *quoad sacra*, and should not make the wife a member of her husband's family. *Manus* by a year's uninterrupted cohabitation was already out of date in the time of Gaius; and, although that by coemption was still in use in his time, it probably was quite unknown by the end of the period. Husband and wife therefore had their separate estates, the common establishment being maintained by the husband, with the assistance of the revenue of the wife's dowry (*dos*),—an institution which received much attention at the hands of the jurists, and was to some extent regulated by statute. Divorce was unfortunately very common; it was lawful even without any assignable cause; when blame attached to either side, he or she suffered deprivation to some extent of the nuptial provisions, but there were no other penal consequences.

Not only in the case of a *filiusfamilias* who had adopted a military career, but in all directions, there was manifested a tendency to place restrictions on the exercise of the *patria potestas.* This was due in a great degree to the hold that the doctrines of natural law were gaining within the Roman system, partly also to the fact that the emperors, having succeeded to the censorial *regimen morum*, allowed it freely to influence their edicts and rescripts. Exposure of an infant was still allowed; but a parent was no longer permitted, even in the character of household judge, to put his son to death; in fact his prerogative was limited to moderate chastisement, the law requiring, in case of a grave offence that merited severer punishment, that he should hand his child over to the ordinary tribunal. His right of sale, in like manner, was restricted to young children, and permitted only when he was in great poverty and unable to maintain them, while their impignoration by him was prohibited under pain of banishment.

Except in the solitary case of a son who was a soldier, a *paterfamilias* was still recognized as in law the owner of all the earnings and other acquisitions of his children *in potestate*; but the old rule still remained that for their civil debts he was not liable beyond the amount of the fund he had advanced them to deal with as *de facto* their own (*peculium profecticium*), except when he had derived advantage from their contract or had expressly or by implication authorized them to enter into it as his agents. To the party with whom he had contracted a *filiusfamilias* was himself liable as fully as if he had been a *paterfamilias*, with one exception, namely, when his debt was for borrowed money; in that case, with some very reasonable qualifications, it was declared by the notorious Macedonian senatusconsult (of the time of Vespasian) that the lender should not be entitled to recover payment, even after his borrower had become *sui juris* by his father's death. Between a father and his emancipated son there was, and always had been, perfect freedom of contract; but so was there now between a father and his soldier son in any matter relating to the *peculium castrense*, even though the son was *in potestate.* What is still more remarkable is that the new sentiment which was operating on the *jus civile* admitted the possibility of natural obligation between *paterfamilias* and *filiusfamilias* even in reference to the *peculium profecticium*, which, though incapable of direct enforcement by action, was yet to some extent recognized and given effect to indirectly.

In the matter of guardianship, while the tutory of pupils was carefully tended and the law in regard to it materially amended during the period under review (particularly by a senatusconsult generally referred to as the *Oratio divi Severi*, prohibiting alienation of the ward's property without judicial authority), that of women above the age of pupilarity gradually disappeared. The guardianship or curatory (*cura*) of minors above pupilarity owed its institution to Marcus Aurelius. The Plætorian law of the middle of the sixth century of the city had indeed imposed penalties on those taking undue advantage of the inexperience of minors, *i.e.*, persons *sui juris* under the age of twenty-five; and from that time the prætors were in the habit of appointing curators to act with such persons for the protection of their interests in particular affairs. But it was Marcus Aurelius who first made curatory a general permanent office, to endure in the ordinary case until the ward attained majority. The powers, duties, and responsibilities of such curators became a matter for careful and elaborate definition and regulation by the jurists, whose exposition of the law of guardianship, whether by tutors or curators, has found wide acceptance in modern systems of jurisprudence.

The Law of Succession and particularly Testamentary Trusts.—There were far more positive changes in the law of succession than in either that of property or that of obligation. The rise and progress of the military testament has already been explained. The testament of the common law was still ostensibly that *per aes et libram*; but the practice of granting *bonorum possessio secundum tabulas* to the persons named as heirs in any testamentary instrument that bore outside the requisite number of seals led, from the time of Marcus Aurelius, to the frequent neglect of the time-honoured formalities of the *familiae mancipatio* and *nuncupatio testamenti*. It was a rescript of his, declaring that an heir-at-law should no longer be entitled to dispute the last wishes of a testator on the technical ground of non-compliance with the purely formal requirements of the law, that practically introduced what Justinian calls the prætorian testament.

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[1] This was altered by Justinian's 118th *Novel*, under which a father taking any part of a deceased son's estate did so as his heir; see *infra*, p. 713.

One of the commonest provisions in the testaments of the period was the *fideicommissum*,—a request by the testator to his heir to enter to the inheritance and thereafter denude wholly or partially in favour of a third party. It was introduced in the time of Augustus by (it is said) a testator who had married a peregrin wife, and desired thus indirectly to give to his peregrin children the succession which, as not being citizens, they could neither take *ab intestato* nor as his direct testamentary heirs.[1] The practice soon gained ground, and became thoroughly established once the emperor, shocked at the perfidy of a trustee who had failed to comply with the request of his testator, indicated his approval of the new institution by remitting the matter to the consuls of the day, with instructions to do in the circumstances what they thought just. So quickly did it establish itself in public favour, and so numerous did the questions become as to the construction and fulfilment of testamentary trusts, that before long it was found necessary to institute a court specially charged with their determination,—that of the *praetor fideicommissarius*.

The employment of a trust as a means of benefiting those who were under disqualifications as heirs or legatees, as, for example, persons who had no *testamenti factio*, women incapacitated by the Voconian law, unmarried and married but childless persons incapacitated by the Julian and Papia-Poppæan law, and so on, was in time prohibited by statute; but that did not affect its general popularity. For, whether what was contemplated was a transfer of the universal *hereditas* or a part of it to the beneficiary (*fideicommissum hereditatis*), or only of some particular thing (*fideicommissum rei singularis*), a testamentary trust had various advantages over either a direct institution or a direct bequest (*legatum*). In theory the imposition upon the heir of a trust in favour of a beneficiary, whether it required him to denude of the whole or only a part of the inheritance, did not deprive him of his character of heir or relieve him of the responsibilities of the position; and at common law therefore he was entitled to decline the succession, often to the great prejudice of the beneficiary. In order to avoid such a mischance, and at the same time to regulate their relations *inter se* and towards debtors and creditors of the testator's, it became the practice for the parties to enter into stipulatory arrangements about the matter; but these were to some extent rendered superfluous by two senatusconsults, the Trebellian in the time of Nero and the Pegasian in that of Vespasian, which at once secured the beneficiary against the trustee's (*i.e.*, the heir's) repudiation of the inheritance, protected the latter from all risk of loss where he was trustee and nothing more, and enabled the former to treat directly with debtors and creditors of the testator's and himself ingather the corporeal items of the inheritance.

It was one of the advantages of a trust-bequest, whether universal or singular, that it might be conferred in a codicil, even though unconfirmed by any relative testament. The codicil (*codicilli*), also an invention of the time of Augustus, was a deed of a very simple nature. It was inappropriate either for disherison of *sui* or institution of an heir; but if confirmed by testament it might contain direct bequests, manumissions, nominations of tutors, and the like, and whether confirmed or unconfirmed might, as stated, be utilized as a vehicle for trust-gifts. Latterly it was held operative even in the absence of a testament, the trusts contained in it being regarded as burdens on the heir-at-law.

The most important changes in the law of intestate succession during the period were those accomplished by the Tertullian and Orphitian senatusconsults, fruits of that respect for the precepts of natural law which in so many directions was modifying the doctrines of the *jus civile*. The first was passed in the reign of Hadrian, the second in the year 178, under Marcus Aurelius. Down to the time of the Tertullian senatusconsult a mother and her child by a marriage that was unaccompanied with *manus* stood related to each other only as cognates, being in law members of different families; consequently their chance of succession to each other was remote, being postponed to that of their respective agnates to the sixth or seventh degree. The purpose of the senatusconsult was to prefer a mother to all agnates of her deceased child except father and brother and sister; father and brother excluded her; but with a sister of the deceased, and in the absence of father or brother, she shared equally. While there can be little doubt that it was natural considerations that dictated this amendment, yet its authors were too timid to justify it on the abstract principle of common humanity, lest thereby they should seem to impugn the wisdom of the *jus civile*, and so they confined its application to women who had the *jus liberorum*, *i.e.*, to women of free birth who were mothers of three children and freedwomen who were mothers of four, thus making it ostensibly a reward of fertility. The Orphitian senatusconsult was the counterpart of the Tertullian. It gave children, whether legitimate or illegitimate, a right of succession to their mother in preference to all her agnates; and subsequent constitutions extended the principle, admitting children to the inheritance not only of their maternal grandparents but also to that of their paternal grandmother.

III. Judicial Procedure.

Formu
system

The Formular System.[2]—The ordinary procedure of the first three centuries of the empire was still two-staged; it commenced before the prætor (*in jure*) and was concluded before a *judex* (*in judicio*). But the *legis actiones* had given place to prætorian *formulae*. Under the older system parties, and particularly the plaintiff, had themselves to formulate in statutory or traditional words of style the matter in controversy between them; and as they formulated, so did it go for trial to centumviral court or *judex* or arbiters, with the not infrequent result that it was then all too late discovered that the real point in the case had been missed. Under the formular system parties were free to represent their plaint and defence to the prætor in any words they pleased, the plaintiff asking for a *formula* and usually indicating the style on the *album* that he thought would suit his purpose, and the defendant demanding when necessary an exception, *i.e.*, a plea in defence, either prætorian or statutory, that, without traversing the facts or law of the plaintiff's case, avoided his demand on grounds of equity or public policy. It was for the prætor to consider and determine whether the action or exception should or should not be granted, and, if granted, whether it should be according to the style exhibited on the *album* or according to a modification of it. The result he embodied in a written and signed appointment to a judge, whom he instructed what he had to try, and empowered to pronounce a finding either condemning or acquitting the defendant. This writing was the *formula*.

Although it was not until the early empire that this system of procedure attained its full development, yet it had its commencement two centuries before the fall of the republic. Gaius ascribes its introduction and definitive establishment to the *Lex Aebutia* (probably of the second decade of the sixth century of the city) and two judiciary laws of the time of Augustus (*supra*, pp. 696, 704). The Æbutian law, of which unfortunately we know very little, is generally supposed to have empowered the prætors (1) to devise a simpler form of procedure for causes already cognizable *per legis actionem*, (2) to devise forms of action to meet cases not cognizable under the older system, and (3) themselves to formulate the issue and reduce it to writing. It was by no means so radical a change as is sometimes supposed. There were *formulae* employed by the prætor both in the procedure *per judicis postulationem* and in that *per condictionem*. The difference between them and the *formulae* of the Æbutian system was that the former were in part mere echoes of the statutory words of style uttered by the plaintiff, and that they were not written but spoken in the hearing of witnesses.

Its appli
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personal
actions

A large proportion of the personal actions of the formular system were evolved out of the *legis actio per condictionem*. The sequence of operations may have been something like this. Taking the simplest form of it, the action for *certa pecunia* under the Silian law, the first step was to drop the formal *condictio* from which it derived its character of *legis actio*, thus avoiding a delay of thirty days; the plaintiff stated his demand in informal words, and, if the defendant denied indebtedness, the prætor straightway formulated a written appointment of and instruction to a judge, embodying in it the issue in terms substantially the same as those he would have employed under the earlier procedure:—“Titius be judge. Should it appear that N. N. ought to pay (*dare oportere*) 50,000 sesterces to A. A., in that sum condemn N. N. to A. A.;[3] should it not so appear, acquit him.” This was no longer the *legis actio per condictionem*, because what had made it *legis actio* was gone, but the *certi condictio* of the formular system. The *condictio triticaria* of the same system ran on the same lines: “Titius be judge. Should it appear that N. N. ought to give A. A. the slave Stichus, then, whatever be the value of the slave, in that condemn N. N. to A. A.,” and so on. In both of these examples the *formula* included only two of the four clauses that might find place in it,[4]—an “intention" and a "condemnation." The matter of claim in both cases was certain,—so much money in one, a slave in the other, but, while in the first the condemnation also was certain, in the second it was uncertain. What if the claim also was uncertain,—say a share of the profits of a joint adventure assured by stipulation? It was quite competent for the plaintiff to condescend on a definite sum, and claim that as due to him; but it was very hazardous, for unless he was able to prove the debt to the last sesterce he got nothing. To obviate the risk of such failure the prætors devised the *incerti condictio*, whose *formula* commenced with a "demonstration" or indication of the cause of action, and whose "intention" referred to it and was conceived indefinitely: "Titius be judge. Whereas A. A. stipulated with N. N. for a share of the profits of a joint adventure, whatever in respect thereof N. N. ought to give to or do for (*dare facere oportet*) A. A., in the money amount thereof condemn N. N.," and so on.[1] Once this point was attained further progress was comparatively easy, the way being open for the construction of *formulae* upon illiquid claims arising from transactions in which the practice of stipulation gradually dropped out of use (*supra*, p. 701), till at last the *bonae fidei judicia* were reached, marked by the presence in the "intention" of the words *ex fide bona*,—"whatever in respect thereof N. N. ought in good faith to give to or do for A. A."

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[1] They could not even have a claim as cognates under the prætorian rules; for the prætors followed the rule of the *jus civile* to this extent, that they did not grant *bonorum possessio* to a person who had not *testamenti factio* with him whose succession was in question

[2] See Keller (as on p. 681, note 1), §§ 23-43; Bethmann-Hollweg (as in same note), vol. ii. §§ 81-87; Bekker (as in same note), vol. i. chaps. 4-7, vol. ii. chaps. 15, 19, 20; Baron, *Gesch. d. rom. Rechts*, Berlin, 1884, vol. i. §§ 202-215.

[3] In the typical Roman styles of actions the plaintiff was usually called Aulus Agerius and the defendant Numerius Negidius.

[4] Gaius enumerates them as the *demonstratio*, *intentio*, *adjudicatio*, and con

Its application to real actions.

In the case of real actions the transition from the *legis actiones* to the *formulae* followed a different course. The Æbutian law did not abolish the procedure *per sacramentum* when reference was to be to the centumviral court on a question of quiritarian right. In the time of Cicero that court was apparently still in full activity (p. 678), but by that of Gaius it is doubtful if it was resorted to except for trial of questions of inheritance. In his time questions of property were raised either *per sponsionem* or *per formulam petitoriam*. The procedure by sponsion must be regarded as the bridge between the sacramental process and the petitory *vindicatio*. In the first as in the second the question of real right was determined only indirectly. The plaintiff required the defendant to give him his stipulatory promise to pay a nominal sum of twenty-five sesterces in the event of the thing in dispute being found to belong to the former; and at the same time the defendant gave security for its transfer to the plaintiff, with all fruits and profits, in the same event. The *formula* that was adjusted and remitted to a judge *ex facie* raised only the simple question whether the twenty-five sesterces were due or not: the action was in form a personal, not a real one, and was therefore appropriately remitted to a single *judex* instead of to the centumviral tribunal. But judgment on it could be reached only through means of a finding (*sententia*) on the question of real right; if it was for the plaintiff he did not claim the amount of the sponsion, but the thing which had been found to be his; and, if the defendant delayed to deliver it, with its fruits and profits, the plaintiff had recourse against the latter's sureties. The petitory *formula* was undoubtedly of later introduction and much more straightforward. Like the *certi condictio* it contained only "intention" and "condemnation." It ran thus: "Titius be judge. Should it appear that the slave Stichus, about whom this action has been raised, belongs to A. A. in quiritary right, then, unless the slave be restored, whatever be his value, in that you will condemn N. N. to A. A.; should it not so appear, you will acquit him."

Formulae in jus and in factum conceptae.

The *formulae* given above, whether applicable to real or personal actions, are so many illustrations of the class known as *formulae juris civilis* or *in jus conceptae*. The characteristic of such a *formula* was that it contained in the "intention" one or other of the following phrases—*ejus esse ex jure Quiritium*, *adjudicari oportere*,[2] *dari oportere*, *dari fieri oportere*, or *damnum decidi oportere*.[3] Such a *formula* was employed where the right to be vindicated or the obligation to be enforced had its sanction in the *jus civile*, whether in the shape of statute, consuetude, or interpretation. Where, on the other hand, the right or obligation had its sanction solely from the prætor's edict, *formulae* so conceived were inappropriate and incompetent. The actions employed in such cases were *actiones juris honorarii*, and these either *actiones utiles* or *actiones in factum*. The first were adaptations of actions of the *jus civile* to cases that did not properly fall within them; the second were actions entirely of prætorian devising, for the protection of rights or redress of wrongs unknown to the *jus civile*.[4]

Action ficticia

Of the *actiones utiles* some were called *actiones ficticiae*. Resort to a fiction is sometimes said to be a confession of weakness, and adversely criticized accordingly. But every amendment on the law is an admission of defect in what is being amended; and it was in sympathy with the spirit of Roman jurisprudence, when it found an action too narrow in its definition, to include some new case that ought to fall within it, rather by feigning that the new case was the same as the old, to bring it within the scope of the existing and familiar action, than to cause disturbance by either altering the definition of the latter or introducing an entirely new remedy. A *bonorum possessor* (*supra*, p. 702) held a position unknown to the *jus civile*; he was not an heir, and therefore not entitled offhand to employ the actions competent to an heir, either for recovering the property of the defunct or proceeding against his debtors. The prætor could have had no difficulty in devising new actions to meet his case; but he preferred the simpler expedient of adapting to it an heir's actions, by introducing into the *formula* a fiction of civil heirship; so he did with the *bonorum emptor* or purchaser of a bankrupt's estate at the sale of it in mass by his creditors. *Emptio bonorum* was a purely prætorian institution, and the prætor, if he had thought fit, could easily have fortified the purchaser's acquisition by giving him prætorian remedies for recovering the property and suing the debtors of the bankrupt; but here again he followed the simpler course of giving him, as if he were a universal successor, the benefit of an heir's actions by help of a fiction of heirship.[5] A peregrin could not sue or be sued for theft or culpable damage to property, for the XII. Tables and the Aquilian law applied only to citizens; but he could both sue and be sued under cover of a fiction of citizenship. A man who had acquired a *res mancipi* on a good title, but without taking a conveyance by mancipation or surrender in court, if he was dispossessed before he had completed his usucapion, could not sue a *rei vindicatio* for its recovery, for he was not in a position to affirm that he was quiritarian owner; neither, for the same reason, could a man who in good faith and on a sufficient title had acquired a thing from one who was not in a position to alienate it. But in both cases the prætor granted him what was in effect a *rei vindicatio* proceeding on a fiction of completed usucapion,—the Publician action referred to on p. 699.

Action in factum

These are examples of *actiones ficticiae*,—actions of the *jus civile* adapted by this very simple expedient to cases to which otherwise they would have been inapplicable, and forming one of the most important varieties of the *actiones utiles*. Quite different was the course of procedure in the *actiones in factum*, whose number and varieties were practically unlimited, although for the most part granted in pursuance of the prætor's promise in the edict that under such and such circumstances he would make a remit to a *judex* (*judicium dabo*),[6] and formulated in accordance with the relative skeleton styles also published on the *album*. A great number of them came to be known by special names, as, for example, the *actio de dolo*, *actio negotiorum gestorum*, *actio hypothecaria*, *actio de pecunia constituta*, *actio vi bonorum raptorum*, *actio de superficie*, &c.,—the generic name *actio in factum* being usually confined to the innominate ones. Their *formulae*, unlike those *in jus conceptae*, submitted no question of legal right for the consideration of the judge, but only a question of fact, proof of which was to be followed by a condemnation. That of the *actio de dolo*, for example, ran thus: "Titius be judge. Should it appear that, through the fraud of N. N., A. A. was induced to convey and cede possession to him of his farm (describing it), then, unless on your order N. N. restores it, you will condemn him in damages to A. A.; if it shall not so appear, you will acquit him."

Our limits do not admit of any explanation of the purpose, form, or effect of the prescriptions, exceptions, replications, &c., that were engrafted on a *formula* when required; or of the ways in which the "condemnation" was occasionally "taxed" by the prætor, so as to prevent the award of extravagant damages; or of the consequences of defects in the *formula*; or of the procedure *in jure* before it was adjusted, or *in judicio* afterwards; or of appeal for review of the judgment by a higher tribunal; or of execution (which was against the estate of the judgment-debtor, and took the form of incarceration only when his goods could not be attached). Our main object has been to show how elastic was this procedure, and how the prætorian *formulae*, in conjunction with the relative announcements in the edict, supplied the vehicle for the introduction into the law of an immense amount of new doctrine. The system was fully developed before Julian's consolidation of the

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demnatio, and describes their several functions in iv. §§ 39-43. Besides these a *formula* might be preceded by a *praescriptio* (Gai., iv. §§ 130-137), and have incorporated in it fictions (§§ 32-38), exceptions (§§ 115-125), and replications, duplications, &c. (§§ 126-129).

[1] This was specifically called the *actio ex stipulatu*, but was really nothing more than a variety of the *condictio incerti*. The later actions on the consensual contracts, and on all the nominate real contracts except *mutuum*, in like manner had specific names, but in fact were just *incerti condictiones* in the larger sense of the phrase.

[2] Employed only in the divisory actions, *i.e.*, for dividing common property, partitioning an inheritance, or settling boundaries; the demand was that the judge should adjudicate (or assign) to each of the parties such a share as he thought just.

[3] Employed in certain actions upon delict, where the old penalties of death, slavery, or talion had in practice been transmuted into money payments, and the defendant consequently called upon to make a settlement in that way.

In a few instances (not satisfactorily explained) there was both civil and prætorian remedy for the same wrong; for Gaius observes (iv. 45) that in commodate and deposit failure of the borrower or depositary to return the thing lent to or deposited with him gave rise to actions that might be formulated either *in jus* or *in factum*. In the same section he gives the styles of *actiones depositi in jus* and *in factum conceptae*; their comparison is instructive.

[5] Gai., iv. 35. Theophilus (*Par. Inst.*, iii. 12) calls the *bonorum emptor* πραιτώριος διάδοχος (prætorian successor) of the bankrupt.

[6] Examples: "Si quis negotia alterius . . . gesserit, judicium eo nomine dabo" (*Dig.*, iii. 5, 3, pr.); "Quae dolo malo facta esse dicuntur, si de his rebus alia actio non erit et justa causa esse videbitur, judicium dabo" (*Dig.*, iv. 3, 1, § 1); "Nautae caupones stabularii quod cujusque salvum fore receperint, nisi restituent, in eos judicium dabo" (*Dig.*, iv. 9, 3, 1); "Quod quis commodasse dicetur, de eo judicium dabo" (*Dig.*, xiii. 6, 1, pr.).

Edict; and the statutory recognition which the latter then obtained did nothing to impair its efficiency.

Procedure extra Ordinem.[1]—The two-staged procedure, first *in jure* and then *in judicio*, constituted the *ordo judiciorum privatorum*. Early in the empire, however, it became the practice in certain cases to abstain from adjusting a *formula* and making a remit to a *judex*, and to leave the cause in the hands of the magistrate from beginning to end. This course was adopted sometimes because the claim that was being made rested rather on moral than on legal right, and sometimes in order to avoid unnecessary disclosure of family misunderstandings. Thus, the earliest questions that were raised about testamentary trusts were sent for consideration and disposal to the consuls, apparently because, in the existing state of jurisprudence, it was thought incompetent for a beneficiary to maintain in reference to the heir (who had only been *requested* to comply with the testator's wishes) that he was bound in law (*dare oportere*) to pay him his bequest. Had the difficulty arisen at an earlier period, and in the heyday of the constructive energy of the prætors, they would probably have solved it with an *actio in factum*. As it was, it fell to the emperors to deal with it, and they adopted the method of *extraordinaria cognitio*, the jurisdiction which they in the first instance conferred on the consuls being before long confided to a magistrate specially designated for it,—the *praetor fideicommissarius*. Questions between tutors and their pupil wards in like manner began to be dealt with *extra ordinem*, the cognition being entrusted by Marcus Aurelius to a *praetor tutelaris*; while fiscal questions in which a private party was interested went to a *praetor fisci*, whose creation was due to Nerva. Claims for aliment between parent and child or patron and freedman rested on natural duty rather than on legal right; they could not therefore well be made the subject-matter of a *judicium*, and consequently went for disposal to the consuls or the city prefect, and in the provinces to the governor. Questions of status, especially of freedom or slavery, at least from the time of Marcus Aurelius, were also disposed of *extra ordinem*; and so were claims by physicians, advocates, and public teachers for their *honoraria*, and by officials for their salaries, the Romans refusing to admit that these could be recovered by an ordinary action of location. In all those extraordinary cognitions the procedure began with a complaint addressed to the magistrate, instead of an *in jus vocatio* of the party complained against; it was for the magistrate to require the attendance of the latter (*evocatio*) if he thought the complaint relevant. The decision was a *judicatum* or *decretum* according to circumstances.

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Jural Remedies flowing directly from the Magistrate's Imperium.[2]—Great as were the results for the law of the multiplication and simplification of *judicia* through the formular system, it may be questioned whether it did not benefit quite as much from the direct intervention of the prætors in certain cases in virtue of the supreme power with which they were invested. This manifested itself principally in the form of (1) interdicts; (2) prætorian stipulations; (3) *missio in possessionem*; and (4) *in integrum restitutio*.

nter-
dicts.

1. The interdicts[3] have already been referred to as in use under the *régime* of the *jus civile*; but their number and scope were vastly increased under that of the *jus praetorium*. The characteristic of the procedure by interdict was this,—that in it the prætor reversed the ordinary course of things, and, instead of waiting for an inquiry into the facts alleged by a complainer, provisionally assumed them to be true and pronounced an order upon the respondent, which he was bound either to obey or show to be unjustified. The order pronounced might be either restitutory, exhibitory (in both cases usually spoken of in the texts as a decree), or prohibitory:—restitutory, when, for example, the respondent was ordained to restore something he was alleged to have taken possession of by violent means, to remove impediments he had placed in the channel of a river, and so on; exhibitory, when he was ordained to produce something he was unwarrantably detaining, *e.g.*, the body of a freeman he was holding as his slave, or a will in which the complainer alleged that he had an interest; prohibitory, as, for example, that he should not disturb the *status quo* of possession as between the complainer and himself, that he should not interfere with a highway, a watercourse, the access to a sepulchre, and so forth. If the respondent obeyed the order pronounced in a restitutory or exhibitory decree, there was an end of the matter. But frequently, and perhaps more often than not, the interdict was only the commencement of a litigation, facilitated by sponsions and restipulations, in which the questions had to be tried (1) whether the interdict or injunction was justified, (2) whether there had been breach of it, and, (3) if so, what damages were due in consequence. The procedure therefore was often anything but summary. In the possessory interdicts *uti possidetis* and *utrubi* in particular it was extremely involved, due to some extent to the fact that they were double interdicts (*interdicta duplicia*), *i.e.*, addressed indifferently to both parties. Gaius says, but, as most jurists think, erroneously, that they had been devised as ancillary to a litigation about ownership, and for the purpose of deciding which of the parties, as possessor, was to have the advantage of standing on the defensive in the *rei vindicatio*.[4] That they were so used in his time, as in that of Justinian, cannot be doubted. But it is amazing that they should have been, for they were infinitely more cumbrous than the *vindicatio* to which they led up. Take the interdict *uti possidetis*, which applied to immovables, as *utrubi* did to movables. Both parties being present, the prætor addressed them to this effect: "I forbid that one of you two who does not possess the house in question to use force in order to prevent the other who is in possession, provided he is so neither by clandestine or violent exclusion of the first, nor in virtue of a grant from him during pleasure, from continuing to possess as at present." It is manifest that this decided nothing; it was no more than a prohibition of disturbance of the *status quo*; it left the question entirely open which of the parties it was that was in possession, and which that was forbidden to interfere. The manner of its explication was somewhat singular. Each of the parties was bound at once to commit what in the case of one of them must have been a breach of the interdict, by a pretence of violence offered to the other (*vis ex conventu*);[5] each of them was thus in a position to say to the other—"We have both used force; but it was you alone that did it in defiance of the interdict, for it is I that am in possession." The interim enjoyment of the fruits was then awarded to the highest bidder, who gave his stipulatory promise to pay for them to his adversary in the event of the latter being successful in the long run; penal sponsions and restipulations were exchanged upon the question which of them had committed a breach of the interdict; and on these, four in number, *formulae* were adjusted and sent to a *judex* for trial. If the procedure could not thus be explicated, because either of the parties declined to take part in the *vis ex conventu*, or the bidding, or the sponsions and restipulations, he was assumed to be in the wrong, and, by what was called a secondary interdict, required to abstain from disturbing the other "in all time coming." Whatever we may think of the action system of the Romans in the period of the classical jurisprudence, one cannot help standing aghast at a procedure so cumbrous and complex as that of their possessory interdicts.

Prætorian stipulations

2. A prætorian stipulation[6] was a stipulatory engagement imposed upon a man by a magistrate or judge, in order to secure a third party from the chance of loss or prejudice through some act or omission either of him from whom the engagement was exacted or of some other person for whom he was responsible. Although called prætorian, because the cases in which such stipulations were exigible were set forth in the *Edict*, there can be no question that they originated in the *jus civile*; in fact they were just a means of assuring to a man in advance the benefit of an action of the *jus civile* whereby he might obtain reparation for any injury suffered by him through the occurrence of the act or omission contemplated as possible. Ulpian classifies them as cautionary (*cautionales*), judicial, and common. The first were purely precautionary, and quite independent of any action already in dependence between the party moving the magistrate to exact the stipulation and him on whom it was desired to impose it. There were many varieties of them, connected with all branches of the law,—for example, the *cautio damni infecti*, security against damage to a man's property in consequence, say, of the ruinous condition of his neighbour's house, the *cautio usufructuaria* that property usufructed should revert unimpaired to the owner on the expiry of the usufructuary's life interest, the ædilian stipulation against faults in a thing sold, and so forth. In all these cases the stipulation or *cautio* was a guarantee against future loss or injury, usually corroborated by sureties, and made effectual by an action on the stipulation in the event of loss or injury resulting. Judicial stipulations, according to Ulpian's classification, were those imposed by a judge in the course of and with reference to an action in dependence before him, as, for example, the *cautio judicatum solvi* (that the defendant would satisfy the judgment), the *cautio de dolo* (that a thing claimed in the action would not be fraudulently impaired in the meantime), and many others. Common were such as might either be imposed by a magistrate apart from any depending action or by a judge in the course of one, such as that taken from a guardian for the faithful administration of his office, or from a procurator that his principal would ratify what he did.

3. *Missio in possessionem* was the putting of a person in possession

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[1] See Keller (as on p. 681, note 1), § 81; Bethmann-Hollweg (as in same note), vol. ii. § 122; Bekker (as in same note), vol. ii. chap. 23; Baron, *Gesch. d. rom. Rechts*, vol. i. § 220.

[2] Keller, §§ 74-80; Bethmann-Hollweg, vol. ii. §§ 98, 119-121; Bekker, vol. ii. chaps. 16-18; Baron, vol. i. §§ 216-219.

[3] In addition to the authorities in last note, see K. A. Schmidt, *Das Interdiktenverfahren d. Röm. in geschichtl. Entwickelung*, Leipsic, 1853; Machelard, *Théorie des interdits en droit romain*, Paris, 1864.

[4] If that had been their original purpose, they must have been unknown as long as a *rei vindicatio* preceeded *per sacramentum*; for in the sacramental real action both parties vindicated, and both consequently were at once plaintiffs and defendants.

[5] So Gaius calls it; it was probably the same thing as the *vis moribus facta* referred to by Cicero, *Pro Caec.*, 1, § 2, 8, § 22.

[6] To the authorities in note 1 above add Schirmer, *Ueber die prätorischen Judicial-Stipulationen*, Greifswald, 1853.

Missio in possessionem.

either of the whole estate of another (*missio in bona*) or of some particular thing belonging to him (*missio in rem*). The former was by far the more important. It was resorted to as a means of execution not only against a judgment-debtor but also against a man who fraudulently kept out of the way and thus avoided summons in an action, or who, having been duly summoned, would not do what was expected on the part of a defendant; against the estate of a person deceased to which no heir would enter, thus leaving creditors without a debtor from whom they could enforce payment of their claims; and also against the estate that had belonged to a person who had undergone *capitis deminutio*, if the family head to whom he had subjected himself refused to be responsible for his debts. *Missio in rem* was granted, *e.g.*, where a man refused to give *cautio damni infecti*; the applicant was then put in possession of the ruinous property for his own protection.

4. *In integrum restitutio*,[1] reinstatement of an individual, on grounds of equity, in the position he had occupied before some occurrence which had resulted to his prejudice, was one of the most remarkable manifestations of the exercise of the *imperium*. It was not that the individual in question, either directly by action or indirectly by exception, obtained a judgment that either rendered what had happened comparatively harmless or gave him compensation in damages for the loss he had sustained from it, but that the magistrate—and it could only be the prætor, the urban or prætorian prefect, a provincial governor, or the emperor himself—at his own hand pronounced a decree that as far as possible restored the *status quo ante*. It was not enough, however, to entitle a man to this extraordinary relief, that he was able to show that he had been taken advantage of to his hurt, and that no other adequate means of redress was open to him; he required in addition to be able to found on some subjective ground of restitution, such as minority, or, if he was of full age, intimidation which could not be resisted, mistake of fact, fraud, absence, or the like. What should be held to amount to a sufficient ground of restitution, either objective or subjective, was at first left very much to the discretion of the magistrate; but even here practice and jurisprudence in time fixed the lines within which he ought to confine himself, and made the principles of *in integrum restitutio* as well settled almost as those of the *actio quod metus causa* or the *actio de dolo*.

CHAPTER V.—THE PERIOD OF CODIFICATION.

(*Diocletian to Justinian.*)

I. Historical Events that influenced the Law.

Emperors sole legislators.

Supremacy of the Emperors as Sole Legislators.—From the time of Diocletian downwards the making of the law was exclusively in the hands of the emperors. The senate still existed, but shorn of all its old functions alike of government and legislation. The responses of patented jurists were a thing of the past. It was to the imperial consistory alone that men looked for interpretation of old law or promulgation of new.

In the reign of Diocletian rescripts were still abundant; but the constitutions in the Theodosian and Justinianian *Codes* from the time of Constantine downwards are mostly of a wider scope, and of the class known as general or edictal laws (*leges generales edictales*). It would be wrong, however, to infer that rescripts had ceased; for Justinian's *Code* contains various regulations as to their form, and the matter is dealt with again in one of his *Novels*. The reason why so few are preserved is that they were no longer authoritative except for the parties to whom they were addressed. This was expressly declared by the emperors Arcadius and Honorius in 398 in reference to those in answer to applications for advice from officials; and it is not unreasonable to assume that a limitation of the same sort had been put at an earlier date on the authority of those addressed to private parties. Puchta is of opinion that the enactment of Honorius and Arcadius applied equally to *decreta*, for the reason that during this period matters of litigation did not come under the cognizance of the emperors except on appeal, and that under the new arrangements of Constantine the judgment of affirmance or reversal was embodied in a rescript addressed to the magistrate from whom the appeal had been taken. The rule of Arcadius and Honorius was renewed in 425 by Theodosius and Valentinian, who qualified it, however, to this extent,—that, if it contained any distinct indication that the doctrine it laid down was meant to be of general application, then it was to be received as an edict or *lex generalis*. To this Justinian adhered in so far as rescripts in the old sense of the word were concerned; but he declared that his judgments (*decreta*) should be received everywhere as laws of general application, and so should any interpretation given by him of a *lex generalis*, even though elicited by the petition of a private party. The imperial edicts, adjusted in the consistory, were usually addressed to the people, the senate, or some official, civil, military, or ecclesiastical, according to the nature of their subject-matter.

Christianity the st religio

Establishment of Christianity as the State Religion.[2]—A disposition has sometimes been manifested to credit nascent Christianity with the humaner spirit which began to operate on some of the institutions of the law in the first century of the empire, but which in a previous section we have ascribed to the infiltration into the *jus civile* of doctrines of the *jus naturale*, the product of the philosophy of the Stoa. The teaching of Seneca did quite as much—nay far more—to influence it then than the lessons that were taught in the little assemblies of the early converts. It would be a bold thing to say that, had Christianity never gained its predominance, that spirit of natural right would not have continued to animate the course of legislation, and to evoke, as years progressed, most of those amendments in the law of the family and the law of succession that were amongst the most valuable contributions of the imperial constitutions to the private law. It may well be that that spirit was intensified and rendered more active with the growth of Christian belief; but not until the latter had been publicly sanctioned by Constantine, and by Theodosius declared to be the religion of the state, do we meet with incontestable records of its influence. We find them in enactments in favour of the church and its property, and of its privileges as a legatee; in those conferring or imposing on the bishops a supervision of charities and charitable institutions, and a power of interfering in matters of guardianship; in the recognition of the efficacy of certain acts done in presence of two or three of the clergy and thereafter recorded in the church registers; in the disabilities as to marriage and succession with which heretics and apostates were visited, and in a variety of minor matters. Of greater importance were three features for which it was directly responsible,—the repeal of the caduciary provisions of the Papia-Poppæan law, the penalties imposed upon divorce, and the institution of the *episcopalis audientia*.

The purpose of the caduciary law was to discourage celibacy and encourage fruitful marriages; but legislation in such a spirit could not possibly be maintained when celibacy had come to be inculcated as a virtue, and as the peculiar characteristic of a holy life. The penalties alike of *orbitas* and *coelibatus* were abolished by Constantine in the year 320. The legislation about divorce, from the first of Constantine's enactments on the subject down to those of Justinian, forms a miserable chapter in the history of the law. Not one of the emperors who busied himself with the matter, undoing the work of his predecessors and substituting legislation of his own quite as complicated and futile, thought of interfering with the old principle that divorce ought to be as free as marriage and independent of the sanction or decree of a judicial tribunal. Justinian was the first who, by one of his *Novels*, imposed a condition on parties to a divorce of common accord (*communi consensu*), namely, that they should both enter a convent, otherwise it should be null; but, so distasteful was this to popular feeling, and so little conducive to improvement of the tone of morals within the conventual precincts, that it was repealed by his successor. The legislation of Justinian's predecessors and the bulk of his own were levelled at one-sided repudiations, imposing penalties, personal and patrimonial (1) upon the author of a repudiation on some ground the law did not recognize as sufficient—and the lawful grounds varied from reign to reign—and (2) upon the party whose misconduct gave rise to a repudiation that was justifiable. The bishop's court (*episcopale judicium*, *episcopalis audientia*) had its origin in the practice of the primitive Christians, in accordance with the apostolic precept, of submitting their differences to one or two of their brethren in the faith, usually a presbyter or bishop, who acted as arbiter. On the establishment of Christianity the practice obtained legislative sanction, Constantine giving the bishop's court concurrent jurisdiction with the ordinary civil courts where both parties preferred the former, and by a later enactment going so far as to empower one of the parties to a suit to remove it to the ecclesiastical tribunal against the will of the other. For various reasons, advantage was taken of this power of resorting to the bishop to an extent which seriously interfered with the proper discharge of his spiritual functions, so that Honorius judged it expedient to revert to the original rule, and, at least as regarded laymen, to limit the right of resort to the episcopal judicatory to cases in which both parties consented. It is impossible to say with any approach to exactitude what effect this intervention of the clergy as judges in ordinary civil causes—for they had no criminal jurisdiction—had on the development of the law. But it can hardly have been without some influence in still further promoting the tendency to subordinate act and word to will and *animus*, to deal leniently with technicalities, and to temper the rules of the *jus civile* with equity and considerations of natural right.

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[1] In addition to the authorities in note 2, p. 709, see Savigny, *System d. röm. Rechts*, vol. vii. §§ 315-343.

[2] See Troplong, *De l'influence du christianisme sur le droit civil des Romains*, Paris, 1843 (and subsequently); Merivale, *The Conversion of the Roman Empire* (Boyle Lectures for 1864), London, 1864.

New methods of procedure.

Abandonment of the Formular System of Procedure.[1]—The formular system, with its remit from the prætor to a sworn *judex* who was to try the cause, was of infinite advantage to the law; for the judgment was that of a free and independent citizen, untrammelled by officialism, fresh from some centre of business, and in full sympathy with the parties between whom he had to decide. Such a system was incompatible with the political arrangements of Diocletian and Constantine; and it is with no surprise that we find the former of these sovereigns instructing the provincial governors that in future, unless when prevented by pressure of business (or, according to a later constitution of Julian's, when the matter was of trifling importance), they were themselves to hear the causes brought before them from first to last, as had previously been the practice in the *extraordinariae cognitiones*. The remit in such cases was not, as formerly, to a private citizen, but to what was called a *judex pedaneus*, probably a matriculated member of the local bar; and for a time his delegated authority was embodied in a *formula* after the old fashion. But even this exceptional use of it did not long survive, for an enactment by the two sons of Constantine, conceived in terms the most comprehensive, declared fixed styles to be but traps for the unwary, and forbade their use in any legal act whatever, whether contentious or voluntary. The result was, not only the formal disappearance of the distinction between the proceedings *in jure* and *in judicio*, but the practical disappearance also of the distinctions between actions *in jus* and *in factum*, and between *actiones directae* and *actiones utiles*, the conversion of the interdict into an *actio ex interdicto*, admission of the power of amendment of the pleadings, condemnation in the specific thing claimed, if in existence, instead of its pecuniary equivalent, and execution accordingly by the aid of officers of the law.

Under the new system a process was full from first to last of intervention by officials. The *in jus vocatio* of the XII. Tables—the procedure by which a plaintiff himself brought his adversary into court—was a thing of the past. In the earlier part of the period the proceedings commenced with the *litis denuntiatio* introduced in the time of Marcus Aurelius and remodelled by Constantine; but under Justinian (though probably begun before his reign) the initial step was what was called the *libellus conventionis*. This was a short and precise written statement addressed by the plaintiff to the court, explaining (but without detail) the nature of the action he proposed to raise and the claim he had to prefer; this was accompanied with a formal undertaking to proceed with the cause and follow it out to judgment, under penalty of having to pay double costs to the defendant. If the judge was satisfied of the relevancy of the libel, he pronounced an interlocutor (*interlocutio*) ordaining its service on the respondent; this was done by an officer of the court, who cited him to appear on a day named, usually at a distance of two or three months. The defendant, through the officer, put in an answer (*libellus contradictionis*), at the same time giving security for the proper maintenance of the defence and eventual satisfaction of the judgment. On the day appointed the parties were first heard on any dilatory pleas, such as defect of jurisdiction; if none were offered, or those stated repelled, they then proceeded to expound their respective grounds of action and defence, each finally making oath of his good faith in the matter (*juramentum calumniae*), and their counsel doing the same.

From this point, which marked the *litis contestatio* or joinder of issue, the procedure was much the same as that *in judicio* under the formular system. But in all cases in which the demand was that a particular thing should be given or restored, and the plaintiff desired to have the thing itself rather than damages, execution was specific and effected through officers of the law (*manu militari*). Where, on the other hand, the condemnation was pecuniary, the usual course was for the judge, through his officers, to take possession of such things belonging to the defendant as were thought sufficient to satisfy the judgment (*pignus in causa judicati captum*), and they were eventually sold judicially if the defendant still refused to pay; the *missio in bona* of the classical period was rarely resorted to except in the case of insolvency.

Valentinian's law of citations.

The Valentinianian Law of Citations.[2]—This famous enactment, the production of Theodosius (II.), tutor of the youthful Valentinian III., was issued from Ravenna in the year 426, and was addressed to the Roman senate. It ran thus:—

"We accord our approval to all the writings of Papinian, Paul, Gaius, Ulpian, and Modestine, conceding to Gaius the same authority that is enjoyed by Paul, Ulpian, and the rest, and sanctioning the citation of all his works. We ratify also the jurisprudence (*scientia*) of those earlier writers whose treatises and statements of the law the aforesaid five have imported into their own works,—Scævola, for example, and Sabinus, and Julian, and Marcellus,—and of all others whom they have been in the habit of quoting as authorities (*omniumque quos illi celebrarunt*), provided always, as their antiquity makes them uncertain, that the texts of those earlier jurists are verified by collation of manuscripts. If divergent *dicta* be adduced, that party shall prevail who has the greatest number of authorities on his side; if the number on each side be the same, that one shall prevail which has the support of Papinian; but, whilst he, most excellent of them all, is to be preferred to any other single authority, he must yield to any two. [Paul's and Ulpian's notes on his writings, however, as already enacted, are to be disregarded.] Where opinions are equal, and none entitled to preference, we leave it to the discretion of the judge which he shall adopt."

This constitution has always been regarded as a signal proof of the lamentable condition into which jurisprudence had sunk in the beginning of the 5th century. Constantine, a hundred years earlier, had condemned the notes of Ulpian and Paul upon Papinian. There were no longer any living jurists to lay down the law (*jura condere*); and, if it was to be gathered from the writings of those who were dead, it was well that the use of them should be regulated. The Valentinianian law proceeded so far in the same direction. It made a selection of the jurisconsults of the past whose works alone were to be allowed to be cited,—Papinian, Paul, Ulpian, and Modestine, the four latest patented counsel of any distinction; Gaius, of authority previously only in the schools, but whose writings were now approved universally, notwithstanding that he had never possessed the *jus respondendi*; and all the earlier jurists to whom those five had accorded their imprimatur. But it went yet a step further, for it declared all of them, with the sole exception of Papinian, to be of the same authority, and degraded the function of the judge in most cases, so far at least as a question of law was concerned, to the purely arithmetical task of counting up the names which the industry of the advocates on either side had succeeded in adducing in support of their respective contentions. It is probable that, from the days of Hadrian down to Alexander Severus, when the emperor in his council had to frame a rescript or a decree, its tenor would be decided by the vote of the majority; but that was after argument and counter-argument, which must in many cases have modified first impressions. Taking the votes of dead men, who had not heard each other's reasons for their opinions, was a very different process. It may have been necessary; but it can have been so only because a living jurisprudence had no existence,—because the constructive talent of the earlier empire had entirely disappeared.

II. Antejustinianian Collections of Statute and Jurisprudence.

Gregorian and Hermogenian Codes.

The Gregorian and Hermogenian Codes.—The first of these *Codes* was a collection of imperial rescripts (with a few edicts, &c.) made by one Gregorianus in the very end of the 3d century, and probably at the instigation of Diocletian, though whether in the East or the West critics are unable to decide. The collection of Hermogenianus, also of rescripts, seems to have been a supplement to the earlier one. As the latest enactment in it belongs to the year 365, the probability is that the collection was published about that time. Both *Codes*, although the work of private parties, received statutory recognition from Theodosius and Valentinian in their commission for the preparation of a collection of edictal law; and from the language of Justinian in reference to them there is reason to believe that in the courts they were regarded as authoritative, even to the ignoring of all rescripts not embodied in them.

Theodosian Code.

The Theodosian Code and Post-Theodosian Novels.—Three years after the publication of the "law of citations" Theodosius nominated a commission to initiate the preparation of a body of law which, if his scheme had been carried into execution, would have rendered that of Justinian unnecessary. In a constitution some ten years later he explains the motives that had actuated him,—that he saw with much concern the poverty-stricken condition of jurisprudence and how very few men there were who, notwithstanding the prizes that awaited them, were able to make themselves familiar with the whole range of law; and that he attributed it very much to the multitude of books and the large mass of statutes through which it was dispersed, and which it was next to impossible for any ordinary mortal to master. His scheme was eventually to compile one single code from materials derived alike from the writings of the jurists, the Gregorian and Hermogenian collections of rescripts, and the edictal laws from the time of Constantine downwards. His language leaves no doubt that it was his intention to have this general code very carefully prepared, so as to make it a complete exponent of the law in force, which should take the place of everything, statutory or jurisprudential, of an earlier date. The collection of edicts which he directed his commissioners to prepare, and which was to contain all that had not been displaced by later legislation, even though some of them might be obsolete by disuse, was to be the first step in the execution of his project. For some reason or other nothing followed upon this enactment; and in 435 a new and stronger commission was nominated to collect the edicts, but nothing was said in their instructions about anything ulterior. The work was completed in three years, and published at Constantinople early in the year 438, with the declaration that it should take effect from 1st January following; and a copy was communicated to Valentinian, who ordained that it should come into force in the West from 12th January 439. The arrangement is in sixteen books, subdivided into titles, in which the constitutions are placed in chronological order. They cover the whole field of law, private and public, civil and criminal, fiscal and municipal, military and ecclesiastical. The private law is contained in the first five, which unfortunately are very defective. The imperial edicts subsequent to the publication of the *Code* got the name of *Novels* (*novellae constitutiones*).

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[1] Wieding, *Der Justinianeische Libellprocess*, Vienna, 1865; Bethmann-Hollweg (as on p. 681, note 1), vol. iii. (1866); Muther (crit. Wieding), in the *Krit. Vierteljahrschrift*, vol. ix. (1867), pp. 161 *sq.*, 320 *sq.*; Wieding, in same journal, vol. xii. (1870), p. 228 *sq.*; Bekker (as on p. 681, note 1), vol. ii. chaps. 23, 24; Baron, *Gesch. d. röm. Rechts*, vol. i. p. 448 *sq.*

[2] *Theod. Cod.*, i. 4, 3; Puchta, in the *Rhein. Museum f. Jurisprud.*, vol. v. (1832), p. 141 *sq.*, and *Verm. Schriften*, Leipsic, 1851, p. 284 *sq.*; Sanio, *Rechtshist. Abhandl. u. Studien*, Konigsberg, 1845, p. 1 *sq.*; Karlowa, *Röm. Rechtsgesch.*, vol. i. p. 933 *sq.*

Collatio.

The Collatio, the Vatican Fragments, and the Consultatio.—These were unofficial collections. The first—*Collatio Legum Mosaicarum et Romanarum*, otherwise *Lex Dei quam Dominus praecepit ad Moysen*—is a parallel of divine and human law, the former drawn from the Pentateuch and the latter from the writings of Gaius, Papinian, Paul, Ulpian, and Modestine, rescripts from the Gregorian and Hermogenian *Codes*, and one or two later general enactments. Its date is probably about the year 390, but its authorship is unknown.

Vatican Fragments.

The *Vatican Fragments* were discovered by Mai in a palimpsest in the Vatican in 1820,—evidently part of a book of practice compiled in the Western empire, and of very considerable dimensions. The extant fragments deal with the law of sale, usufruct, dowries, donations, tutories, and processual agency, and are drawn from the writings of Papinian, Ulpian, and Paul, the two collections of rescripts, and a few general enactments, the latest dating from the year 372. The compilation, therefore, may be of about the same antiquity as the *Collatio*.

Consultatio.

The *Consultatio* (*Veteris cujusdam Jurisconsulti Consultatio*) was first published by Cujas in 1577. It seems to be part of a collection of answers upon questions of law submitted for the opinion of counsel, and is of value for the fragments it contains from Paul's *Sentences* and the three *Codes*. It is thought to have been written in France in the end of the 5th or beginning of the 6th century.

Romano-barbarian codes.

The Romano-Barbarian Codes.—This title is usually applied to three collections compiled in western Europe after it had thrown off the sovereignty of Rome.

1. *The Edictum Theodorici* was compiled at the instance of Theodoric, king of the Ostrogoths, in or very soon after the year 500. Its materials were drawn from the writings of the jurists—principally the *Sentences* of Paul—the Gregorian, Hermogenian, and Theodosian *Codes*, and the later *Novels*, all reduced into 154 sections, with no systematic arrangement, but touching upon all branches of the law public and private, especially criminal law and procedure. It was professedly intended to apply to all Theodoric's subjects, both Goths and Romans.

2. The *Lex Romana Visigothorum* or *Breviarium Alaricianum* was a much more ambitious and important collection. It was compiled by a commission appointed by Alaric II., king of the Western Goths, with approval of the bishops and nobles, and published at Aire in Gascony in the year 506. The compilers selected their material partly from *leges* (statute law) and partly from *jus* (jurisprudential law), taking what they considered appropriate, without altering the text except in the way of excision of passages that were obsolete or purely historical. For the *leges* they utilized some 400 of the 3400 enactments (according to Haenel's estimate) of the Theodosian *Code*, and about 30 of the known 104 post-Theodosian *Novels*; for the *jus*,—the *Institutes* of Gaius, Paul's *Sentences*, the Gregorian and Hermogenian rescripts, and the first book of Papinian's *Responses* (a single sentence). All of these, except Gaius, were accompanied with an "interpretation," which resembles the *interpretatio* of the XII. Tables in that it is often not so much explanatory of the text as qualificative or corrective. Gaius is contained in an epitome in two books, believed to have been only a reproduction of an abridgment already current, and dating from about the beginning of the 5th century. The *Breviary* exercised very considerable influence in Europe generally; and there is no question that, until the rise of the Bologna school in the 12th century, it was from it, rather than from the books of Justinian, that western Europe acquired its scanty knowledge of Roman law

3. The *Lex Romana Burgundionum*, formerly, owing to a mistake of a transcriber, called *Papianus*, is the collection which King Gundobald, when publishing his code of native law (*Lex Burgundionum* or *Gundobada*), had promised should be prepared for the use of his Roman subjects. It deals with private law, criminal law, and judicial procedure, distributed through 47 titles, and is arranged very much after the order of the *Gundobada*, from which it has a few extracts. Its statutory Roman sources are the same as those of the *Breviary*; the jurisprudential authorities referred to are Gaius and Paul, the latter in his *Sentences*, and the former (only three times altogether) in some other book than his *Institutes*

III. The Justinianian Legislation

Justinian's codification

Justinian's Collections and his own Legislation.—It is unnecessary to revert to the history of Justinian outside his legislative achievements, or even to speak of his collections in detail, for both have already been described in the article JUSTINIAN I. (vol. xiii. p. 792 *sq.*). Ambitious to carry out a reform more complete even than that which Theodosius had planned but failed to execute, he took the first step towards it little more than six months after the death of his uncle Justin, in the appointment of a commission to prepare a collection of statute law (*leges*), among which he included the rescripts of the Gregorian and Hermogenian *Codes*. It was published in April 529; and in rapid succession there followed his *Fifty Decisions* (529-532), his *Institutes* (21st November 533), his *Digest* of excerpts from the writings of the jurists (16th December 533), and the revised edition of his *Code*, in which he incorporated his own legislation down to date (16th November 534). From that time down to his death in 565 there followed a series of *Novels* (*novellae constitutiones*), mostly in Greek, which were never officially collected, and of which probably many have been lost.

His own enactments

Taking his enactments in the *Code* and his *Novels* together we have of Justinian's own legislation about 400 constitutions. Diocletian's contributions to the *Code* are about three times as numerous; but most of them professed to be nothing more than short declaratory statements of pre-existing law, whereas Justinian's, apart from his *Fifty Decisions*, were all reformatory enactments, many of them as long as an average Act of Parliament, and dealing with diverse matters under the same rubric. They cover the whole field of law, public and private, civil and criminal, secular and ecclesiastical. It cannot be said that they afford pleasant reading: they are so disfigured by redundancy of language, involved periods, and nauseous self-glorification. But it cannot be denied that many of those which deal with the private law embody reforms of the highest importance and of most salutary tendency. He sometimes loved to pose as the champion of the simplicity and evenhandedness of the early law, at others to denounce it for its subtleties; sometimes he allowed himself to be influenced by his own extreme asceticism, and now and again we detect traces of subservience to the imperious will of his consort; but in the main his legislation was dictated by what he was pleased to call *humanitas* so far as the law of persons was concerned, and by *naturalis ratio* and public utility so far as concerned that of things. The result was the eradication of almost every trace of the old *jus Quiritium*, and the substitution for it, under the name of *jus Romanum*, of that cosmopolitan body of law which has contributed so largely to almost every modern system.

Law of family relatio

Amendments on the Law of the Family.—With the Christian emperors the last traces disappeared of the old conception of the *familia* as an aggregate of persons and estate subject absolutely to the power and dominion of its head. *Manus*, the power in a husband over his wife and her belongings, was a thing of the past; both stood now on a footing of equality before the law; perhaps it might be more accurate to say, at least with reference to the Justinianian legislation, that the wife was the more privileged of the two in respect both of the protection and the indulgence the law accorded her. With *manus* the old confarreation and coemption had ceased, marriage needing nothing more than simple interchange of consent, except as between persons of rank or when the intention was to legitimate previous issue; in the latter case a written marriage settlement was required, and in the former either such a settlement or a marriage in church before the bishop and at least three clerical witnesses, who granted and signed a certificate of the completed union. The legislation of the Christian emperors on the subject of divorce, largely contributed to by Justinian in his *Novels*, has already been referred to. In regard to dowries many new provisions were introduced, principally for curtailing the husband's power of dealing with the dowry while the marriage lasted, enlarging the right of the wife and her heirs in respect of it, and simplifying the means of recovering it from the husband or his heirs when the marriage was dissolved. Between the time of Constantine and that of Theodosius and Valentinian it had become the practice for a man to make a settlement on his intended wife of a provision which was to remain his property (but without the power of alienation) during the marriage, but to pass to her on his predecease; it got the name of *donatio ante nuptias* or sometimes, as being a sort of return for the *dos*, *antipherna*. The earliest legislation about it was by the last-mentioned emperors; Zeno and Justin followed suit; and Justinian, in *Code* and *Novels*, published five or six enactments for its regulation. The general result was that, wherever a *dos* was given or promised on the part of the wife, there a *donatio* was to be constituted on the part of the husband; that, if one was increased during the marriage, a corresponding increase was to be made to the other; that it might be constituted after the marriage without infringing the rule prohibiting donations between husband and wife, which caused Justinian to change its name to *donatio propter nuptias*; that the wife might demand its transfer to her (as she could that of the *dos*) on her husband's insolvency, but under obligation to apply its income to the maintenance of the family; and that on the dissolution of the marriage by her husband's death or by a divorce for which he was in fault she had ample remedies for reducing it into possession.

The change in the complexion of the relations between husband and wife under the Christian emperors, however, was insignificant when compared with that which had overtaken the relation between parent and child. Justinian in his *Institutes* reproduces the boast of Gaius that nowhere else had a father such power over his children as was exercised by a Roman *paterfamilias*. True it is that the *patria potestas* in name still held a prominent place in the Justinianian collections; but it had been shorn of most of the prerogatives that had characterized it in the republic. To expose a new-born child was forbidden under penalties. To take the life of a grown-up one—unless it was a daughter slain with her paramour in the act of adultery—was murder; for the domestic tribunal, with the judicial power of life and death in the *paterfamilias* as its head, had long disappeared. For the same reason a parent could no longer sell his child as a slave, at least he could do so only when the child was an infant and he in such extreme poverty as to be unable to support it. Even the right to make a noxal surrender of his son to a party who had suffered from the latter's delict had silently become obsolete; so greatly had altered sentiment, in sympathy with legislation, curtailed the power of the *paterfamilias* over those in his *potestas*. All that remained of it in the latest Justinianian law was no more than is sanctioned in most modern systems as natural emanations of the paternal relationship,—the rights of moderate chastisement for offence, of testamentary nomination of guardians, of pupilary substitution (enlarged by Justinian), and of withholding consent from the marriage of a child, but subject to magisterial intervention if used unreasonably.

How the right of the *paterfamilias* over the earnings and acquisitions of his children was modified by the recognition of the *peculium castrense* has been shown in a previous page (p. 706). But the modification was carried to such an extent by the Christian emperors as finally to negative the father's ownership altogether, except as regarded acquisitions that were the outcome of funds advanced by him to his child for his separate use (*peculium profecticium*). Of some of the child's acquisitions his father had, down to the time of Justinian, the life interest and right of administration; but by his legislation even these might be excluded at the pleasure of the parties from whom the acquisitions had been derived. By the classical law the father's radical right in his son's *peculium castrense* revived on the latter's death; for if he died intestate the former appropriated it not as his son's heir, but as an owner whose powers as such had been merely temporarily suspended. But by one of the chapters in the famous *Novel* on the law of intestate succession even this prerogative of the *paterfamilias* was abolished, and all a child's belongings except his *peculium profecticium* were recognized as his own in death as well as in life, so that if any of them should pass to his parent on his intestacy it should only be by title of inheritance and in the absence of descendants.

In every other branch of the law of the family the same reforming spirit was manifested. Adoption was no longer followed in all cases by a change of family for the adoptee, but only when the adopter was in fact one of his parents, such as a paternal or maternal grandfather,—when there was a natural *potestas* to underlie and justify the civil one. The modes of legitimation of children born out of wedlock, especially that by subsequent marriage of the parents, first introduced by Constantine, were regulated, and the extent of the rights of the legitimated issue carefully defined. Emancipation was simplified, and the old procedure by sales and manumissions, which degraded the child too much to the level of a slave, dispensed with. Tutory at law was opened to the pupil's nearest kinsman, whether on the father's side or the mother's; and the mother herself, or the child's grandmother, might be allowed, under certain conditions, to act as its guardian. Slavery was often converted into the milder condition of colonate; but, even where this did not happen, the rights of owners were not allowed to be abused; for slaves were permitted to claim the protection of the magistrate, and cruelty by a master might result in his being deprived of his human property. Kinship that had arisen between two persons when one or both were slaves (*servilis cognatio*) was recognized as creative not only of disabilities but of rights. The modes of manumission were multiplied, and the restrictions of the legislation of the early empire abolished; and a freedman invariably became a citizen, Junian Latinity and dediticiancy being no longer recognized.

Law of property.

Amendments on the Law of Property and Obligation.—In the law of property the principal changes of the Christian empire were the simplification of the forms of conveyance, the extension of the colonate, the introduction and regulation of emphyteusis, and the remodelling of the law of prescription. Simplification of the forms of conveyance was necessary only in the case of *res mancipi*, for *res nec mancipi* had always passed by delivery. From the Theodosian *Code* it is apparent that movable *res mancipi* usually passed in the same way from very early in the period, and that for the mancipation of lands and houses (for *in jure cessio* had disappeared with the formular system) a *solemnis traditio*, a written instrument and delivery following thereon, and both before witnesses, was gradually substituted. Of this there is no trace in the Justinianian *Code*. For Justinian abolished all remains of the distinction between *res mancipi* and *res nec mancipi*, between full ownership, bonitarian ownership, and *nudum jus Quiritium*, placing movables and immovables on a footing of perfect equality so far as their direct conveyance was concerned. But, as regarded the possession required of an alienee to cure any defect in the conveyance, he made a marked difference between them. For, amalgamating the old positive usucapion of the *jus civile* with the negative "prolonged possession" (*longi temporis possessio*) that had been introduced in the provinces (probably by the provincial edict), he declared that possession on a sufficient title and in good faith should in future make the possessor legal owner of the thing possessed by him, provided that the possession of himself and his author had endured uninterruptedly for three years in the case of a movable, and in the case of an immovable for ten years if the party against whom he possessed was resident in the same province, or for twenty if he resided in another one.

Emphyteusis.

The same causes that led to the colonate induced the introduction of emphyteusis,[1]—an institution which had already existed in some of the Eastern provinces when independent, and which came to be utilized first by the emperors, then by the church, and afterwards by municipalities and private landowners, for bringing into cultivation the large tracts of provincial land belonging to them which were unproductive and unprofitable through want of supervision on the spot. Its nature and conditions were carefully defined by Zeno and amended by Justinian. The *emphyteuta*, as the grantee of the right was called, did not become owner; the granter still remained *dominus*, all that the grantee enjoyed being a *jus in re aliena*, but *de facto* so extensive as hardly to be distinguishable from ownership. It conferred upon him and his heirs a perpetual right in the lands included in the grant, in consideration of a fixed annual payment to the lord (*canon*) and due observance of conventional and statutory conditions; but he was not entitled to abandon it, nor able to free himself of the obligations he had undertaken, without the lord's consent. The latter was entitled to hold the grant forfeited if the *canon* fell into arrear for three years (in church lands for two), or if the land-tax was in arrear for the same period, or if the *emphyteuta* allowed the lands to deteriorate, or if he attempted to alienate them (*alienare meliorationes*, as the text says) without observance of statutory requirements. These were that he should intimate an intended alienation and the name of the intended alienee to the lord, so that the latter, before giving his assent, might satisfy himself that he would not be a loser by the transaction; and, if the alienation was to be by sale, he had to state the price fixed, so as to give the lord the opportunity of exercising his statutory right of pre-emption at the same figure. If those requirements were complied with, and the lord had no reasonable objection to the proposed alienee, he was not entitled to resist the alienation, provided a payment (*laudemium*) was made to him of two per cent. of the sale-price in consideration of his enforced consent.

The changes in the law of obligation were more superficial than those in the law of property, and consisted principally in the simplification of formalities and in some cases in their entire abolition. To describe them, however, would carry us into details which would here be out of place.

Testamentary succession.

Amendments on the Law of Succession.—The changes made in the law of succession by Justinian's Christian predecessors, especially Theodosius II. and Anastasius, were far from insignificant; but his own were in some directions positively revolutionary. The testament *per aes et libram* of the *jus civile* probably never obtained any firm footing in the East; for it was only by Caracalla's constitution conferring citizenship on all his free subjects that provincials generally acquired *testamenti factio*; and by that time a testament bearing externally the requisite number of seals had been recognized as sufficient for a grant of *bonorum possessio*, unchallengeable by the heirs-at-law, even though they were able to prove that neither *familiae mancipatio* nor *testamenti nuncupatio* had intervened. Hence the universal adoption of what Justinian calls the prætorian testament, which, however, underwent considerable reform at the hands of the emperors, notably in the requirement (in the ordinary case) of signature by the testator and subscription by the witnesses. There was much hesitating legislation on the subject before the law was finally established as it stands in the Justinianian books; and even at the last we find it encumbered with many exceptions and reservations in favour of testaments that were merely deeds of division by a parent among his children, testaments made in time of plague, testaments recorded in books of court, testaments entrusted to the safe-keeping of the emperor, and so forth. Codicils had become deeds of such importance as, in the absence of a testament, to be dealt with as imposing a trust on the heir-at-law; it was therefore thought expedient to deny effect to them unless attested by at least five witnesses. And a most important step in advance was taken by Justinian in the recognition of the validity of an oral *mortis causa* trust; for he declared that, if it should be represented to a competent judge that a person on his deathbed had by word of mouth directed his heir-at-law to give something to the complainant, the heir should be required either on his oath to deny the averment or to give or pay what was claimed.

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[1] See Elia Lattes, *Studi storici sopra il Contratto d'Enfiteusi nelle sue relazioni col Colonato*, Turin, 1868, chaps. 1 and 3; and François, *De l'Emphytéose*. Paris, 1883.

The 118th novel.

In the matter of intestacy there was long a halting between two opinions,—a desire still further to amend the law in the direction taken by the prætors and by the legislature in the Tertullian and Orphitian senatusconsults, and yet a hesitancy about breaking altogether from the time-hallowed principle of agnation. Justinian in his *Code* went far beyond his predecessors, making a mother's right of succession independent altogether of the *jus liberorum*; extending that of a daughter or sister to her descendants, without any deduction in favour of agnates thus excluded; admitting emancipated collaterals and their descendants as freely as if there had been no *capitis deminutio minima*; applying to agnates the same *successio graduum* that the prætors had allowed to cognates, and so forth. But it was by his *Novels*, especially the 118th and 127th, that he revolutionized the system, by eradicating agnation altogether and settling the canons of descent—which were the same for real and personal estate—solely on the basis of blood kinship, whether through males or females, and whether crossed or not by a *capitis deminutio*. First came descendants of the intestate, male and female alike, taking *per capita* if all were of the same degree, *per stirpes* if of different degrees. Failing descendants, the succession passed to the nearest ascendants, and, concurrently with them, to brothers and sisters of full blood and (by *Nov.* 127) the children of any that had predeceased. Where there were ascendants alone, one-half of the succession went to the paternal line and one-half to the maternal; where there were ascendants and brothers and sisters, or only brothers and sisters, the division was made equally *per capita*; when children of a deceased brother or sister participated it was *per stirpes*. In the third class came brothers and sisters of half-blood or by adoption and their children; the division here was on the same principle as in the second class. The fourth class included all other collaterals according to propinquity, and without distinction between full and half blood; the primary division was *per stirpes*, but all of the same degree took *per capita*.

The 115th novel.

A reform effected by Justinian by his 115th *Novel* ought not to pass unnoticed; for it rendered superfluous all the old rules about disherison and præterition of a testator's children, practically abolished *bonorum possessio contra tabulas*, and established the principle that a child had, as a general rule, an inherent and indefeasible right to be one of his father's heirs in a certain share at all events of his succession, and that a parent had the same right in the succession of his child if the latter had died without issue. The enactment enumerated certain grounds upon which alone it should be lawful for a parent to disinherit his child or a child his parent, declaring that in every case of disherison the reason of it should be stated in the testament, but giving leave to the person disinherited to dispute and disprove the facts when the testament was opened. If a child who had not been disinherited—and one improperly disinherited was eventually in the same position—was not instituted to at least his "legitim" (*legitima* or *debita portio*), he was entitled to have the testament declared null in so far as the institutions in it were concerned, thus opening the succession to himself and the other heirs-at-law, but without affecting the minor provisions, such as bequests, nominations of tutors, &c. The legitim, which under the practice of the centumviral court had been one-fourth of the share to which the child would have been entitled *ab intestato*, was raised by Justinian to one-third at least, and one-half where there were five or more entitled to participate. He did not allow challenge of the will to be excluded, as in the earlier *querela inofficiosi testamenti*, because the testator had made advances to his child during his life or left him a legacy which quantitatively equalled the legitim; his idea was that a child was entitled to recognition by his parent *as one of his heirs*, and that to deny him that position was to put upon him an indignity which the law would not permit.

Other changes.

Amongst the other beneficial changes effected by Justinian may be mentioned the assimilation so far as possible of *hereditas* and *bonorum possessio*, so that the latter might be taken like the former without formal petition for a grant of it; the equiparation of legacies and singular trust-gifts, and the application of some of their rules to *mortis causa* donations; the extension of the rule of "transmission" to every heir without exception, so that, if he died within the time allowed him for considering whether or not he would accept (*tempus deliberandi*), his power of acceptance or declinature passed to *his* heirs, to be exercised by them within what remained of the period; the introduction of entry under inventory (*cum beneficio inventarii*), which limited the heir's responsibilities and rendered unnecessary the nine or twelve months of deliberation; and the application of the principle of collation to descendants generally, so that they were bound to throw into the mass of the succession before its partition every advance they had received from their parent in anticipation of their shares.

IV. THE JUSTINIANIAN LAW-BOOKS.

Justinianian law-books.

Their Use in the Courts and in the Schools.—Although the *Institutes* were primarily intended to serve as a text-book in the schools, it was expressly declared that they and the *Digest* and the *Code* should be regarded as just so many parts of one great piece of legislation and all of equal authority, and that, although *Digest* and *Code* were but collections of legislation and doctrine that had proceeded originally from many different hands, yet they were to be treated with the same respect as if they had been the work of Justinian himself. But, while everything within them was to be held as law, nothing outside them was to be looked at, not even the volumes from which they had been collected; and so far did this go that, after the publication of the revised *Code*, neither the first edition of it nor the *Fifty Decisions* were allowed to be referred to. If a case arose for which no precedent was to be found, the emperor was to be resorted to for its decision, as being outside his collections the only fountain of the law. To preserve the purity of the texts Justinian forbade the use of conventional abbreviations (*sigla*) in making transcripts, visiting an offender with the penalties of falsification (*crimen falsi*). Literal translations into Greek were authorized, and indeed were very necessary for many of his subjects; so were *παράτιτλα* or summaries of the contents of individual titles (although the jurists read the word less strictly). Commentaries and general summaries were forbidden under heavy penalties, as an interference with the imperial prerogative of interpretation; but the prohibition does not seem to have been enforced, as we have accounts and remains not only of translations but of commentaries, notes, abridgments, excerpts, and general summaries even in Justinian's lifetime. These, it is true, were mostly by professors (*antecessores*), and their productions may have been intended primarily for educational purposes; but there can be little doubt that they soon passed into the hands of the practitioners and were used without scruple in the courts. A Greek *Paraphrase of the Institutes*, usually attributed to Theophilus, a professor in Constantinople and one of Justinian's commissioners, is commonly supposed to have been used by him in his prelections. It embodies much more historical matter than is to be found in the *Institutes*; but its value has been very differently rated by different critics. Its latest editor, Ferrini, who puts a high estimate on it, is of opinion that the original of it was a paraphrase of Gaius, which was remodelled after the plan of Justinian's *Institutes*, and had their new matter incorporated in order to adapt it to the altered conditions; but he doubts if there be any sufficient authority for ascribing it to Theophilus. If he be right in assuming that it was really a redaction of Gaius, the historical explanations will be received with all the more confidence.

Fate of the Justinianian Books in the East.—The literary work indicated in the preceding section was continued throughout the 6th century. But the next three were comparatively barren, the only thing worth noting being the *Ἐκλογὴ τῶν νόμων ἐν συντόμῳ γενομένη* of Leo the Isaurian in 740, professedly an abstract of the whole Justinianian law amended and rearranged; but it was repealed by Basil the Macedonian on account of its imperfections and its audacious departure from the law it pretended to summarize. The last-named emperor, with his son Leo the Philosopher, set themselves in the end of the 9th and beginning of the 10th centuries to the production of an authoritative Greek version of the whole of the Justinianian collections and legislation, omitting what had become obsolete, excising redundancies, and introducing such of the post-Justinianian legislation as merited preservation. The result was the *Basilica* (Τὰ Βασιλικά, *i.e.*, *νόμιμα*), which was completed in the reign of Leo, though probably issued in a preparatory stage in the reign of Basil, who also published a sort of institutional work, the *Πρόχειρον*, which was revised and republished by Leo under the name of Ἐπαναγωγὴ τοῦ νόμου. The *Basilica* consists of sixty books, subdivided into titles, following generally the plan of the Justinianian *Code*, but with the whole law on any particular subject arranged consecutively, whether from *Digest*, *Code*, or *Novels* (see Basilica, vol. iii. p. 419). Leo's son, Constantinus Porphyrogenitus, made an addition to it in the shape of an official commentary collected from the writings of the 6th-century jurists, the so-called Παράγραφαι τῶν παλαιῶν, which is now spoken of as the *scholia* to the *Basilica*, and has done good exegetical service for modern civilians. The *Basilica* retained its statutory authority until the fall of the Byzantine empire in 1453. But long before that it had practically been abandoned; and not a single complete copy of it exists. Its place was taken by epitomes and compendia, the last being the Ἑξάβιβλος of Constantinus Harmenopulus of 1345, "a miserable epitome of the epitomes of epitomes," as Bruns calls it, which survived the vicissitudes of the centuries, and finally received statutory authority in the modern kingdom of Greece in the year 1835, in place of the *Basilica*, which had been sanctioned thirteen years before, in 1822.

hei. ate in he West.

Their Fate in the West.—Before the rise of the Bologna school it was to a much greater extent from the Romano-barbarian codes than from the books of Justinian that central and western Europe derived their acquaintance with Roman law. Theodoric's *Edict* can have had little influence after Justinian's recovery of Italy, and the Romano-Burgundian law was no doubt gradually displaced by the *Breviary* (*Lex Rom. Visigothorum*) after Burgundy had fallen into the hands of the Franks; but the *Breviary* itself found its way in all directions in France and Germany, penetrating even into England, to a great extent through the agency of the church. There must, however, have been other repertories of Roman law in circulation, as witness a testament made in Paris in the end of the 7th century, preserved by Mabillon, in which the testator uses the old formula of the *jus civile*,—"ita do, ita lego, ita testor, ita vos Quirites testimonium mihi perhibetote,"—words that are not to be found either in the Visigothic or the Justinianian collections.

In his pragmatic sanction of the year 554 Justinian anew accorded his imperial sanction to the *jura* and *leges*, *i.e.*, the *Digest* and *Code*, which he says he had long before transmitted to Italy, at the same time declaring that his *Novels* were to be of the same authority there as in the East. Two years after this came Julian's Latin epitome of them, not improbably prepared by command of the emperor himself. That they all came at once to some extent into use is beyond question; for there is preserved in Marini's collection the testament of one Mannanes, executed at Ravenna in the reign of Justinian's immediate successor Justin II., in which the requirements of both *Code* and *Novels* are scrupulously observed. Of other monuments of the same period that prove the currency of the Justinianian law in Italy several are referred to by Savigny in the second volume of his *History of the Roman Law in the Middle Ages*, among which may be mentioned the Turin gloss of the *Institutes*, which Fitting ascribes to about the year 545, and two little pieces known as the *Dictatum de consiliariis* and the *Collectio de tutoribus*, which form an appendix to some manuscripts of Julian's epitome of the *Novels*, and may possibly have been from his pen. The invasion of the Lombards, the disturbance they caused in Italy for two centuries, and the barrier they formed between it and the rest of Europe militated against the spread of the Justinianian law northwards; but it was taught without much interruption in Ravenna, the seat of the exarchs, to which (but this is doubtful) the school (*studium*) of Rome, revived by Justinian, is said to have been transferred. By the Lombards, as their savagery toned down, the Roman law was so far recognized that they allowed it to be applied to the Romans living within their territory; and it is said to have even been taught in Pavia, which they had established as their capital. Their overthrow by Charlemagne opened an outlet for it beyond Italy, and in the 9th century there is evidence that the Justinianian books or some of them were already circulating in the hands of the clergy in various parts of Europe. Yet there are very few remains of any literature indicating much acquaintance with them. Almost the only pieces worth mentioning are the so-called *Summa Perusina*, an abridgment of the first eight books of the *Code*, ascribed to the 9th century; the *Quaestiones ac monita*, to the Lombardic laws, drawn mostly from the *Institutes*, but with a few texts from the *Digest*, the *Code*, and Julian's *Epitome*, and supposed to have been written early in the 11th century; the *Brachylogus*, an abbreviated revision of Justinian's *Institutes*, with references to his other books, which is thought to have been written in France (Orleans?), according to Fitting between 999 and 1002, but according to other authorities nearer the end of the 11th century; and the *Petri exceptiones legum Romanarum*, a systematic exposition of the law in four books, written in the south of France early in the latter half of the 11th century, and mostly compiled from Justinianian sources.

The glossarists.

It was in the very end of the 11th century or the beginning of the 12th that at Bologna, and under one Irnerius, who appears not to have been a professional jurist but originally a teacher of letters, the study of Roman law began somewhat suddenly to attract students from all parts of the world. Through the action of the clergy the only parts of the Justinianian legislation that had hitherto been in ordinary use were the *Institutes*, the *Code*, and the *Novels*. The first, from its elementary character, had naturally commended itself; the *Code*, with its opening title on the Trinity and its second on Holy Church, and the *Novels*, with their abundant legislation on matters ecclesiastical, were in many respects charters of the church's privileges, and were prized accordingly; but the *Digest*, as being the work of pagan jurists, had been practically ignored. The *Code* and the *Novels*, however, with their modicum of wheat concealed in such a quantity of chaff, offered little attraction to laymen of intelligence; and, when a copy of a portion of the *Digest*, with its infinitely purer diction and its clear and incisive reasoning, came into the hands of Irnerius, it must have been for him as a new revelation. The text of it seems to have reached him by instalments; at least this is the only reasonable explanation of its division by the glossarists (as Irnerius and his successors of the Bologna school were called, the name being derived from the *glossae*, notes marginal and interlinear, with which they furnished it) into three parts, *Digestum Vetus* (books 1 to 24, tit. 2), *Infortiatum*, and *Digestum Novum* (book 39 to the end), the general idea being that, after first the old and then the new *Digest* had come to light, the connecting link unexpectedly turned up, and got in consequence the somewhat singular name by which it continued to be known for centuries. The whole collection was by the glossarists distributed in five volumes, the fourth containing the first nine books of the *Code*, and the fifth, called *Volumen parvum legum*, containing the *Institutes*, a Latin translation of 134 of the *Novels* known as the *Authenticum*, and the last three books of the *Code* which had been recovered subsequently to the others. With these five volumes, the teaching that accompanied them, and the *glossae*, *summae*, *casus*, *brocarda*, &c., with which they were enriched from the rise of the school with Irnerius till its close with Franciscus Accursius in 1260, Roman jurisprudence began a new career, which it would carry us beyond the limits of this article to attempt to trace even in meagrest outline.[1] (J. M*.)

ROMAN LITERATURE

It would be impossible within the limits allowed for this article to attempt, even in outline, any history of the course of Roman literature which would include an account, not only of the extant works which it contains and of their authors, but also of the principal works and writers known to us from ancient testimony. The mere enumeration of these in chronological order, without some attempt to ascertain their individual features and to estimate their relation to the intellectual movement of their time, could be of no interest or use to any one. All that is possible to accomplish here is to pass in rapid review the first four of the five periods into which Roman literature may most conveniently be divided, to ascertain the chief literary motives and characteristics of each, and to connect these with the works and writers in whom they are most conspicuously displayed. It will be unnecessary to give any biographical account even of the greatest authors or to criticize their works in detail, as these have been sufficiently treated in separate articles of the present work. The object of the following survey will be to obtain some appreciation of the relation in which the individual authors noticed stand to the whole subject, *i.e.*, to the collective literary expression, so far as they found an expression, of the action, the ideas, the character, the various feelings, passions, and moods, of ancient Rome and of the races which it absorbed, so long as that literature has a distinct unity and individuality.

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[1] The great authority on the matter of this section is still Savigny's *Gesch. d. röm. Rechts im Mittelalter*, 7 vols., 2d. ed., Heidelberg, 1834-51; but much additional light has been thrown on it by Merkel, Stintzing, Blume, Fitting, Bruns, Mommsen, Krüger, Ficker, Rivier, Conrat (Cohn), and others, whose writings, mostly in periodicals, are too numerous to mention. On the early traces of Roman law in England, see Amos, *History and Principles of the Civil Law of Rome*, London, 1883, p. 443 *sq.*; Caillemer, *Le Droit Civil dans les provinces Anglo-Normandes*, Caen, 1883; Scrutton, *The Influence of the Roman Law on that of England*, Cambridge, 1885

The actual beginning of Roman artistic literature can be assigned to a definite date, the year 240 B.C., when Livius Andronicus produced on a Roman stage a drama with a regular plot, instead of the unconnected dramatic dialogues (*saturæ*) by which the holidays of the people had previously been enlivened. Yet the germs of an indigenous literature had existed independently at an earlier period in Rome and in the country districts of Italy. Although these cannot be said to have exercised any marked influence on the subsequent development of literature, they have an importance as indicating natural wants in the Italian race, which were ultimately satisfied by regular literary forms. The art of writing was first employed in the service of the state and of religion for the preservation of the sacred hymns, books of ritual, treaties with other states, the laws of the XII. Tables, &c. An approach to literature was made in the *Annales Maximi*, although it cannot be supposed that the pontifex maximus in drawing up the dry records of the prodigies and events of the year had any thought of gratifying intellectual curiosity or imparting intellectual pleasure. But in the satisfaction they afforded to the commemorative and patriotic instincts they anticipated an office afterwards performed by the national epics and the works of regular historians. A still nearer approach to literature was probably made in oratory, as we learn from Cicero that in the generation before the first regular dramatic representation a speech delivered by Appius Claudius Cæcus was given to the world. Appius was also the author of a poem of an ethical and didactic character, which Cicero tells us (*Tusc.*, v. 2, 4) was praised by Panætius. No other name associated with any form of literature belonging to the pre-literary age has been preserved by tradition, and it is to be borne in mind that Appius lived on till the wars with Pyrrhus, when the first active collision between Rome and Greece took place. This premature stirring of literary ambition is like the occasional anticipation by individual thinkers of some important discovery or some great intellectual movement before the world around them is ready to receive it.

But it was rather in extemporaneous effusions than in written compositions that some germs of a native poetry might have been detected. The most genuine indication of that impulse which ultimately finds its realization in artistic literature appears in the use of a metre of pure native origin, the Saturnian, which by its rapid and lively movement gives expression to the vivacity and quick apprehension of the Italian race. This metre appears to have been first used in ritual hymns, which seem to have assumed definite shapes out of the exclamations of a primitive priesthood engaged in a rude ceremonial dance. It was also employed by a class of bards or itinerant soothsayers known by the name of "vates." It was used also in the "Fescennine verses," which gave expression to the coarse gaiety of the people and to their strong tendency to personal raillery and satiric comment. This tendency, which under the stern censorship of the patrician rulers of the early republic was repressed by stringent laws, found ultimately its legitimate outlet in Roman satire. The metre was also employed in commemorative poems, accompanied with music, which were sung at funeral banquets in celebration of the exploits and virtues of distinguished men. These had their origin in the same impulse which ultimately found its full gratification in Roman history, Roman epic poetry, and that form of Roman oratory known as "laudationes," and in some of the *Odes* of Horace. The latest and probably the most important of these rude and inchoate forms was that of dramatic *saturæ* (medleys), put together without any regular plot, and consisting apparently of contests of wit and satiric invective, and perhaps of comments on current events, accompanied with music ("saturas impletas modis," Liv., vii. 2). These have a real bearing on the subsequent development of Roman literature. They prepared the mind of the people for the reception of regular comedy. They may have contributed to the formation of the style of comedy which appears at the very outset much more mature than that of serious poetry, tragic or epic. They gave the name and some of the characteristics to that special literary product of the Roman soil, the "satura," addressed to readers, not to spectators, which ultimately was developed into pure poetic satire in Lucilius, Horace, Persius, and Juvenal, into the prose and verse miscellany of Varro, and into something approaching the prose novel in Petronius.

First Period: from 240 *to about* 80 B.C.

The historical event which brought about the greatest change in the intellectual condition of the Romans, and thereby exercised a decisive influence on the whole course of human culture, was the capture of Tarentum in 272. After the capture many Greek slaves were brought to Rome, and among them the young Livius Andronicus, who was employed in teaching Greek in the family of his master, a member of the Livian gens. From that time to learn Greek became a regular part of the education of a Roman noble. The capture of Tarentum was followed by the complete Romanizing of all Southern Italy. Soon after came the First Punic War, the principal scene of which was Sicily, where, from common hostility to the Carthaginian, Greek and Roman were brought into friendly relations, and the Roman armies must have become familiar with the spectacles and performances of the Greek theatre. In the year following the conclusion of the war (240), after the armies had returned and the people were at leisure to enjoy the fruits of victory ("et post Punica bella quietus," Hor., *Ep.*, ii. 162), Livius Andronicus "took the bold step" ("ausus est primus argumento fabulam serere," Liv., vii. 2) of substituting at one of the public festivals a regular drama translated or adapted from the Greek for the musical medleys (*saturæ*) hitherto in use. From this time dramatic performances became a regular accompaniment of the public games, and came more and more to encroach on the older kinds of amusement, such as the chariot races. The dramatic work of Livius was, however, merely educative; it can hardly be called in any sense of the word literary. The same may be said of his later work, which was still used as a schoolbook in the days of Horace,—the translation of the *Odyssey*; and probably the religious hymn which he was called upon to compose in the latter part of the Second Punic War had no higher literary pretension. He was, however, the first to make the old name of poet a title of honour instead of reproach; and by familiarizing the Romans with the forms of the Greek drama and the Greek epic he determined the main lines which Roman literature followed for more than a century afterwards.

Livius Andronicus.

His immediate successor, Cn. Nævius, was not, like Livius, a Greek, but either a Roman citizen or one who enjoyed the limited citizenship of a Latin, and who had served in the Roman army in the First Punic War. His first appearance as a dramatic author was in 235. He adapted both tragedies and comedies from the Greek, but the bent of his genius, the tastes of his audience, and the condition of the language, developed through the active intercourse and business of life, gave a greater impulse to comedy than to tragedy. Nævius tried to use the theatre, as it had been used by the writers of the Old Comedy of Athens, for the purposes of political warfare, and thus seems to have anticipated by a century the part played by Lucilius. Satiric and censorious criticism rather than a humorous sense of the comedy of human life and character was apparently the chief motive of his representation. But the state censorship, which in a more revolutionary time tolerated the free criticism of public men in works addressed to a select class of readers, arrested at the outset all such criticism addressed to the mass of the people assembled in the theatre; and Nævius, after being imprisoned, had to retire in his old age into banishment. He was not only the first in point of time, and according to ancient testimony one of the first in point of merit, among the comic poets of Rome, and in spirit, though not in form, the earliest of the line of Roman satirists, but he was also the oldest of the national poets. Besides celebrating the success of Marcellus in 225 over the Gauls in a play called *Clastidium*, he gave the first specimen of the "fabula prætexta" in his *Alimonium Romuli et Remi*, based on the most national of all Roman traditions. Still more important service was rendered by him in his long Saturnian poem on the First Punic War, in which he not only told the story of contemporary events but gave shape to the legend of the settlement of Æneas in Latium,—the theme ultimately adopted for the great national epic of Rome.

Plautus.

His younger contemporary Plautus (d. 184) was the greatest comic and dramatic genius of Rome, and is still read as one of the great comic and dramatic writers of the world. He lived and wrote only to amuse his contemporaries, and thus, although more popular in his lifetime and more fortunate than any of the older authors in the ultimate survival of a large number of his works, he is less than any of the great writers of Rome in sympathy with either the serious or the caustic spirit in Roman literature. Yet he is the one extant witness to the humour and vivacity of the Italian temperament at a stage between its early rudeness and rigidity and its subsequent degeneracy.

Ennius.

Thus far Roman literature, of which the predominant characteristics are dignity, gravity, and fervour of feeling, and which more than any other literature aimed at fortifying and elevating the character, seemed likely to become a mere vehicle of amusement adapted to all classes of the people in their holiday mood. But a new spirit came over the Italian Camenæ in the time of Plautus, which henceforth became predominant. Roman literature ceased to be in close sympathy with the popular spirit, either in political partisanship or in ministering to general amusement, but became the expression of the ideas, sentiment, and culture of the aristocratic governing class. It was by Q. Ennius (239-169) of Calabria that a new direction was given to Roman literature and new and deeper springs of emotion were elicited from the native genius. Deriving from his birthplace the culture, literary and philosophical, of Magna Græcia, having served with distinction in the Roman armies, and gained the friendship of the greatest of the Romans living in that great age, he was of all the early writers most fitted to be the medium of conciliation between the serious genius of ancient Greece and the serious genius of Rome. Alone among the older writers he was endowed with the gifts of a poetical imagination and animated with enthusiasm for a great ideal. With the widest culture and knowledge among all the men of his generation, he had also the justest discernment of the relation of culture and knowledge to actual life and to the work which he had to accomplish.

First among his special services to Roman literature was the fresh impulse which he gave to tragedy. He turned the eyes of his contemporaries from the commonplace social humours of later Greek life to the contemplation of the heroic age. But he did not thereby denationalize the Roman drama. He animated the heroes of early Greece with the martial spirit of Roman soldiers and the ideal magnanimity and sagacity of Roman senators, and imparted weight and dignity to the language and verse in which their sentiments and thoughts were expressed. Although Rome wanted creative force to add a great series of tragic dramas to the literature of the world, yet the spirit of elevation and moral authority breathed into tragedy by Ennius passed into the ethical and didactic writings and the oratory of a later time.

Another work, the πάρεργον of his serious activity, was the *saturæ*, written in various metres, but chiefly in that which came nearest to the spoken language of Rome, the trochaic tetrameter. He thus became the inventor of a new form of literature; and, if in his hands the *satura* was rude and indeterminate in its scope, it was a proof of the practical bent of his understanding that he found a vehicle by which to address a reading public on matters of the day, or on the materials of his wide reading, in a style not far removed from the language of common life. His greatest work, which made the Romans regard him as the father of their literature, was his epic poem, in eighteen books, the *Annales*, in which the record of the whole career of Rome was unrolled with idealizing enthusiasm and realistic detail. The idea which inspired Ennius was ultimately realized in both the national epic of Virgil and the national history of Livy. And the metrical vehicle which he conceived as the only one adequate to his great theme was a rude experiment, which was ultimately developed into "the stateliest metre ever moulded by the lips of man." Even as a grammarian he performed an important service to the literary language of Rome, by fixing its prosody and arresting the tendency to decay in its final syllables. Although we know his writings only in fragments, these fragments are enough, along with what we know of him from ancient testimony, to justify us in regarding him as the most important among the makers of Roman literature,—the most important indeed among Roman authors before the age of Cicero.

Cato.

There is still one other name belonging partly to this, partly to the next generation to be added to those of the men of original force of mind and character who created Roman literature, that of M. Porcius Cato (234-149), the younger contemporary of Ennius. More than Nævius and Plautus he represented the pure native element in that literature, the mind and character of Latium, the plebeian pugnacity, which was one of the great forces in the Roman state. He had no poetic imagination, and set himself in antagonism to the literature of imagination created by Ennius. He strove to make literature ancillary to politics and to objects of practical utility, and thus started prose literature on the main lines which it afterwards followed. Through his industry and vigorous understanding he gave a great impulse to the creation of Roman oratory, history, and systematic didactic writing. He was one of the first to publish his speeches and thus to bring them into the domain of literature. Cicero speaks of 150 of these speeches as extant in his day. He praises them for their acuteness, their wit, their conciseness. He speaks with emphasis of the impressiveness of Cato's eulogy and the satiric bitterness of his invective. As an orator he seems to have been akin in spirit to Nævius and Lucilius, and to the last genuine representative of the native temper in literature, the satirist Juvenal.

Porcius Cato also heads the roll of the Roman historians, at least of those whose works were ranked as literature. His *Origines*, the work of his old age, was written with that thoroughly Roman conception of history which regards actions and events not in relation to their causes or their general human interest but as incidents in the continuous and progressive life of the state. Such is the conception of the past in Livy and Tacitus, and in Ennius and Virgil. But in one respect Cato seems to have formed a truer conception of his subject than any of these writers except Virgil, who, availing himself of the labours of Cato, realized and perfected his conception. Cato felt that the record of Roman glory could not be isolated from the story of the other Italian communities, which, after fighting against Rome for their own independence, shared with it the task of conquering the world. To the wider national sympathies which stimulated the researches of the old censor into the legendary history of the Italian towns we owe some of the most truly national parts of the *Æneid.* There is another point of contact between the work done by Cato and that of Virgil, although they may be regarded as the most dissimilar in intellectual and imaginative gifts in the whole range of Roman literature, the one being the most realistic and prosaic, the other the most idealistic and imaginative. While the ideal charm of the old rural life and industry of Italy still lives in the *Georgics*, the practical utilitarian prose of that life may best be learned from the *De Re Rustica* of Cato.

Lucilius.

Nævius, Plautus, Ennius, and Cato not only represent but may be said actually to have been the contending forces which strove for ascendency in determining what was to be the character of the new literature. Although their combined activity was spread over nearly a century, yet so vigorous was their vitality and so prolonged their career that they may be spoken of as contemporaries. Cato, the youngest of the four, was a man of mature years, actively engaged in the service of the state, when Nævius was still in the full vigour of his powers, and before Plautus had reached the most productive period of his career. It is characteristic of the time that the genius of all these writers was ripest in their old age. They were thus able partially to overcome the difficulties incident to the beginning of their art. They acquired by the rude attempts of their earlier activity the faculty which they exercised with unabated natural force till the end of their lives. In their prolonged career of intellectual energy they remind us of some of the early philosophers and travellers of Greece. The work begun by them was carried on by younger contemporaries and successors, that of Plautus by Cæcilius Statius and others, the tragedy of Ennius by his kinsman, Pacuvius, and, in the following generation, by Accius. The impulse given to oratory by Cato, Sulpicius Gallus, and others, and along with it the development of prose composition, went on with increased momentum till the age of Cicero. But the interval between the death of Ennius (169) and the beginning of Cicero's career, while one of progressive advance in the appreciation of literary form and style, was much less distinguished by original force than the time immediately before and after the end of the Second Punic War. The one complete survival of the generation after the death of Ennius, the comedy of Terence (185-159), exemplifies the gain in literary accomplishment and the loss in literary freedom. Terence has nothing Roman or Italian except his pure and idiomatic Latinity. His relation to the Greek authors whom he copied is that of a fine engraver to the great painters of another age and time. The Athenian elegance of Terence affords the strongest contrast to the Italian rudeness of Cato's *De Re Rustica.* By looking at them together we understand how much the comedy of Terence was able to do to refine and humanize the manners of Rome, but at the same time what a solvent it was of the discipline and ideas of the old republic. What makes Terence an important witness of the culture of his time is that he wrote from the centre of the Scipionic circle, in which what was most humane and liberal in Roman statesmanship was combined with the appreciation of what was most vital in the Greek thought and literature of the time. Cicero tells us that the peculiar glory of that age was the purity of its Latinity; and it is natural to ascribe to the members of that aristocracy of birth and culture the sentiment ascribed to Cæsar a century later, that to maintain the purity of the Latin tongue was due to the sense both of personal and of national dignity. The comedies of Terence may therefore be held to give some indication of the tastes of Scipio, Lælius, and their friends in their youth. The influence of Panætius and Polybius was more adapted to their maturity, when they led the state in war, statesmanship, and oratory, and when the humaner teaching of Stoicism began to enlarge the sympathies of Roman jurists. But in the last years during which this circle kept together a new spirit appeared in Roman politics and a new power in Roman literature,—the revolutionary spirit evoked by the Gracchi in opposition to the long-continued ascendency of the senate, and the new power of Roman satire, which was exercised impartially and unsparingly against both the excesses of the revolutionary spirit and the arrogance and incompetence of the extreme party among the nobles. Roman satire, though in form a legitimate development of the indigenous dramatic *satura* through the written *satura* of Ennius and Pacuvius, is really a birth of this time, and its author was the youngest of those admitted into the intimacy of the Scipionic circle, C. Lucilius of Aurunca (166[1]-102). Among the writers before the age of Cicero he alone deserves to be named with Nævius, Plautus, Ennius, and Cato as a great originative force in literature. For about thirty years the production of the satires of Lucilius, in which the politics, morals, society, and letters of the time were criticized with the utmost freedom and pungency, and his own personality was brought immediately and familiarly before his contemporaries, was much the most important event in Roman literature. The years that intervened between his death and the beginning of the Ciceronian age are singularly barren in works of original value.

General results from 130 to 80.

The general results of the last fifty years of the first period, from *c.* 130 to *c.* 80, may be thus summed up. In poetry we have the satires of Lucilius, the tragedies of Accius and of a few successors among the Roman aristocracy, who thus exemplified the affinity of the Roman stage to Roman oratory; the "comœdia togata" of Afranius, in which comedy, while assuming a Roman dress, did not assume the virtue of a Roman matron; various annalistic poems intended to serve as continuations of the great poem of Ennius; minor poems of an epigrammatic and erotic character, unimportant anticipations of the Alexandrian tendency operative in the following period; works of criticism in trochaic tetrameters by Porcius Licinus and others, forming part of the critical and grammatical movement which almost from the first accompanied the creative movement in Roman literature, and which may be regarded as rude precursors of the didactic epistles that Horace devoted to literary criticism.

The only extant prose work which may be assigned to the end of this period is the treatise on rhetoric known by the title *Ad Herennium*, a work indicative of the attention bestowed on prose style and rhetorical studies during the last century of the republic, and which may be regarded as a precursor of the oratorical treatises of Cicero in the following generation and of the work of Quintilian in the first century of the empire. But the great literary pro-

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[1] The reasons for rejecting the date usually assigned to his birth (148) have been given under the heading LUCILIUS.

Oratory

duct of this period was oratory, developed indeed with the aid of these rhetorical studies, but itself the immediate outcome of the imperial interests, the legal conflicts, and the political passions of that time of agitation. The speakers and writers of a later age looked back on Scipio and Lælius, the Gracchi and their contemporaries, L. Crassus and M. Antonius, as masters of their art. We can only judge of what they were by the fame of their speeches and a few unimportant fragments. But as we infer from the artistic excellence of the Homeric poems that many poets of power and genius, whose names were soon forgotten, preceded the great master; as we know that the art of Shakespeare did not come without due preparation into the world; so from the mature perfection of the art of Cicero we may, in a measure, judge of the power and accomplishment of the orators who came before him, from whom he professes to have learned much, and whom he regarded with generous admiration.

History.

In history, regarded as a great branch of prose literature, it is not probable that much was accomplished, although, with the advance of oratory and grammatical studies, there must have been not only greater fluency of composition but the beginning of a richer and more ornate style. Yet Cicero, so candid and indulgent in his estimate of early Roman poetry and oratory, denies to Rome the existence, before his own time, of any adequate historical literature. Nevertheless it was by the work of a number of Roman chroniclers during this period that the materials of early Roman history were systematized, and the record of the state, as it was finally given to the world in the artistic work of Livy, was extracted from the early annals, state documents, and private memorials, combined into a coherent unity, and supplemented by invention and reflexion. There were also special works on Roman antiquities and contemporary memoirs, which formed the sources of future historians.

Summary of the period

Although the artistic product of the first period of Roman literature which has reached us in a complete shape is limited to the comedies of Plautus and Terence, the influence of the lost literature in determining the spirit, form, and style of the eras of more perfect accomplishment which followed is unmistakable. While humour and vivacity, which were not surpassed in the more advanced stages of literature, had characterized the earlier, and an urbanity of tone, with which Horace by frequent imitation acknowledges his sympathy, characterizes the later development of comedy, the tendency of serious literature had been in the main practical, ethical, commemorative, and satirical. The higher poetical imagination had appeared only in Ennius, and had been called forth in him by sympathy with the grandeur of the national life and the great personal qualities of its representative men. Some of the chief motives of the later poetry, such as the love of nature and the pleasures and sorrows of private life, had as yet found scarcely any expression in Roman literature. The fittest metrical vehicle for epic, didactic, and satiric poetry had been discovered, but its movement was as yet rude and inharmonious. The idiom of ordinary life and social intercourse and the more fervid and elevated diction of oratorical prose had made great progress, but the language of imagination and poetical feeling was, if vivid and impressive in isolated expressions, still incapable of being wrought into consecutive passages of artistic composition. Although the impulse which awoke the literary energy of Rome had come from the semi-Greeks of the south of Italy, the character of the literature was in the main Roman and Latin; and to this may be attributed the preponderance of the prosaic over the poetical element in it. The Sabellian races of central and eastern Italy and the Italo-Celtic and Venetian races of the north, in whom the poetic susceptibility of Italy was most manifest two generations later, were not, until after the Social War, sufficiently in sympathy with Rome, and were probably not as yet sufficiently educated to induce them to contribute their share to the national literature. Hence the end of the Social War, and of the Civil War which arose out of it, is most clearly a determining factor in Roman literature, and may most appropriately be taken as marking the end of one period and the beginning of another.

Second Period: from 80 *to* 42 B.C.

The last age of the republic coincides with the first half of the Golden Age of Roman literature. It is generally known as the Ciceronian age from the name of its greatest literary representative, whose activity as a speaker and writer was unremitting during nearly the whole period. It is the age of purest excellence in prose, and of a new birth of poetry, characterized rather by great original force and artistic promise than by perfect accomplishment. The five chief representatives of this age who still hold their rank among the great classical writers are Cicero, Cæsar, Sallust, Lucretius, and Catullus. The works of other prose writers, Varro and Cornelius Nepos, have been partially preserved; but these writers have no claim to rank with those already mentioned as creators and masters of literary style. Although literature had not as yet become, as it did in the age of Martial, and to a certain extent in the age represented in the *Epistles* of Horace, a trade or profession, an educated reading public already existed, and books and intellectual intercourse filled a large part of the leisure of men actively engaged in affairs. Even oratory was intended quite as much for readers as for the audiences to which it was immediately addressed; and some of the greatest speeches which have come down from that great age of orators were never delivered at all, but were published as manifestoes after the event with the view of influencing educated opinion, and as works of art with the view of giving pleasure to educated taste.

Cicero.

Thus the speeches of Cicero (106-43), more certainly than any modern speeches, belong to the domain of literature quite as much as to that of forensic or political oratory. And, although Demosthenes is a master of style unrivalled even by Cicero, the literary interest of most of Cicero's speeches is greater than that of the great mass of Greek oratory,—a result of what from a forensic point of view would now be regarded as a serious defect. Thus it is with justice urged that the greater part of the *Defence of Archias* was irrelevant to the issue and would not have been listened to by a Greek court of justice or a modern jury. But it was fortunate for the interests of literature that a court of educated Romans could be influenced by the considerations there submitted to them. In this way a question of the most temporary interest, concerning an individual of no particular eminence or importance, has produced one of the most impressive vindications of literature ever spoken or written. Oratory at Rome assumed a new type from being cultivated as an art which endeavoured to produce persuasion not so much by intellectual conviction as by appeal to those general human sympathies which are the subject-matter with which literature has to deal. In oratory, as in every other intellectual province, the Greeks had a truer sense of the limits and conditions of their art. But command over form is only one element in the making of an orator or poet. The largeness and dignity of the matter with which he has to deal is at least as important. The Roman oratory of the law courts had to deal not with petty questions of disputed property, of fraud, or violence, but with great imperial questions, with matters affecting the wellbeing of large provinces and the honour and safety of the republic; and no man ever lived who, by the intensity of his patriotic and imperial feeling, by his practical experience of great affairs, and by the largeness of his human sympathies, was better fitted than Cicero to be the representative of the type of oratory demanded by the condition of the later republic. He elevates nearly every subject with which he deals, in those speeches at least which he thought worthy of preservation, by connecting it with great political or imperial issues. But with the patriotic motive of his speeches there is generally combined a great moral motive. Whatever were the weaknesses and faults of his personal character, no man of antiquity had higher ethical aspirations. Nowhere is the Roman ideal of character humanized by Greek studies presented with more impressiveness than in the speeches of Cicero. In no writer ancient or modern do we find a greater power of moral indignation. And, while he inveighed against the enormities of the man whom he accused with the grave rebuke of a censor as well as the passion of a personal enemy, no advocate could feel or awaken in others a keener sympathy with the fortunes and the character of the man whom he was defending.

To his great artistic accomplishment, perfected by practice and elaborate study, to the power of his patriotic, his moral, and personal sympathies, and his passionate emotional nature, must be added his vivid imagination and the rich and copious stream of his language, in which he had no rival among Roman writers or speakers.[1] He realizes with the imagination of a great dramatist the personages of his story, their feelings and motives, and the minutest details of their action. It has been said that Roman poetry has produced few, if any, great types of character. But the Verres, Catiline, Antony of Cicero are living and permanent types. The story told in the *Pro Cluentio* may be true or false, but the picture of provincial crime which it presents is vividly dramatic.

Had we only known Cicero in his speeches we should have ranked him with Demosthenes as one who had realized the highest literary ideal, and thereby secured immortality to an art the effect of which is not often perpetuated. We should think of him also as the creator and master of Latin style,—the writer by whom the amplest, most passionate, and most living powers of the language had been called forth and combined into a great and orderly literary organ. We know him, moreover, not only as a great orator but as a just and appreciative critic of oratory. But to his services to Roman oratory we have to add his services not indeed to philosophy but to the literature of philosophy, and his application to the exposition of his doctrines of the calmer and more equable resources of the language. If not a philosopher he is an admirable interpreter of those branches of philosophy which are fitted for practical application, and he presents us with the results of Greek reflexion vivified by his own human sympathies and his large experience of men. In giving a model of the style in which human interest can best be imparted to abstract discussions, he has used his great oratorical gift and art to persuade the world to accept the most hopeful opinions on human destiny and the principles of conduct most conducive to elevation and integrity of character.

The *Letters* of Cicero are the best either in his own or in any other language. They are thoroughly natural,—"colloquia absentium amicorum," to use his own phrase. In nearly all other published correspondence there is some medium which interrupts the natural outlet of the man, something of literary mannerism, natural reserve, academic elaborateness, and after-thought. Cicero's letters to Atticus and to the friends with whom he was completely at his ease are the most sincere and immediate expression of the thought and feeling of the moment. They let us into the secret of his most serious thoughts and cares, and they give a natural outlet to his vivacity of observation, his wit and humour, his kindliness of nature. It shows how flexible an instrument Latin prose had become in his hand, when it could in accordance with the conditions of perfect literary taste do justice at once to the ample and vehement volume of his oratory, to the calmer and more rhythmical movement of his philosophical meditation, and to the natural interchange of thought and feeling in the everyday intercourse of life.

Among the many rival orators of the age the most eminent were Hortensius and Cæsar. The former, like other members of the aristocracy, such as Memmius and Torquatus, and like Q. Catulus in the preceding generation, was a kind of dilettante poet and a precursor of the poetry of pleasure, which attained such prominence in the elegiac poets of the Augustan age. Of Julius Cæsar (100-44) as an orator we can judge only by his reputation and by the testimony of his great rival and adversary Cicero; but we are able to appreciate the special praise of perfect taste in the use of language attributed to him.[2] In his *Commentaries*, by laying aside the ornaments of oratory,[3] he created the most admirable style of prose narrative, the style which presents interesting events in their sequence of time and dependence on the will of the actor, rapidly and vividly, with scarcely any colouring of personal or moral feeling, any oratorical passion, any pictorial illustration. While he shows the persuasive art of an orator by presenting the subjugation of Gaul and his own action in the Civil War in the light most favourable to his claim to rule the Roman world, he is entirely free from the Roman fashion of self-laudation or disparagement of an adversary. Yet the character of the man is stamped on every line that he writes, and reveals itself especially in a perfect simplicity of style, the result of the clearest intelligence and the strongest sense of personal dignity. He avoids not only every unusual but every superfluous word; and, although no writing can be more free from rhetorical colouring, yet there may from time to time be detected a glow of sympathy, like the glow of generous passion in Thucydides, the more effective from the reserve with which it betrays itself whenever he is called on to record any act of personal heroism or of devotion to military duty. Cæsar.

In the simplicity of his style, the directness of his narrative, the entire absence of any didactic tendency, Cæsar presents a marked contrast to another prose writer of that age,—the historian Sallust (87-34). Like Varro, he survived Cicero by some years, but the tone and spirit in which his works are written assign him to the republican era. He was the first of the purely artistic historians, as distinct from the annalists and the writers of personal memoirs. He imitated the Greek historians in taking particular actions—the *Jugurthan War* and the *Catilinarian Conspiracy*—as the subjects of artistic treatment. He wrote also a continuous work, *Historiæ*, treating of the events of the twelve years following the death of Sulla, of which only fragments are preserved. His two extant works are more valuable as artistic studies of the rival parties in the state and of personal character than as trustworthy narratives of facts. His style aims at effectiveness by pregnant expression, sententiousness, archaism. He produces the impression of caring more for the manner of saying a thing than for its truth. Yet he has great value as a painter of historical portraits, some of them those of his contemporaries, and as an author who had Sallust.

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[1] "Qui non illustravit modo sed etiam genuit in hac urbe dicendi copiam" (Cic., *Brut.*, 73).

[2] "Latine loqui elegantissime."

[3] "Nudi enim sunt, recti et venusti, omni ornatu orationis tanquam veste detracto" (Cicero).

been a political partisan and had taken some part in making history before undertaking to write it; and he gives us, from the popular side, the views of a contemporary on the politics of the time.

In following the development of Roman literature we have seen it become the prose organ of great affairs, but since the appearance of the *Annals* of Ennius, in whom the poetry of national life had originated, no work of great and original poetical genius had appeared. The powerful poetical force which for half a century continued to be the strongest force in literature, and which created masterpieces of art and genius, first revealed itself in the latter part of the Ciceronian age. The strength with which it burst forth seems indicative of latent sources of imaginative feeling and conception long suppressed in the Italian temperament, owing perhaps to the absorption of the mind and passion of the race in war, politics, and practical affairs. The conditions which enabled the poetic genius of Italy to come to maturity in the person of Lucretius (99-55) were entire seclusion from public life and absorption in the ideal pleasures of contemplation and artistic production. He produces the impression of a man so possessed by intellectual and imaginative enthusiasm as to have separated himself from the active interests and social pleasures of his time, and to have passed that period of his life which was given to literary production in studying the laws and watching the spectacle of nature, and in the active exercise of imaginative thought on the problems of human life. This isolation from the familiar ways of his contemporaries, while it was, according to tradition and the internal evidence of his poem, destructive to his spirit's health, resulted in a work of genius, unique in character, which was a second birth of imaginative poetry in Italy, and still stands forth as the greatest philosophical poem in any language. In the form of his poem he followed a Greek original; and the stuff out of which the texture of his philosophical argument is framed was derived from Greek science; but all that is of deep human and poetical meaning in the poem is his own. His sense of the grace and beauty of language had indeed been educated by the sympathetic study of Homer and Euripides; but the philosophical guidance which he followed and his reverence for his guide were rather a hindrance than an aid to his art, and were the cause of his presenting the pure ore of his own genius overlaid with great masses of alien alloy. While we recognize in the *De Rerum Natura* some of the most powerful poetry in any language and feel that few poets have penetrated with such passionate sincerity and courage into the secret of nature and some of the deeper truths of human life, we must acknowledge that, as compared with the great didactic poem of Virgil, it is crude and unformed in artistic design, and often rough and unequal in artistic execution. Yet, apart altogether from its independent value, by his speculative power and enthusiasm, by his revelation of the life and spectacle of nature, by the fresh creativeness of his diction and the elevated movement of his rhythm, he exercised a more powerful influence than any other on the art of his more perfect successors.

While the imaginative and emotional side of Roman poetry was so powerfully represented by Lucretius, attention was directed to its artistic side by a younger generation, who moulded themselves in a great degree, though not exclusively, on Alexandrian models. Of this small group of poets, who were bound together by common tastes and friendship, one only has survived, fortunately the man of most genius among them, Valerius Catullus (84[1]-54). He too was a new force in Roman literature. Although of a family probably originally Roman, and although brought early in his career into intimate relations with members of the great Roman families, he was a provincial by birth, and was apparently moved in his earliest youth by that fresh enthusiasm for culture which in his own and the following generation enabled Cisalpine Gaul to do so much to enrich Roman literature. His nature, in which sensuous passion and warm affection were united, made him fall a victim to the fascinations of the famous Clodia, whom he has celebrated, under the name of Lesbia, in some of the most powerful and charming love poetry found in any language. The subjects of his best art are taken immediately from his own life,—his loves, his friendships, his travels, his animosities, personal and political. His most original contribution to the substance of Roman literature was that he first shaped into poetry the experience of his own heart, as it had been shaped by Alcæus and Sappho in the early days of Greek poetry. No poet has surpassed him in the power of vitally reproducing the pleasure and pain of the passing hour, not recalled by idealizing reflexion as in Horace, nor overlaid with mythological ornament as in Propertius, but in all the keenness of immediate impression. He also introduced into Roman literature that personal as distinct from political or social satire which appears later in the *Epodes* of Horace and the *Epigrams* of Martial. The sting in Catullus, at least in his iambics and phalæcians, is more concentrated than in the later writers. He anticipated Ovid in recalling the stories of Greek mythology into a second poetical life. His greatest contribution to poetic art consisted in the perfection which he attained in the phalæcian, the pure iambic, and the scazon metres, and in the ease and grace with which he used the language of familiar intercourse, as distinct from that of the creative imagination, of the "rostra," and of the schools, to give at once a lifelike and an artistic expression to his feelings. He has the interest of being the last poet of the free republic. In his life and in his art he was the precursor of those poets who used their genius as the interpreter and minister of pleasure; but he rises above them in the spirit of personal independence, in his affection for his friends, in his keen enjoyment of natural and simple pleasures, and in his power of giving vital expression to these feelings.

Third Period: Augustan Age, 42 B.C. *to* 17 A.D.

The poetic impulse and culture communicated to Roman literature in the last years of the republic passed on without any break of continuity into the literature of the succeeding age. One or two of the circle of Catullus survived into that age; but an entirely new spirit came over the literature of the new period, and it is by new men, educated indeed under the same literary influences, but living in an altered world and belonging originally to a different order in the state, that the new spirit was expressed. The literature of the later republic reflect the sympathies and prejudices of an aristocratic class, sharing in the conduct of national affairs and living on terms of equality with one another; that of the Augustan age, both in its early serious enthusiasm and in the licence and levity of its later development, represents the hopes and aspirations with which the new monarchy was ushered into the world, and the pursuit of pleasure and amusement, which becomes the chief interest of a class cut off from the higher energies of practical life, and moving in the refining and enervating atmosphere of an imperial court. The great inspiring influence of the new literature was the enthusiasm produced first by the hope and afterwards by the fulfilment of the restoration of peace, order, national glory, under the rule of Augustus. All that the age longed for seemed to be embodied in a man who had both in his own person and by inheritance the natural spell which sways the imagination of the world. The sentiment of hero-worship was at all times strong in the Romans, and no one was ever the object of more sincere as well as simulated hero-worship than Augustus. It was not, however, by his equals in station that the first feeling was likely to be entertained. The earliest to give expression to it was the humbly-born poet from the Cisalpine province; but the spell was soon acknowledged by the calmer and more worldly-wise poet whose first enthusiasm had directed him into the opposite camp. The disgust aroused by the anti-national policy of Antony, and the danger to the empire which was averted by the result of the battle of Actium, with the confidence inspired by the new ruler, combined to reconcile the great families as well as the great body of the people to the new order of things.

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[1] The reasons for accepting 84 rather than 87 as the date of his birth have been given in the article CATULLUS.

While the establishment of the empire produced a revival of national and imperial feeling, it suppressed all independent political thought and action. Hence the two great forms of prose literature which drew their nourishment from the struggles of political life, oratory and contemporary history, were arrested in their development. The chief interest of letter-writing had consisted in its being the medium of interchange of thought on politics, and thus, although correspondence between friends still went on as before, no collection of letters was of sufficient importance to be preserved. The main course of literature was thus for a time diverted into poetry. That poetry in its most elevated form aimed at being the organ of the new empire and of realizing the national ideals of life and character under its auspices; and in carrying out this aim it sought to recall the great memories of the past. It became also the organ of the pleasures and interests of private life, the chief motives of which were the love of nature and the passion of love. It sought also to make the art and poetry of Greece live a new artistic life. Satire, debarred from that comment on political action which had been open to Lucilius and to Catullus and Calvus under the republic, turned to social and individual life, and combined with the newly-developed taste for ethical analysis and reflexion introduced by Cicero. One great work had still to be done in prose—a retrospect of the past history of the state from an idealizing and romanticizing point of view. For that work the Augustan age, as the end of one great cycle of events and the beginning of another, was eminently suited, and a writer who, by his gifts of imagination and sympathy, was perhaps better fitted than any other man of antiquity for the task, and who through the whole of this period lived a life of literary leisure, was found to do justice to the subject

Although the age did not afford that free scope and stimulus to individual energy and enterprise which have been the conditions under which the most truly creative literature has flourished, no age afforded more material and social advantages for the peaceful cultivation of letters. The new influence of patronage, which in other times has chilled the genial current of literature, became, in the person of Mæcenas, the medium through which literature and the imperial policy were brought into union. Poetry thus acquired the tone of the world, kept in close connexion with the chief source of national life, while it was cultivated to the highest pitch of artistic perfection under the most favourable conditions of leisure and freedom from the distractions and anxieties of life.

The earliest in the order of time of the poets who adorn this age—Virgil (70-19)—is also the greatest in genius, the most richly cultivated, and the most perfect in art. He is the idealizing poet of the hopes and aspirations and of the purer and happier life of which the age seemed to contain the promise. He elevates the present by associating it with the past and future of the world, and sanctifies it by seeing in it the fulfilment of a divine purpose. Poetry is no longer, as in the previous generation, in discord with the dominant tendency of affairs, but in harmony with all that was restorative of the peace, order, and happiness of the world. Virgil is the true representative poet of Rome and Italy, of national glory and of the beauty of nature, the artist in whom all the efforts of the past were made perfect, and the unapproachable standard of excellence to future times. While more richly endowed with sensibility to all native influences, he was more deeply imbued than any of his contemporaries with the poetry, the thought, and the learning of Greece. It was by leaning on these supports that his genius felt its way and expanded into higher and wider development. His art begins in imitation of the cadences, the diction, and the pastoral fancies of Theocritus; but even in these imitative poems of his youth we see that he is perfect master of his materials. The Latin hexameter, which in Ennius and Lucretius was the organ of the more dignified and majestic emotions, became in his hands the most perfect measure in which the softer and more luxurious sentiment of nature has been expressed; and the Latin language was enriched with its sweetest and most musical variations. The sentiment of Italian scenery and the love which the Italian peasant has for the familiar sights and sounds of his home found a voice which never can pass away; and the joy and pain of the passion of love were revealed in these poems in a way as yet unapprehended by the world. In this the earliest and least serious effort of Virgil's genius there is no immaturity of art, and in poems outwardly most remote from the current of active life there is the recognition of the master-force by which that current was destined to be impelled and controlled.

In his next poem, the *Georgics*, we are struck by the great advance in the originality and self-dependence of the artist, in the mature perfection of his workmanship, in the deepening and strengthening of all his sympathies and convictions. His genius still works under forms prescribed by Greek art, and under the disadvantage of having a practical and utilitarian aim imposed on it. But he has even in form so far surpassed his originals that he alone has gained for the pure didactic poem a place among the highest forms of serious poetry, while he has so transmuted his material that, without violation of truth, he has made the whole poem alive with poetic feeling. The homeliest details of the farmer's work are transfigured through the magical potency of the poet's love of nature in her immediate charm of sight and sound and in her all-pervading presence, especially as that charm and presence reveal themselves in the land and climate of Italy; through his religious feeling and his pious sympathy with the sanctities of human affection; through his patriotic sympathy with the national greatness; and through the rich allusiveness of his art to everything in poetry and legend which can illustrate and glorify his theme.

In the *Pastoral Poems* and *Georgics* Virgil is the idealizing poet of the beauty and of the old simple and hardy life of Italy, as the imagination could conceive of it in an altered world. In the *Æneid* he is the idealizing poet of national glory, especially as that glory was manifested in the person of Augustus. The epic of national life, vividly conceived but rudely executed by Ennius, was perfected in the years that followed the decisive victory at Actium. To do justice to his idea Virgil enters into rivalry with a greater poet than those whom he had equalled or surpassed in his previous works. And, though he cannot unroll before us the page of heroic action with the power and majesty of Homer, yet by the sympathy with which he realizes the idea of Rome, and by the power with which he has used the details of tradition, of local scenes, of religious usage, to embody it, he has built up in the form of an epic poem the most enduring and the most artistically constructed monument of national grandeur.

The second great poet of the time—Horace (65-8)—holds a lower place in the reverence of the world, but is perhaps as much loved and is even more largely and familiarly known. He is both the realist and the idealist of his age. If we want to know the actual lives, manners, and ways of thinking of the Romans of the generation succeeding the overthrow of the republic it is in the *Satires* and partially in the *Epistles* of Horace that we shall find them. If we ask what there was in the life of that time of more exquisite or more piquant charm, of more elevated enthusiasm, of graver experience, to stir the fancy and move the mood of imaginative reflexion, it is in the lyrical poems of Horace that we shall find the most varied and trustworthy answer. He was prepared for his double task by the experience of life and his strong hold on the actual world, and by drinking long and deeply of the purer and more remote sources of Greek inspiration.

His literary activity extends over about thirty years and naturally divides itself into three periods, each marked by a distinct character. The first—extending from about 40 to 29—is that of the composition of the *Epodes* and *Satires*. In the former he imitates the Greek poet Archilochus, but takes his subjects from the men, women, and incidents of the day. They are the expression of the least happy part of his career and the least estimable side of his nature. His humorous observation of life and the more serious grain in his character found more congenial occupation in perfecting the national work of Lucilius than in introducing "the Parian iambics to Latium." Personality is the essence of his *Epodes*; in the *Satires* it is used merely as illustrative of general tendencies. In the *Satires* we find realistic pictures of social life, and the conduct and opinions of the world submitted to the standard of good feeling and common sense. The style of the *Epodes* is pointed and epigrammatic, that of the *Satires* natural and familiar. The hexameter no longer, as in Lucilius, moves awkwardly as if in fetters, but, like the language of Terence, of Catullus in his lighter pieces, of Cicero in his letters to Atticus, adapts itself to the everyday intercourse of life. The next period is the meridian of his genius, the time of his greatest lyrical inspiration, which he himself associates with the peace and leisure secured to him by his Sabine farm. The spirit of the child who had lost himself on Monte Voltore seemed to come back to him in his lonely wanderings among the Sabine hills. The life of pleasure which he had lived in his youth comes back to him, not as it was in its actual distractions and disappointments, but in the idealizing light of meditative retrospect. He had not only become reconciled to the new order of things, but was moved by his intimate friendship with Mæcenas to aid in raising the world to sympathy with the imperial rule through the medium of his lyrical inspiration, as Virgil had through the glory of his epic art. With the completion of the three books of *Odes* he cast aside for a time the office of the "vates," and resumed that of the critical spectator of human life, but in the spirit of a moralist rather than a satirist. He feels the increasing languor of the time as well as the languor of advancing years, and seeks to encourage younger men to take up the rôle of lyrical poetry, while he devotes himself to the contemplation of the true art of living. Self-culture rather than the fulfilment of public or social duty, as in the moral teaching of Cicero, is the aim of his teaching: and in this we recognize the influence of the empire in throwing the individual back on himself. As Cicero tones down his oratory in his moral treatises, so Horace tones down the fervour of his lyrical utterances in his *Epistles*, and thus produces a style combining the ease of the best epistolary style with the grace and concentration of poetry,—the style, as it has been called, of "idealized common sense," that of the "urbanus" and cultivated man of the world who is also in his hours of inspiration a genuine poet. In the last decennium of his life he resumed for a time, under pressure of the imperial command, his lyrical function, and produced some of the most exquisite and mature products of his art. But his chief activity is devoted to criticism. He first vindicates the claims of his own age to literary pre-eminence, and then seeks to stimulate the younger writers of the day to what he regarded as the manlier forms of poetry, and especially to the tragic drama, which seemed for a short time to give promise of an artistic revival. It seems strange that, although he must have known the writings of Propertius and the earlier writings of Ovid, he has no word of recognition for them. And, though he writes to Tibullus with friendly regard, he seems to value him as a student of philosophy more than as a poet, and says nothing to indicate that he believed his work would be more enduring than that of Titius or Julius Florus or Iulus Antonius.

Tibullus.

But the poetry of the latter half of the Augustan age destined to survive did not follow the lines either of lyrical or of dramatic art marked out for them by Horace. The latest form of poetry adopted from Greece and destined to gain and permanently to hold the ear of the world was the elegy. From the time of Mimnermus this form seems to have presented itself as the most natural vehicle for the poetry of pleasure in an age of luxury, refinement, and incipient decay. Its facile flow and rhythm seem to adapt it to the expression and illustration of personal feeling. It goes to the mind of the reader through a medium of sentiment rather than of continuous thought or imaginative illustration. The greatest masters of this kind of poetry are the elegiac poets of the Augustan age,—Tibullus, Propertius, and Ovid. Of these Tibullus (d. 19) is the most refined and tender. As the poet of love he gives utterance to the pensive melancholy rather than to the pleasures associated with it. In his sympathy with the life and beliefs of the country people he shows an affinity both to the idyllic spirit and to the piety of Virgil. There is something, too, in his fastidious refinement and in his shrinking from the rough contact of life that reminds us of the English poet Gray.

Propertius.

A poet of more strength and more powerful imagination, but of less refinement in his life and less exquisite taste in his art, is Propertius (*c.* 50-*c.* 15), "the Roman Callimachus." His youth was a more stormy one than that of Tibullus, and was passed, not like his, among the "healthy woods" of his country estate, but amid all the licence of the capital. His passion for Cynthia, the theme of his most finished poetry, is second only in interest to that of Catullus for Lesbia; and Cynthia in her fascination and caprices seems a more real and intelligible personage than the idealized object first of the idolatry and afterwards of the malediction of Catullus. Propertius is a less accomplished artist and a less equably pleasing writer than either Tibullus or Ovid, but he shows more power of dealing gravely with a great or tragic situation than either of them, and his diction and rhythm give frequent proof of a concentrated force of conception and a corresponding movement of imaginative feeling which remind us of Lucretius.

The most facile and brilliant of the elegiac poets and the least serious in tone and spirit is Ovid (43 B.C.-17 A.D.), the latest in order of time. As an amatory poet he is the poet of pleasure and intrigue rather than of tender sentiment or absorbing passion. Though he treats his subject in relation to himself with more levity and irony than real feeling, yet he alone among the elegiac poets is able to embody it in dramatic form, and by his vivid gifts of fancy to create a literature of romantic passion and adventure adapted to amuse and fascinate the idle and luxurious society of which the elder Julia was the centre. The power of continuous narrative is best seen in the *Metamorphoses*, written in hexameters, to which he has imparted a rapidity and fluidity of movement more suited to romantic and picturesque narrative than the weighty self-restrained verse of Virgil. In his *Fasti* he treats a subject of national interest; it is not, however, through the strength of Roman sentiment but through the power of vividly conceiving and narrating stories of strong human interest that the poem lives. In his latest works—the *Tristia* and *Ex Ponto*—he imparts the interest of personal confessions to the record of a unique experience. Latin poetry is more rich in the expression of personal feeling than of dramatic imagination. In Ovid we have both. We know him in the intense liveliness of his feeling and the human weakness of his nature more intimately than any other writer of antiquity, except perhaps Cicero. As Virgil marks the point of maturest excellence in poetic diction and rhythm, Ovid marks that of the greatest facility.

The Augustan age was one of those great eras in the world, like the era succeeding the Persian War in Greece, the Elizabethan age in England, and the beginning of the present century in Europe, in which what seems a new spring of national and individual life calls out an idealizing retrospect of the past. As the present seems full of new life, the past seems rich in glory and the future in hope. The past of Rome had always a peculiar fascination for Roman writers. Virgil in a supreme degree, and Horace, Propertius, and Ovid in a less degree, had expressed in their poetry the romance of the past. But it was in the great historical work of Livy (59 B.C.-17 A.D.) that the record of the national life, coloured by idealizing retrospect, received its most systematic exposition. The conception of his work must have nearly coincided in point of time with the impulses in which the *Æneid* and the national *Odes* of Horace had their origin. Its execution was the work of a life prolonged through the languor and dissolution following so soon upon the promise of the new era, during which time the past became glorified by contrast with the disheartening aspect of the present. The value of the work consists not in any power of critical investigation or weighing of historical evidence but in the intense sympathy of the writer with the national ideal, and the vivid imagination with which under the influence of this sympathy he gives life to the events and personages, the wars and political struggles, of times remote from his own. Although he has no accurate conception of the constitutional history of the state, yet nowhere else in ancient history do we find the patrician and plebeian forces in a state by which that history is worked out so vividly and dramatically embodied. He makes us feel more than any one the majesty of the Roman state, of its great magistracies, and of the august council by which its policy was guided. And, while he makes the words "senatus populusque Romanus" full of significance for all times, no one realizes with more enthusiasm all that is implied in the words "imperium Romanum," and the great military qualities of head and heart by which that empire was acquired and maintained. While the general conception of his work is thus animated by national enthusiasm, the details are filled up with all the resources of a vivid imagination and of literary art. The vast scale on which the work was conceived and the thoroughness of artistic execution with which the details are finished are characteristically Roman. The prose style of Rome, as a vehicle for the continuous narration of events coloured by a rich and picturesque imagination and vivified by dignified emotion, attained its perfection in him.

Fourth Period: from 17 *to about* 130 A.D.

Characteristics of post-Augustan age

For more than a century after the death of Augustus Roman literature continues to flow in the old channels. Rome continues the centre of the literary movement. The characteristics of the great writers are essentially national, not provincial nor cosmopolitan. In prose the old forms—oratory, history, the epistle, treatises or dialogues on ethical and literary questions—continue to be cultivated. Scientific and practical subjects, such as natural history, architecture, medicine, agriculture, are treated in more elaborate literary style. The old Roman *satura* is developed into something like the modern prose novel. In the various provinces of poetry, while there is little novelty or inspiration, there is abundance of industry and ambitious effort. The national love of works of large compass shows itself in the production of long epic poems, both of the historic and of the imitative Alexandrian type. Out of many others four of these have been preserved, two at least of which the world might have allowed to perish without sensible diminution to its literary wealth. The imitative and rhetorical tastes of Rome showed themselves in the composition of exotic tragedies, as remote in spirit and character from Greek as from Roman life, of which the only extant specimens are those attributed to the younger Seneca. The composition of didactic, lyrical, and elegiac poetry also was the accomplishment and pastime of an educated dilettante class. The only extant specimens of any interest are some of the *Silvæ* of Statius. The only voice with which the poet of this age can express himself with force and sincerity is that of satire and satiric epigram. Ovid was the last of the true poets of Rome who combined idealizing power of imagination with artistic originality. After him we find only imitative echoes of the old music created by Virgil and others, as in Statius, or powerful declamation, as in Lucan and Juvenal. There is a deterioration in the diction as well as in the music of poetry. The elaborate literary culture of the Augustan age has done something to impair the native force of the Latin idiom. The language of literature, in the most elaborate kind of prose as well as poetry, loses all ring of popular speech. The old oratorical tastes and aptitudes find their outlet in public recitations and the practice of declamation. Forced and distorted expression, exaggerated emphasis, point and antithesis, an affected prettiness, "melliti verborum globuli," were studied with the view of gaining the applause of audiences who thronged the lecture and recitation rooms in search of temporary excitement. Education was more widely diffused, but was less thorough, less leisurely in its method, less than before derived from the purer sources of culture. The precocious immaturity of Lucan's career affords a marked contrast to the long preparation of Virgil and Horace for their high office. Although there are some works of the Silver Age of considerable and one at least of supreme interest, from the insight they afford into the experience of a century of organized despotism and its effect on the spiritual life of the ancient world, it cannot be doubted that the steady literary decline which characterized the last centuries of paganism begins with the death of Ovid and Livy. If the world had not altogether ceased to produce men of genius, the conditions under which their genius could unfold itself were no longer the same. The influences which had inspired the republican and Augustan literature were the artistic impulse derived from a familiarity with the great works of Greek genius, becoming more intimate with every new generation, the spell of Rome over the imagination of the kindred Italian races, the charm of Italy, and the vivid sensibility of the Italian temperament. These influences were certainly much less operative in the first century of the empire. The imitative impulse, which had much of the character of a creative impulse, and had resulted in the appropriation of the forms of poetry suited to the Roman and Italian character and of the metres suited to the genius of the Latin language, no longer stimulated to artistic effort. The great sources of Greek poetry were no longer regarded, as they were by Lucretius and Virgil, as "integri" and "sancti fontes," and approached in a spirit at once of daring adventure and reverential enthusiasm.[1] We have the testimony of two men of the shrewdest common sense and the most masculine understanding—Martial and Juvenal—to the stale and lifeless character of the art of the Silver Age, which sought to reproduce in the form of epics, tragedies, and elegies the bright fancies of the Greek mythology.

The idea of Rome, owing to the antagonism between the policy of the Government and the sympathies of the class by which literature was favoured and cultivated, could no longer be an inspiring motive, as it had been in the literature of the republic and of the Augustan age. The spirit of Rome appears only as animating the protest of Lucan, the satire of Persius and Juvenal, the sombre picture which Tacitus paints of the annals of the empire. Oratory is no longer an independent voice appealing to sentiments of Roman dignity, but the weapon of the "delatores," wielded for their own advancement and the destruction of that class which, even in their degeneracy, retained most sympathy with the national traditions. Roman history was no longer a record of national glory, stimulating the patriotism and flattering the pride of all Roman citizens, but a personal eulogy or a personal invective, according as servility to a present or hatred of a recent ruler was the motive which animated it.

The charm of Italian scenes still remained the same, but the fresh and inspiring feeling of nature as a great power in the world, a great restorative influence on human life, gave place to the mere sensuous gratification derived from the luxurious and artificial beauty of the country villa. The idealizing poetry of passion, which found a genuine voice in Catullus and the elegiac poets, could not prolong itself through the exhausting licence of successive generations. The vigorous vitality which gives interest to the personality of Catullus, Propertius, and Ovid no longer characterizes their successors. The pathos of natural affection is occasionally recognized in Statius and more rarely in Martial, but it has not the depth of tenderness found in Lucretius and Virgil. Human life is altogether shallower, has the same capacity for neither joy nor sorrow. The wealth and luxury of succeeding generations, the monotonous routine of life, the separation of the educated class from the higher work of the world, have produced their enervating and paralysing effect on the mainsprings of poetic and imaginative feeling.

New elements, however, appear in the literature of this period. As the result of the severance from the active interests of life, a new interest is awakened in the inner life of the individual. The extreme immorality of the age not only affords abundant material to the satirist but deepens the consciousness of moral evil in purer and more thoughtful minds. To these causes we attribute the pathological observation of Seneca and Tacitus, the new sense of purity in Persius called out by contrast with the impurity around him, the glowing if somewhat sensational exaggeration of Juvenal, the vivid characterization of Martial. The literature of no time presents so powerfully the contrast between moral good and evil. In this respect it is truly representative of the life of the age. Another new element is the influence of a new race. In the two preceding periods the rapid diffusion of literary culture following the Social War and the first Civil War was seen to awaken into new life the elements of original genius in Italy and Cisalpine Gaul. In the first century of the empire a similar result was produced by the diffusion of that culture in the Latinized districts of Spain. The fervid temperament of a fresh and vigorous race, which received the Latin discipline just as Latium had two or three centuries previously received the Greek discipline, revealed itself in the writings of the Senecas, Lucan, Quintilian, Martial, and others, who in their own time added literary distinction to the Spanish towns from which they came. This new cosmopolitan element introduced into Roman literature draws into greater prominence the characteristics of the last great representatives of the genuine Roman and Italian spirit,—Tacitus and Juvenal.

On the whole this century shows, in form, language, and substance, the beginning of literary decay. But it is still capable of producing men of original force; it still maintains the traditions of a happier time; it is still alive to the value of literary culture, and endeavours by minute attention to style to produce new effects. Though it was not one of the great eras in the annals of literature, yet the century which produced Martial, Juvenal, and Tacitus cannot be pronounced barren in literary originality, nor that which produced Seneca and Quintilian in culture and literary taste.

This fourth period is itself subdivided into three divisions:—(1) that extending from the accession of Tiberius to the death of Nero, 68,—the only important part of it being the Neronian age, 54 to 68; (2) the Flavian era, from the death of Nero to the death of Domitian, 96; (3) the period included in the reigns of Nerva and Trajan and part of the reign of Hadrian.

Period from Tiberius to Nero.

(1) For a generation after the death of Augustus no new original literary force appeared. The later poetry of the Augustan age had ended in trifling dilettanteism, for the continuance of which the atmosphere of the court was no longer favourable. The class by which literature was encouraged had become both enervated and terrorized. The *Fables* of Phædrus, the Pierian freedman, a work of no kind of national significance and representative in its morality only of the spirit of cosmopolitan individualism, is the chief poetical product of the time. Velleius Paterculus and Valerius Maximus are the most important prose-writers. The traditional culture was still, however, maintained, and the age was rich in grammarians and rhetoricians. The new profession of the "delator" must have given a stimulus to oratory. A high ideal of culture, literary as well as practical, was realized in Germanicus, which seems to have been transmitted to his daughter Agrippina, whose patronage of Seneca had important results in the next generation. The reign of Claudius was a time in which antiquarian learning, grammatical studies, and jurisprudence were cultivated, but no important additions were made to literature. A fresh impulse was given to letters on the accession of Nero, and this was partly due to the theatrical and artistic tastes of the young emperor. Four writers of the Neronian age still possess considerable interest,—Seneca, Lucan, Persius, and Petronius. The first three represent the spirit of their age by exhibiting the power of the Stoic philosophy, as a moral, political, and religious force; the last is the most cynical exponent of the depravity of the time. Seneca (d. 65) is less than Persius a pure Stoic, and more of a moralist and pathological observer of man's inner life. He makes the commonplaces of a cosmopolitan philosophy

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[1] Contrast with the "juvat integros accedere fontes" and the "sanctos ausus recludere fontes" of the older poets the first line of Persius's prologue "nec fonte labra prolui caballino.

interesting by his abundant illustration drawn from the private and social life of his contemporaries. He has knowledge of the world, the suppleness of a courtier, Spanish vivacity, and the "ingenium amœnum" attributed to him by Tacitus, the fruit of which is sometimes seen in the "honeyed phrases" mentioned by Petronius,—pure aspirations combined with inconsistency of purpose,—the inconsistency of one who tries to make the best of two worlds, the ideal inner life and the successful real life in the atmosphere of a most corrupt court. The *Pharsalia* of Lucan (39-65), with Cato as its hero, is essentially a Stoical manifesto of the opposition. It is written with the force and fervour of extreme youth and with the literary ambition of a race as yet new to the discipline of intellectual culture, and is endowed with a rhetorical rather than a poetical imagination. The *Satires* of Persius (34-62) are the purest product of Stoicism,—a Stoicism that had found in a living contemporary, Thrasea, a more rational and practical hero than Cato. But no important writer of antiquity has less literary charm than Persius. He either would not or could not say anything simply and naturally. In avoiding the literary conceits and fopperies which he satirizes he has recourse to the most unnatural contortions of expression. Of the works of the time that which from a human point of view is perhaps the most detestable in ancient literature has the most genuine literary quality, the fragment of the prose novel of Petronius. It is most sincere in its representation, least artificial in diction, most penetrating in its satire, most just in its criticism of art and style.

Age of Domitian.

(2) A greater sobriety of tone was introduced both into life and literature with the accession of Vespasian. The time was, however, characterized rather by good sense and industry than by original genius. Under Vespasian Pliny the elder is the most important prose-writer, and Valerius Flaccus, author of the *Argonautica*, the most important among the writers of poetry. The reign of Domitian, although it silenced the more independent spirits of the time, Tacitus and Juvenal, witnessed more important contributions to Roman literature than any age since the Augustan,—among them the *Institutes* of Quintilian, the *Punic War* of Silius Italicus, the epics and the *Silvæ* of Statius, and the *Epigrams* of Martial. Quintilian (*c.* 35-95) is brought forward by Juvenal as a unique instance of a thoroughly successful man of letters, of one not belonging by birth to the rich or official class who had risen to wealth and honours through literature. He was well adapted to his time by his good sense and sobriety of judgment. His criticism is just and true rather than subtle or ingenious, and thus stands the test of the judgment of after-times. The poem of Silius (25-101) is a proof of the industry and literary ambition of members of the rich official class. Of the epic poets of the Silver Age Statius (*c.* 45-96) shows the greatest technical skill and the richest pictorial fancy in the execution of detail; but his epics have no true inspiring motive, and, although the recitation of the *Thebaid* could attract and charm an audience in the days of Juvenal, it really belongs to the class of poems so unsparingly condemned both by him and Martial. In the *Silvæ*, though many of them have little root in the deeper feelings of human nature, we find occasionally more than in any poetry after the Augustan age something of the purer charm and pathos of life. But it is not in the artificial poetry of the *Silvæ*, nor in the epics and tragedies of the time, nor in the cultivated criticism of Quintilian that the age of Domitian lives for us. It is in the *Epigrams* of Martial (*c.* 41-102) that we have a true image of the average sensual frivolous life of Rome at the end of the 1st century, seen through a medium of wit and humour, but undistorted by the exaggeration which moral indignation and the love of effect add to the representation of Juvenal. Martial represents his age in his *Epigrams*, as Horace does his in his *Satires* and *Odes*, with more variety and incisive force in his sketches, though with much less poetic charm and serious meaning. We know the daily life, the familiar personages, the outward aspect of Rome in the age of Domitian better than at any other period of Roman history, and that knowledge we owe to Martial. Though a less estimable character than some of them, he is a better writer than any of his contemporaries because he did not withdraw into a world of literary interests, but lived and wrote in the central whirl of city life. He tells us the truth of his time without the wish either to protest against or to extenuate its vices.

(3) But it was under Nerva and Trajan that the greatest and most truly representative works of the empire were written, those which at once present the most impressive spectacle to the imagination and have made its meaning sink most deeply into the heart and conscience of the world. The *Annals* and *Histories* of Tacitus (54-119), with the supplementary *Life of Agricola* and the treatise *On the Manners of the Germans*, and the *Satires* of Juvenal (*c.* 47-130) have summed up for all after-times the moral experience of the Roman world from the accession of Tiberius to the death of Domitian. The powerful feelings under which they both wrote, the generous scorn and generous pathos of the historian acting on extraordinary gifts of imaginative insight and imaginative characterization, and the fierce indignation of the satirist finding its vent in exaggerating realism, have undoubtedly disturbed the completeness and exactness of the impressions which they received and have perpetuated; nevertheless their works are the last powerful voices of Rome, the last voices expressive of the freedom and manly virtue of the ancient world. In them alone among the writers of the empire the spirit of the Roman republic seems to revive. The *Letters* of Pliny (61-*c.* 115), though they do not contradict the representation of Tacitus and Juvenal regarded as an exposure of the political degradation and moral corruption of prominent individuals and classes, do much to modify the pervadingly tragic and sombre character of their representation, and to show that life even in the higher circles of Roman society had still sources of pure enjoyment and wellbeing.

With the death of Juvenal, the most important part of whose activity falls in the reign of Trajan, Roman literature as an original and national expression of the experience, character, and sentiment of the Roman state and empire, and as one of the great literatures of the world, may be considered as closed. There still continued to be much industry and activity in gathering up the memorials of the past and in explaining and illustrating the works of genius of the ages of literary creation. A kind of archaic revival took place in the reign of Hadrian, which showed itself both in affectation of style and in a renewed interest in the older literature. The most important works of the age succeeding that of Juvenal are the *Biographies* of Suetonius (*c.* 75-160), which did much to preserve a knowledge of both political and literary history. The *Noctes Atticæ* of Aulus Gellius, written in the latter part of the 2d century, have preserved many anecdotes, some of them of doubtful authenticity, concerning the older writers. The persistence of critical and grammatical studies and of interest in the literature of the past resulted in the 4th and 5th centuries in the works of Donatus and Servius and in the *Saturnalia* of Macrobius. The works of the great Latin grammarians are also to be connected with the scholarly study of antiquity which superseded to a great extent the attempt to produce works of new creation. The writer of most original genius among the successors of Juvenal and Tacitus is probably Apuleius, and his most original work, the *Metamorphoses*, has nothing of Roman or Italian colouring. The last writer who combines genius with something of national spirit is the poet Claudian, who wrote his epics under the immediate inspiring influence of a great national crisis and a national hero. As fresh blood came to the nearly exhausted literary genius of Italy from Spain in the first century of the empire, so in the later centuries it came from Africa. Whatever of original literary force appears either in the pagan or Christian literature written in the Latin language between the 2d and the 6th century is due to Romanized settlements in Africa. We have to remember during all these comparatively barren centuries that secular literature had again found its organ in the Greek language, and that the new spiritual life of the world had come into stern antagonism with many of the most powerful motives of classical poetry.

Literature.—The most important books on the subject are the *Geschichte der römischen Litteratur*, by J. C. F. Bähr; the *Grundriss der römischen Litteratur*, by G. Bernhardy; and the *Geschichte der römischen Litteratur*, by W. S. Teuffel. The last of these has been translated into English. There is also a *Geschichte der römischen Litteratur* by G. Munck. The most recent books on the subject in English are Mr. G. A. Simcox's *History of Latin Literature from Ennius to Boethius*, and the *History of Roman Literature from the Earliest Period to the Death of Marcus Aurelius*, by Mr C. T. Cruttwell. (W. Y. S.)

ROMANS, a town of France, in the department of Drôme, 12 miles north-east of Valence by the railway connecting this town with Grenoble, stands at the foot of an eminence on the right bank of the Isère, 530 feet above the sea. A fine stone bridge unites it with Bourg du Péage on the other side of the river. Both towns owe their prosperity to their situation in the most fertile part of the valley of the Isère, where land is sometimes sold at £200 per acre. The population of Romans was 11,916 (13,806 in the commune) in 1881. The present parish church belonged to an abbey founded in 837 by St Bernard, forty-ninth bishop of Vienne. The north portal, now condemned, dates from the 11th century; the principal portal is one of the finest specimens of 12th-century Romanesque; and the choir and the transept are striking examples of the style of the 13th. Romans has also a wealthy hospital and a large seminary. Besides the silk-trade the local industries comprise shoemaking, tanning, hat-making, oil-refining, &c.

ROMANS, Epistle to the. The origin of the Christian community at Rome is involved in obscurity. According to Catholic tradition it was founded by Peter, who was its bishop for a quarter of a century. But neither allegation has historical support. The most striking proof of the contrary is precisely this epistle of Paul. It does not contain the remotest reference to either the one fact or the other. And if Paul had written such an epistle to a community founded by Peter he would not only have violated the agreement mentioned in Gal. ii. 9, but would also have gone against his own principle of refraining from intrusion on the mission fields of others (Rom. xv. 20; 2 Cor. x. 16). But neither was Paul the founder of the church in Rome. This also is shown by the present epistle, in which he for the first time opens relations with a community already formed. Thus we are thrown upon mere conjecture. In pursuing the investigation we have this fact to start from, that even before the Christian era there already existed in Rome a strong Jewish colony. After the conquest of Jerusalem by Pompey (63 B.C.) numbers of Jewish prisoners of war were brought to Rome and there sold as slaves. Of these many were soon afterwards emancipated by their masters, Jewish slaves being a peculiarly inconvenient kind of property on account of the strictness of their observance of their law, especially in the matter of clean and unclean meats (Philo, *Leg. ad Caium*, ii. 568, ed. Mangey). These freedmen became the nucleus of a Jewish community, which ultimately settled in Trastevere and organized itself into an independent religious communion. It rapidly increased and became an important element in the life of the capital. By the time of Herod's death (4 B.C.) the independent Jews of Rome—that is, besides women and children—already numbered 8000 according to Josephus (*Antiq.*, xvii. 11, 1; *Bell. Jud.*, ii. 6, 1). In the reign of Tiberius indeed this large and powerful organization was dissolved at a single stroke, a decree of the senate (19 A.D.) having sent to Sardinia for military service all Jews capable of bearing arms (Tac., *Ann.*, ii. 85; Suet., *Tiber.*, 36; Joseph., *Antiq.*, xviii. 3, 5). It is probable, however, that after the death (31 A.D.) of Sejanus, to whom this measure had been mainly due, the Jews were expressly permitted to return to Rome, for we are told by Philo (*Leg. ad Caium*, ii. 569, ed. Mangey) that after the death of his favourite Tiberius perceived the Jews to have been unjustly calumniated, and ordered the authorities to refrain from oppressing them. At all events the community must ultimately have come together again, for in the reign of Claudius its existence is again presupposed, the idea of expelling the Jews from the capital having anew been entertained under that emperor. Regarding this proposal, however, accounts vary. According to the Acts of the Apostles (xviii. 2), and also Suetonius (*Claud.*, 25), it was actually carried out; but according to Dio Cassius (lx. 6) the expulsion was only proposed, and, when it was seen to be impracticable without great tumult, all that was done was to withdraw from the Jews their right of meeting. The latter version is doubtless the more correct. The withdrawal of the right of meeting was equivalent to the prohibition of public worship, and sufficiently explains why numbers left the city (Acts xviii. 2). But the main body must have remained and doubtless have again obtained the privilege of assembly, for from the time of Nero onwards we find the Jews in Rome once more flourishing with undiminished vigour.

From the midst of this Jewish community it was that the Christian congregation doubtless arose. The Jews of the Dispersion, it is well known, kept up an active correspondence with the mother-country in Palestine. Every year they sent their gifts and offerings thither, and every one in a position to do so went in person to the great festivals of the Holy City. As a result of this vigorously maintained intercourse, which was aided also by the interests of trade, tidings of Jesus as the promised Messiah did not fail to reach the capital of the empire. Individual Jews who had become believers came forward in Rome as preachers of the gospel and found acceptance with a section of their countrymen. They found a perhaps still more numerous following among the "God-fearing" or "devout" (σεβόμενοι, φοβούμενοι, τὸν θεόν) heathen, *i.e.*, within that large circle which consisted of those who had adopted the faith of the Jews, observed certain of the more important precepts of their law, and also attended their public worship, but did not, strictly speaking, belong to the communion, and thus represented a sort of Judaism of the second order.[1] In proportion as faith in Jesus as the Messiah gained ground within the Jewish community, a separation between the believers and the others would of course become more and more inevitable. Under what circumstances and conditions the separation actually took place is not now known. We may be sure, however, that it was not brought about without violent internal commotions; it is probable even that the edict of Claudius itself may have had its occasion in these. The remark of Suetonius (*Claud.*, 25) readily admits of being interpreted in such a sense: "Judæos impulsore Chresto[1] assidue tumultuantes Roma expulit." So interpreted, these words contain our first notice of the Christian Church in Rome; its earliest constitution must have taken place precisely then. For, as has already been seen, the edict of banishment was probably never carried out, or at all events did not continue long in force. Unfortunately, we do not know the date of it, but it must have belonged to the later years of Claudius, for in the beginning of his reign the disposition of that emperor towards the Jews was friendly (Jos., *Antiq.*, xix. 5). In its context also Acts xviii. 2 implies a late rather than an early date, say about 50-52 A.D.; and there is nothing against this in the circumstance that the edict is mentioned by Dio Cassius towards the beginning of his account of that reign, for in that particular passage the author is characterizing his subject in a general way and not referring to events in their chronological sequence.

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[1] Many scholars identify these "devout" heathen with the "proselytes of the gate" who are met with in Rabbinical literature; but in reality the two are quite distinct and unrelated.

If the foregoing suppositions are correct, Paul's epistle to the church at Rome was written some six or eight years after its formation. Paul was staying in Corinth at the time, in the last month before the eventful journey to Jerusalem which led to his captivity (58 A.D.). The evidence that the epistle was written during this last sojourn in Greece, which is only briefly alluded to in Acts xx. 2, 3, is simple and conclusive. We know from the Epistles to the Corinthians that shortly before this stay the apostle had set on foot throughout the churches of Macedonia and Achaia a collection on behalf of the needy church at Jerusalem (1 Cor. xvi.; 2 Cor. viii.-ix.). This collection it was his wish to carry in person from Corinth (1 Cor. xvi. 3-6; 2 Cor. i. 16; Acts xxiv. 17). But the Epistle to the Romans was written, as we learn from the author himself (Rom. xv. 24-28), when the collection had just been concluded and he was on the point of taking it with him to Jerusalem,—in other words, before his departure from Corinth, but not long before.

We have now to inquire into the motive which led the apostle precisely at such a juncture to address a communication so full and elaborate as this to the Christian community at Rome, with which he had no personal acquaintance. In general terms we have it from himself at the beginning and end of the epistle (i. 8-15, xv. 14 *sq.*). He had proclaimed the gospel in all the East from Jerusalem to Illyricum (xv. 19). He regarded his work in these quarters as for the present finished, and he felt impelled to preach Christ crucified also in the West. He was already looking towards Spain (Rom. xv. 24, 28). He wished first to take the collection to Jerusalem, and, that once accomplished, his labours in the West were to begin forthwith. But there, in Rome, the metropolis of the world, a community already existed which had come into being apart from any effort of his. For his activity in the West it was obviously of the utmost importance to secure the organization for himself and his message. Should its attitude be cold, he would be left without any secure base of operations. The purpose of the present epistle, then, is, to speak generally, this: to secure a connexion with the community at Rome, to gain it for himself and the gospel he carried. But had it hitherto been without that gospel? The community was at any rate already a Christian one. And, if perhaps it was in need of fuller teaching, why did he not wait until he arrived in person in Rome in order to give it? Surely he could have done this more effectually by word of mouth than by a written treatise. Why then, did he send this written message before him? There must have been some perfectly definite circumstances which led him to take this course. The nature of these will become clear to us when we seek to ascertain what at that juncture was the state of the Christian community in Rome.

Assuming that church to have arisen out of the midst of the Jewish community of the place, the most obvious conjecture is that at the period of the present letter it still continued to consist mainly of Jewish Christians, *i.e.*, that the majority of its members were Jews by birth who even after their conversion to Christ still continued to regard the Mosaic law in its totality as binding on them. This is the view which Baur in particular sought to establish,[2] as against the previously prevailing belief in the Gentile Christian character of the church in question. Baur's position was adopted by many subsequent critics, the most careful and elaborate defence of it, though with many modifications in detail, being that of Mangold.[3] An intermediate position between the older view and that of Baur has been sought by Beyschlag,[4] who works out the theory that the Christian community in Rome may possibly have been Jewish Christian in its way of thinking, yet at the same time Gentile Christian in its origin. In direct opposition to Baur, on the other hand, Theodor Schott[5] has again maintained the older view as to its Gentile character, and in all essential points this is also defended by Weizsäcker,[6] who, however, recognizes in Baur's hypothesis certain elements of truth by which the older theory must be corrected and supplemented.

In presence of the facts we are compelled to adopt the view of Weizsäcker as on the whole the right one. For the Jewish Christian character of the church Baur and Mangold, besides the argument from its presumable origin, have adduced a number of isolated texts. On the majority of these Mangold no longer lays any stress, since they admit of being otherwise interpreted. Thus when Paul designates Abraham as "our father" (τὸν προπάτορα ἡμῶν; iv. 1) he indeed includes his readers under the ἡμῶν. But in 1 Corinthians, an epistle certainly addressed to a church of Gentile Christians, the fathers of Israel are also called "our fathers" (1 Cor. x. 1). The Christian Church is in point of fact the true Israel; hence the patriarchs of Israel are its "fathers."[7] In another place (Rom. vii. 1) Paul addresses his readers as persons "who know the law." But this holds true not of born Jews alone but of Gentile Christians as well, to whom also the Old Testament was a sacred book. Mangold finds an "irrefragable evidence of the Jewish Christian character of the community in Rome" in Rom. vii. 4: "ye also, beloved brethren, have died to the law" (καὶ ὑμεῖς ἐθανατώθητε τῷ νόμῳ). If they have died to it they must of course have once lived under it: so argues Mangold quite correctly. But the inference that in such a case they must have been born Jews is nevertheless a rash one. Not the Jews only, who possess the written law, but the whole of pre-Christian mankind are in Paul's conception ideally under the law,—under its bondage and curse. For all alike redemption is a redemption from the law's penalty and dominion. Hence Paul can say even to born Gentiles, ἐθανατώθητε τῷ νόμῳ. But according to Baur and Mangold the decisive evidence for the Jewish Christian character of the Roman Christians is the whole substance of the present epistle. All its arguments have for their aim to establish and vindicate the free gospel of Paul as against the objections of the Judaizers. They therefore conclude that it can have been designed only for Judaistically-disposed readers whom Paul seeks by these representations to win for his gospel. This line of argument is at bottom sound, and Baur has rendered a real service by showing that the epistle is by no means an outline of the Pauline dogmatic as a whole, but is simply an elucidation of such points in it as were offensive to the Judaically-minded. A brief review of its contents will make this clear.

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[1] The vulgar pronunciation "Chrestus" for "Christus" is borne witness to in other passages (Tert., *Apol*, 3, and *Ad Nat.*, i. 3; Lactan., *Inst. Div.*, iv. 7. 5).

[2] First of all in his essay "Ueber Zweck u. Veranlassung des Romerbriefs," in the *Tübinger Zeitschr. f. Theol.*, 1836, hft. 3, p. 59 *sq.*

[3] *Der Römerbrief u. d. Anfänge der römischen Gemeinde*, Marburg, 1866; *Der Römerbrief u. seine geschichtlichen Voraussetzungen*, Marburg, 1884.

[4] "Ueber das geschichtliche Problem des Romerbriefs," in *Stud. u. Krit.*, 1867, p. 627 *sq.*

[5] *Der Romerbrief, seinem Endzweck u. Gedankengang nach ausgelegt*, Erlangen, 1858.

[6] "Ueber die älteste römische Christengemeinde," in *Jahrbb. f. deutsche Theol.*, 1876, p. 248 *sq.*

[7] The words κατὰ σάρκα in Rom. iv. 1 are not to be construed with προπάτορα ἡμῶν but with the verb εὑρηκέναι. Abraham is thus designated as "our father" only in the spiritual and not in the physical sense.

The epistle falls into two unequal parts,—a theoretical (i.-xi.) and a hortatory (xii.-xvi.). The latter is almost of the nature of a mere appendix. The proper kernel of the epistle, that for the sake of which it came to be written, is found in the theoretical exposition of the first eleven chapters. These again fall into two sections,—chaps. i.-v. laying the positive foundations of the Pauline gospel as freed from the law, and chaps. vi.-xi. containing the vindication of that gospel against objectors. Having shown directly in chaps. i.-v. that we can attain righteousness and so salvation not along the path of legal observance but only along the path of faith, that is to say, believing apprehension of the mercy of God in Christ, he goes on in chap. vi. to refute point by point the positions of the Judaizers. He shows that in the freedom from the law the freedom to sin is by no means involved; on the contrary, it is with the believer an inherent necessity that he should live a new life in his fellowship with Christ (chap. vi.), and precisely by that fellowship is he for the first time truly enabled so to live (chap. viii.). The law cannot give him this power; it only commands, and does not at the same time give strength to obey. Hence, although good in itself, it has for men only a pernicious effect, inasmuch as by its injunctions sinful desire is excited (chap. vii.). A special objection of the Judaizers against the activity of Paul was also this,—that he should have turned to the heathen while still the greater part of Israel remained unconverted. His answer to this is contained in chaps. ix.-xi. On the one hand, it is Israel's own fault to have rejected its salvation; on the other hand, such has been God's will. Israel is at present rejected in order that the heathen may step into the gap thus made. Yet the rejection of Israel is only for a time. By the admission of the heathen Israel is to be stirred to jealousy and thus at last to be also converted. Precisely in such intricate paths as these is the wonderful depth of the divine wisdom made manifest.

Thus all the theoretical disquisitions of the epistle are in reality neither more nor less than a vindication and a polemic against the Jewish Christian point of view. But are we to conclude from this that the readers were themselves Jewish Christians? Such an inference has against it the fact that Paul, both at the beginning and at the close of his epistle, clearly designates them as Gentile Christians. In i. 5, 6, and i. 13-15, as well as in xv. 15, 16, he appeals to his office as apostle of the Gentiles as justifying him in now writing to the church at Rome and in proposing further labours there. In xi. 13, also, the readers are spoken to as of Gentile birth. The arguments by which Baur and Mangold seek to weaken the force of this passage are very far-fetched. If, then, the Roman Christians were Gentiles by blood, the theory of Beyschlag, that they were Gentile Christians in origin but Jewish Christians by conviction, appears to have most to commend it in view of the contents of the epistle. If the epistle stopped short at the end of chap. xiii., we should indeed be compelled to adopt that theory. But the remaining chapters (xiv., xv.) suggest much rather that the majority were by conviction also Gentile Christians and emancipated from the law. For in the chapters specified Paul deals with a division that has arisen within the community. One section still remained in the bonds of the strictest legal scrupulosity: they regarded a vegetable diet (λάχανα) as alone permissible, rejecting the use of animal food (xiv. 2), and they also observed certain days (xiv. 5), by which, there can be no doubt, the Jewish sabbaths and festivals must be understood. In fact they were legal Jewish Christians, but Jewish Christians who in their asceticism went beyond the precepts of Mosaism, which indeed prohibits the use of the flesh of unclean animals, but not animal food in general. Over against these Jewish Christian ascetics, called by Paul "the weak in the faith," stood another section, whom he describes as "the strong." They rejected these legal observances, taking their stand on the gospel as freed from the law. But the latter must have been in the majority, for they are exhorted by the apostle to have a tender regard for the weakness of their brethren, and not by any harsh terrorism to force them into any courses which might offend their consciences. Such an exhortation, as Weizsäcker remarks, would have no meaning if the representatives of the freer view were not in the majority. The majority, then, of the church at Rome was Gentile Christian not only by origin but by conviction.

Here two problems arise, neither of which received sufficient attention from critics before Baur: (1) How are we to explain the origin, outside the limits of Paul's activity, of a Christian community thus free from the fetters of the law? and (2) How came it about that Paul should have addressed to such a community a letter like this,—adapted, as it appears to be, for Jewishly-inclined readers? As regards the first question, in the absence of adequate materials for a conclusive solution, our answer can only be conjectural. The problem is a difficult one, because, following Gal. ii., we must start with the assumption that the communities founded under the more direct influence of the original apostles did not reject the Jewish law. In seeking, then, to account for the existence of a community which had so done, we must carry with us the fact that within the wide limits of the Jewish Dispersion very various degrees of strictness in observance of the law were to be found. Even those who were in the truest sense members of the communities of the Dispersion can hardly have observed the law as strictly as did the Pharisees in Palestine. But the demands made on those "God-fearing" Gentiles who were wont to attach themselves, more or less closely, to the Jewish communities must of course have been still more accommodating. If only they accepted the monotheistic religion and its worship without the use of images, the ceremonial precepts laid upon them were reduced to a bare minimum,—the observance of Sabbaths, and also of some laws regarding meat. Now the community at Rome seems to have chiefly arisen out of the circles of such "God-fearing" Gentiles. As Paul himself gained access for the preaching of the gospel, at Thessalonica, for example, principally among the "God-fearing Greeks" (Acts xvii. 4), so also in Rome do these seem to have been the main element in the church. On this assumption we can understand how from the outset the community had not been in the habit of observing the Mosaic law. At most it was observed in isolated details, and as new members continued to be added from the outer heathen world these relics of Jewish custom received less and less prominence, fading away in presence of the faith in Jesus as the Redeemer. It is possible that influences from Pauline circles may also have come into play, but of this we cannot be sure.

If such were the circumstances in which the majority of the community in Rome had been brought to their attitude of freedom towards the law, that attitude was one of fact rather than of principle. The law was not observed; but there was no clear consciousness that it had no obligatory force. A community thus placed had no firm basis from which to withstand a Judaizing agitation when it should arise. In such an event there was the greatest danger to its very existence. It is here, then, that we must look for the real occasion of the present epistle. Paul was afraid that the Judaizers who had wrought with such effect within the churches founded by himself in Galatia and Corinth might also lay hold on that at Rome. Perhaps they had already arrived there and the apostle knew it. At all events he perceived a threatening danger. He was unwilling to delay till he could visit the church personally, and accordingly sent forthwith an elaborate document in establishment and vindication of the gospel as free from the law, so that the Roman Christians might be confirmed in their free practice and might be strengthened to withstand the agitations of Judaizers. This is the explanation of the fact that a letter addressed to a Gentile Christian church, not in bondage to the law, is yet almost entirely devoted to the refutation of the Judaistic positions.

The genuineness of the epistle is practically undisputed; not so, however, its integrity. Baur (as had already been done by Marcion in ancient times) disputed the genuineness of the last two chapters (xv., xvi.), chiefly on the ground that in them a spirit of concession towards the weak is urged in a wholly un-Pauline manner. Lucht[1] has sought to separate out the genuine from the spurious in these chapters in a very complicated manner, but substantially on the lines of Baur's criticism. The most thorough discussion of Baur's and Lucht's views is that of Mangold,[2] who has very convincingly shown that there is no real ground for refusing to attribute to the apostle the chapters in question. All the exhortations to concession do not, after all, go beyond the principle acted on by Paul himself (1 Cor. ix. 20),—"to the Jews I became as a Jew that I might win the Jews." In two points, however, the defence does not hold: (1) the doxology at the close (Rom. xvi. 25-27) appears certainly to be from a later hand;[3] (2) ch. xvi. 3-20 seems to be genuinely Pauline indeed, but not to belong to the present epistle. Not only is the large number of salutations in a letter addressed to a community personally unknown to the apostle in itself strange; but salutations also occur addressed to persons whom one would expect to find rather at Ephesus than at Rome (ver. 3, Aquila and Priscilla; ver. 5, Epænetus) and in districts where the apostle had resided and laboured (xvi. 7, 9, 13). Not without reason, therefore, is it conjectured that here we have a fragment of an epistle to the Ephesians which by mistake has come to be incorporated with that to the Romans.[4]

The more recent literature relating to the Epistle to the Romans has been fully catalogued and discussed in the work of Grafe (*Ueber Veranlassung u. Zweck des Romerbriefes*, Tubingen, 1881). The most important works in the list have already been named in the present article. (E. S*.)

ROMANUS I. (Lecapenus), who shared the imperial throne with CONSTANTINE VII. (*q.v.*) and exercised all the real power from 919 to 944, was admiral of the Byzantine fleet on the Danube when, hearing of the defeat of the army at Achelous (17th August 917), he resolved to sail for Constantinople. Popular caprice as well as his influence over his sailors aided his ambition, and, after the marriage of his daughter Helena to Constantine, he was first proclaimed "basileopater" in April 919 and afterwards crowned colleague of his son-in-law on 17th December of the same year. His reign, which was undistinguished and uneventful, was terminated by his own sons Stephen and Constantine, who in 944 carried him off to the island of Prote and compelled him to become a monk. He died in 948.

ROMANUS II., emperor of the East, succeeded his father Constantine VII. in 959 at the age of twenty-one, and died—poisoned, it was believed, by his wife, Theophano —in 963. He was a pleasure-loving sovereign, but showed judgment in the selection of his ministers. The great event of his reign was the conquest of Crete by Nicephorus Phocas.

ROMANUS III. (Argyrus), emperor of the East, was an accomplished but otherwise undistinguished member of the Byzantine aristocracy when, summoned to the palace of the dying Constantine VIII., he was informed that he had been selected to marry one of the imperial princesses and succeed the emperor. His hesitation as already a married man was removed by his wife, who generously took the veil; and his union with Zoe and their joint coronation were celebrated on 19th November 1028. Two days later Constantine died. A serious defeat which Romanus sustained in person at Azaz in Syria, when marching to take possession of Aleppo, considerably impaired the popularity among his subjects which he had sought to purchase by lavish concession to various classes, and soon afterwards he began to show symptoms of disease, attributed by many to slow poison administered by connivance of the empress. His death took place on 11th April 1034, and he was forthwith succeeded by MICHAEL IV. (*q.v.*).

ROMANUS IV. (Diogenes), emperor of the East from 1068 to 1071, was a member of a distinguished Cappadocian family and had risen to distinction in the army when he was convicted of treason against the sons of Constantine X. While waiting execution he was summoned into the presence of their mother, Eudocia Macrembolitissa, the empress regent, whom he so fascinated that she granted him a free pardon and shortly afterwards married him. Taking the field soon after his coronation, he carried on three campaigns against the Saracens and Seljuk Turks without achieving any decisive success, and in a fourth he was disastrously defeated by Alp Arslan on the banks of the Araxes and taken prisoner. Released from captivity after promising to pay a large ransom and concluding a treaty of peace, he returned homewards only to find revolution in full flood, and after a second defeat of his arms by the troops of Michael VII. he was compelled to resign the empire and retire to the island of Prote, where he soon died in great misery. It was during this reign that by the surrender of Bari (15th April 1071) the Byzantine empire lost its last hold upon Italy.

ROMAN WALL. See ANTONINUS, WALL OF, vol. ii. p. 139, and HADRIAN, WALL OF, vol. xi. p. 364.

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[1] *Ueber die beiden letzten Kapitel des Römerbriefes*, Berlin, 1871.

[2] *Der Römerbrief u. s. gesch. Voraussetz.*, pp. 1-164.

[3] See Mangold, *op. cit.*, pp. 44-81.

[4] See especially Mangold, *op. cit.*, pp. 147-164. Lightfoot (*St Paul's Epistle to the Philippians*, 2d ed., pp. 169-176) has shown that many of the names met with in Rom. xvi. 3-20 are found precisely in Roman inscriptions of the period of the emperors, but the fact is more striking than convincing. The names in themselves are common. It is not to the names but to the persons characterized that we have to look. But of these it is difficult to believe that they should all have been living in Rome.

ROME

PART I.—ROMAN HISTORY.

SECTION I.—ANCIENT HISTORY

1. *The Beginnings of Rome and the Monarchy.*

BOTH the city and the state of Rome are represented in tradition as having been gradually formed by the fusion of separate communities. The original settlement of Romulus is said to have been limited to the Palatine Mount. With this were united before the end of his reign the Capitoline and the Quirinal; Tullus Hostilius added the Cælian, Ancus Martius the Aventine; and finally Servius Tullius included the Esquiline and Viminal, and enclosed the whole seven hills with a stone wall. The growth of the state closely followed that of the city. To the original Romans on the Palatine were added successively the Sabine followers of King Tatius, Albans transplanted by Tullus, Latins by Ancus, and lastly the Etruscan comrades of Cæles Vibenna. This tradition is supported by other and more positive evidence. The race of the Luperci on February 15 was in fact a purification of the boundaries of the "ancient Palatine town,"[1] the "square Rome" of Ennius;[2] and the course taken is that described by Tacitus as the "pomoerium" of the city founded by Romulus.[3] On the Esquiline, Varro mentions an "ancient city" and an "earthen rampart,"[4] and the festival of the Septimontium is evidence of a union between this settlement and that on the Palatine.[5] The fusion of these "Mounts" with a settlement on the Quirinal "Hill" is also attested by trustworthy evidence;[6] and in particular the line taken by the procession of the Argei represents the enlarged boundaries of these united communities.[7] Lastly, the Servian agger still remains as a witness to the final enclosure of the various settlements within a single ring-wall. But is tradition right in representing this fusion of distinct settlements as a fusion also of communities of different race? Much of what it says on this point may be at once dismissed as fabulous. The tales of Æneas and his Trojans, of Evander and his Arcadians, of the followers of Heracles, and of the still earlier Aborigines have no claim to a place in history;[8] we cannot accept the tradition to which the Romans clung with proud humility of the asylum opened by Romulus, or believe that the ancestors of the Romans were a mixed concourse of outlaws and refugees,[9] nor, while admitting the probability of the tradition that in remote times the "Sicels" had dwelt on the seven hills, can we allow them any part or lot in the historic Roman people.[10] That this people were in the main homogeneous and in the main of Latin descent is unquestionable. Indications of the truth are not wanting even in the traditions themselves: King Faunus who rules the Aborigines on the Palatine is Latin; "Latini" is the name assumed by the united Aborigines and Trojans; the immediate progenitors of Rome are the Latin Lavinium and the Latin Alba. The evidence of the language, the religion, the institutions and civilization of early Rome points to the same conclusion. The speech of the Romans is from the first Latin;[11] the oldest gods of Rome—Saturn, Janus, Jupiter, Juno, Diana, &c.—are all Latin; "rex," "praetor," "dictator," "curia," are Latin titles and institutions.[12] Geographically too the low hills by the Tiber form a part of the strip of coast-land from which the Latini took their name, and the primitive settlements, with their earthen ramparts and wooden palisades planted upon them out of reach both of human foes and of the malaria of the swampy low grounds, are only typical of the mode of settlement which the conditions of life dictated throughout Latium.[13] But tradition insists on the admixture of at least two non-Latin elements, a Sabine and an Etruscan. The question as regards the latter will be more fully discussed hereafter; it is enough to say here that there is no satisfactory evidence that any one of the communities which combined to form Rome was Etruscan, or that there was any important Etruscan strain in the Roman blood.[14] With the Sabines it is otherwise. That union of the Palatine and Quirinal settlements which constituted so decisive a stage in the growth of Rome is represented as having been in reality a union of the original Latins with a band of Sabine invaders who had seized and held not only the Quirinal Hill but the northern and nearest peak of the Capitoline Mount. The tradition was evidently deeply rooted. The name of the Quirinal Hill itself was derived from the Sabine town of Cures.[15] The ancient worships connected with it were said to be Sabine.[16] One of the three old tribes, the Tities, was believed to represent the Sabine element;[17] the second and the fourth kings are both of Sabine descent. By the great majority of modern writers the substance of the tradition, the fusion of a body of Sabine invaders with the original Latins, is accepted as historical; and even Mommsen allows its possibility, though he throws back the time of its occurrence to an earlier period than that of the union of the two settlements.[18] We cannot here enter into the question at length, but two statements may be safely made respecting it. The Sabine invasion, if it took place at all, must have taken place far back in the prehistoric age; it must have been on a small scale; and the Sabine invaders must have amalgamated easily and completely with the Latin settlers. The structure of the early Roman state, while it bears evident marks of a fusion of communities, shows no traces of a mixture of race. Nor is it easy to point to any provably Sabine element in the language, religion, or civilization of primitive Rome.[1] The theory of a Sabine conquest can hardly be maintained in the face of the predominantly Latin character of both people and institutions. On the other hand, the probability of a Sabine raid and a Sabine settlement, possibly on the Quirinal Hill, in very early times may be admitted. The incursions of the highland Apennine tribes into the lowlands fill a large place in early Italian history. The Latins were said to have originally descended from the mountain glens near Reate.[2] The invasions of Campania and of Magna Græcia by Sabellian tribes are matter of history, and the Sabines themselves are represented as a restless highland people, ever seeking new homes in richer lands.[3] In very early days they appear on the borders of Latium, in close proximity to Rome, and Sabine forays are familiar and frequent occurrences in the old legends.

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[1] Varro, *L. L.*, vi. 34.

[2] Fest., 258; Varro ap. Solinus, i. 17.

[3] Tac., *Ann.*, xii. 24. For a full discussion of the exact limits of the Palatine city see Smith, *Dict. Geog.*, s. v. "Roma"; Jordan, *Topog. d. Stadt Rom*, i. cap. 2; Gilbert, *Topog. u. Gesch. d. Stadt Rom*, i. caps. 1, 2; and "Topography" below.

[4] *L. L.*, v. 48; *cf. ibid.*, 50.

[5] Festus, 348; Jordan, i. 199; Gilbert, i. 161. The seven "montes" are the Palatine with the Velia and Germalus, the Subura, and the three points of the Esquiline (Fagutal, Oppius, and Cispius).

[6] See Mommsen, *R. G.* (7th ed.), i. 51.

[7] Varro, *L. L.*, v. 45, vii. 44; Jordan, ii. 237.

[8] For these traditions see Dionys., i. 31-71.

[9] For a criticism of the myth of the asylum see Schwegler, *R. G.*, i. 465 *sq.*, who, however, exaggerates the mixed character of the Roman people. Hegel, *Phil. d. Gesch.*, 345, takes the story seriously.

[10] Dionys., i. 9: Thuc., vi. 2; Dionys., i. 16, ii. 1.

[11] The theory that Latin was a "mongrel speech" is now discarded; see Schwegler, i. 190, and LATIN LANGUAGE, vol. xiv. p. 327.

[12] The title "rex" occurs on inscriptions at Lanuvium, Tusculum, Bovillæ; Henzen, *Bullettino dell. Inst.*, 1868, p. 159; Orelli, 2279; *Corp. I. Lat.*, vi., 2125. For "dictator" and "praetor," see Livy, i. 23, viii. 3; *cf.* Marquardt, *Röm. Staatsverwaltung*, i. 475; for "curia," Serv. on *Æn.* i. 17; Marquardt, i. 467.

[13] Helbig, *Die Italiker in d. Poebene*: Pohlmann, *Anfänge Roms*, 40; Abeken, *Mittel-Italien*, 61 *sq.*

[14] The existence of a Tuscan quarter (Tuscus vicus) in early Rome probably points to nothing more than the presence in Rome of Etruscan artisans and craftsmen. The Etruscan origin ascribed to the third tribe, the "Luceres," is a mere guess; see Schwegler, i. 504, and Lange, *Röm. Alterth.*, i. 85.

[15] Varro, *L. L.*, v. 51.

[16] Varro, *L. L.*, v. 74; Schwegler, i. 248 *sq.*; but Mommsen (*R. G.*, i. 53) points out that most of these so-called Sabine deities are at least equally Latin.

[17] Varro, *L. L.*, v. 55; Livy, i. 13.

[18] Mommsen, *R. G.*, i. 43. Schwegler (*R. G.*, i. 478) accepts the tradition of a Sabine settlement on the Quirinal, and considers that in the united state the Sabine element predominated. Volquardsen (*Rhein. Mus.*, xxxiii. 559) believes in a complete Sabine conquest; and so does Zoller (*Latium u. Rom*, Leipsic, 1878), who, however, places it after the expulsion of the Tarquins. Gilbert (*Topogr.*, i. cap. 5) accepts the Sabine settlement, but holds rightly that in the union the Latin element decisively predominated.

The early state.

Such is all we know of the manner in which the separate settlements on the seven hills grew into a single city and community. How long Rome took in the making, or when or by whom the work was completed, we cannot say. Nor is it possible to give more than a very meagre outline of the constitution and of the history of the united state in the early days of its existence.

The people.

The "populus Romanus" was, we are told, divided into three tribes, Ramnes, Tities, and Luceres,[4] and into thirty "curiae." The three tribes probably represent a primitive clan division, older than the Roman state itself. They survived in later times only as divisions of the ancient "equitum centuriae," and even in the accounts of the earliest constitution they have ceased to serve as a political division of the people.[5] Of far greater importance is the division into "curiae." In Cicero's time there were still curies, curial festivals, and curiate assemblies, and modern authors are unquestionably right in regarding the curia as the keystone of the primitive political system. It was a primitive association held together by participation in common "sacra," and possessing common festivals, common priests, and a common chapel, hall, and hearth. The members of a curia were very probably neighbours and kinsmen, but the curia seems to represent a stage in political development midway between that in which clanship is the sole bond of union and that in which such claims as those of territorial contiguity and ownership of land have obtained recognition. As separate associations the curiæ are probably older than the Roman state, but,[6] however this may be, it is certain that of this state when formed they constituted the only effective political subdivisions. The members of the thirty curiæ are the populus Romanus, and the earliest known condition of Roman citizenship is the "communio sacrorum," partnership in the curial "sacra." Below the curia there was no further political division, for there is no reason to believe that the curia was ever formally subdivided into a fixed number of gentes and families.[7] Nor can we assent to the view which would represent the curiæ as containing only the "patrician gentes." The primitive Roman people of the thirty curiæ included all the freemen of the community, simple as well as gentle.[8]

At their head was the "rex," the ruler of the united people. The Roman "king" is not simply either the hereditary and patriarchal chief of a clan, the priestly head of a community bound together by common sacra, or the elected magistrate of a state, but a mixture of all three.[9] In later times, when no "patrician magistrates" were forthcoming to hold the elections for their successors, a procedure was adopted which was believed to represent the manner in which the early kings had been appointed.[10] In this procedure the ancient privileges of the old "gentes" and their elders, the importance of maintaining unbroken the continuity of the "sacra," on the transmission and observance of which the welfare of the community depended, and thirdly the rights of the freemen, are all recognized. On the death of a king, the auspicia, and with them the supreme authority, revert to the council of elders, the "patres," as representing the "gentes." By the "patres" an "interrex" is appointed, who in turn nominates a second; by him, or even by a third or fourth interrex, a new king is selected in consultation with the "patres." The king-designate is then proposed to the freemen assembled by their curiæ for their acceptance, and finally their formal acceptance is ratified by the "patres," as a security that the "sacra" of which they are the guardians have been respected.[11] Thus the king is in the first instance selected by the representatives of the old gentes, and they ratify his appointment. In form he is nominated directly by a predecessor from whose hands he receives the auspicia. But it is necessary also that the choice of the patres and the nomination of the interrex should be confirmed by a solemn vote of the community.

It is useless to attempt a precise definition of the prerogatives of the king when once installed in office. Tradition ascribes to him a position and powers closely resembling those of the heroic kings of Greece. He rules for life, and he is the sole ruler, unfettered by written statutes. He is the supreme judge, settling all disputes and punishing wrongdoers even with death. All other officials are appointed by him. He imposes taxes, distributes lands, and erects buildings. Senate and assembly meet only when he convenes them, and meet for little else than to receive communications from him. In war he is absolute leader,[1] and finally he is also the religious head of the community. It is his business to consult the gods on its behalf, to offer the solemn sacrifices, and to announce the days of the public festivals. Hard by his house was the common hearth of the state, where the vestal virgins cherished the sacred fire.

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[1] See Mommsen, i. 43. The Sabine words in Latin, if not common to both dialects, were probably introduced later, or are Sabinized Latin (Mommsen, *Unterital. Dialekten*, 347). Schwegler's attempt to distinguish Sabine features in the Roman character is ingenious but unsatisfactory.

[2] Cato ap. Dionys., ii. 48, 40.

[3] Cato ap. Dionys., ii. 48, 49. For the institution of the "ver sacrum" see Schwegler, *Röm. Gesch.*, i. 240; Nissen, *Templum*, iv.

[4] The tradition connecting the Ramnes with Romulus and the Tities with Tatius is as old as Ennius (Varro, *L. L.*, v. 55). Mommsen (i. 41) explains Ramnes as = Romani, but this etymology is rejected by Schwegler and by Corssen. As regards the Luceres there is little to add to Livy's statement (i. 13), "nominis et originis causa incerta est." *Cf.*, on the whole question, Schwegler, i. 505, and Volquardsen, *Rhein. Mus.*, xxxiii. 538.

[5] They are traditionally connected only with the senate of 300 patres, with the primitive legion of 3000, with the vestal virgins, and with the augurs (Varro, *L. L.*, v. 81, 89, 91; Livy, x. 6; Festus, 34 , Mommsen, i. 41, 74, 75; Genz, *Patricisch. Rom*, 90)

[6] It is possible that the curiæ were originally connected with separate localities; *cf.* such names as Foriensis, Veliensis (Fest., 174; Gilbert, i. 213).

[7] Niebuhr's supposition of ten gentes in each curia has nothing in its favour but the confused statement of Dionysius as to the purely military δέκαδες (Dionys., ii. 7; *cf.* Muller, *Philologus*, xxxiv. 96).

[8] The view taken here on the vexed question of the purely patrician character of the curiæ is that of Mommsen (*Röm. Forschungen*, vol. i.).

[9] Rubino, Genz, and Lange insist on the hereditary patriarchal character of the kingship, Ihne on its priestly side, Schwegler on its elective. Mommsen comes nearest to the view taken in the text, but fails to bring out the nature of the compromise on which the kingship rests.

[10] Cic. *De Legg.*, iii. 3, Livy, iv. 7.

[11] "Patres auctores facti," Livy, i. 22; "patres fuere auctores," Id., i. 32. In 339 B.C. (Livy, viii. 12) the Publilian law directed that this sanction should be given beforehand, "ante initum suffragium," and thus reduced it to a meaningless form (Livy, i. 11). It is wrongly identified by Schwegler with the "lex curiata de imperio," which in Cicero's day followed and did not precede election. According to Cicero (*De Rep.*, ii. 13, 21), the proceedings included, in addition to the "creation" by the comitia curiata and the sanction of the patres, the introduction by the king himself of a lex curiata conferring the imperium and auspicia; but this theory, though generally accepted, is probably an inference from the practice of a later time, when the "creatio" had been transferred to the "comitia centuriata."

By the side of the king stood the senate, or council of elders. In the descriptions left us of the primitive senate, as in those of the "rex," we can discover traces of a transition from an earlier state of things when Rome was only an assemblage of clans or village communities, allied indeed, but each still ruled by its own chiefs and headmen, to one in which these groups have been fused into a single state under a common ruler. On the one hand the senate appears as a representative council of chiefs, with inalienable prerogatives of its own, and claiming to be the ultimate depository of the supreme authority and of the "sacra" connected with it. The senators are the "patres"; they are taken from the leading "gentes"; they hold their seats for life; to them the "auspicia" revert on the death of a king; they appoint the interrex from their own body, are consulted in the choice of the new king,[2] and their sanction is necessary to ratify the vote of the assembled freemen. On the other hand they are no longer supreme. They cannot appoint a king but with the consent of the community, and their relation to the king when appointed is one of subordination. Vacancies in their ranks are filled up by him, and they can but give him advice and counsel when he chooses to consult them.

The popular assembly of united Rome in its earliest days was that in which the freemen met and voted by their curiæ (comitia curiata[3]). The assembly met in the comitium at the north-east end of the forum,[4] at the summons and under the presidency of the king or, failing him, of the "interrex." By the "rex" or "interrex" the question was put, and the voting took place "curiatim," the curiæ being called up in turn. The vote of each curia was decided by the majority of individual votes, and a majority of the votes of the curiæ determined the final result. But the occasions on which the assembly could exercise its power must have been few. Their right to elect magistrates was apparently limited to the acceptance or rejection of the king proposed by the interrex. Of the passing of laws, in the later sense of the term, there is no trace in the kingly period. Dionysius's statement[5] that they voted on questions of war and peace is improbable in itself and unsupported by tradition. They are indeed represented, in one instance, as deciding a capital case, but it is by the express permission of the king and not of right.[6] Assemblies of the people were also, and probably more frequently, convened for other purposes. Not only did they meet to hear from the king the announcement of the high days and holidays for each month, and to witness such solemn religious rites as the inauguration of a priest, but their presence (and sometimes their vote) was further required to authorize and attest certain acts, which in a later age assumed a more private character. The disposal of property by will[7] and the solemn renunciation of family or gentile "sacra"[8] could only take place in the presence of the assembled freemen, while for adoption[9] (arrogatio) not only their presence but their formal consent was necessary

Such in outline was the political structure of th Roman state at the earliest period known to us. It is clear that it belongs to a comparatively advanced stage in the development of society, and that a long previous history lies behind it. Traces of an older and more primitive order of things still linger in the three ancient shadowy tribes, in the curiæ and gentes, in many of the features noticeable in the senate; but they are traces of an order that has passed away. The supremacy of the state is established over the groups out of whose fusion it has grown, and such of these groups as still retain a distinct existence are merely private corporations. Private differences are settled and wrongdoers punished by the state tribunals, and even within the close limits of the family the authority of the head is limited by the claims of the state upon the services of the sons and dependants.

Rome under the kings.

A history of this early Roman state is out of the question. The names, dates, and achievements of the first four kings are all too unsubstantial to form the basis of a sober narrative;[10] a few points only can be considered as fairly well established. If we except the long eventless reign ascribed to King Numa, tradition represents the first kings as incessantly at war with their immediate neighbours. The details of these wars are no doubt mythical; but the implied condition of continual struggle, and the narrow range within which the struggle is confined, may be accepted as true. The picture drawn is that of a small community with a few square miles of territory, at deadly feud with its nearest neighbours, within a radius of some 12 miles round Rome. Nor, in spite of the repeated victories with which tradition credits Romulus, Ancus, and Tullus, does there seem to have been any real extension of Roman territory except towards the sea. Fidenæ remains Etruscan; the Sabines continue masters up to the Anio; Præneste, Gabii, and Tusculum are still untouched; and on this side it is doubtful if Roman territory, in spite of the possible destruction of Alba, extended to a greater distance than the sixth milestone from Rome.[11] But along the course of the Tiber below the city there was a decided advance. The fortification of the Janiculum, the building of the "pons sublicius," the foundation of Ostia, and the acquisition of the saltworks near the sea may all be safely ascribed to this early period. Closely connected, too, with the control of the Tiber from Rome to the sea was the subjugation of the petty Latin communities lying south of the river; and the tradition of the conquest and destruction of Politorium, Tellenæ, and Ficana is confirmed by the absence in historical times of any Latin communities in this district.

With the reign of the fifth king Tarquinius Priscus a marked change takes place. The traditional accounts of the last three kings not only wear a more historical air than those of the first four, but they describe something like a transformation of the Roman city and state. Under the rule of these latter kings the separate settlements are for the first time enclosed with a rampart of colossal size and extent.[1] The low grounds are drained, and a forum and circus elaborately laid out; on the Capitoline Mount a temple is erected, the massive foundations of which were an object of wonder even to Pliny.[2] To the same period are assigned the redivision of the city area into four new districts and the introduction of a new military system. The kings increase in power and surround themselves with new splendour. Abroad, too, Rome suddenly appears as a powerful state ruling far and wide over southern Etruria and Latium. These startling changes are, moreover, ascribed to kings of alien descent, who one and all ascend the throne in the teeth of established constitutional forms. Finally, with the expulsion of the last of them—the younger Tarquin—comes a sudden shrinkage of power. At the commencement of the republic Rome is once more a comparatively small state, with hostile and independent neighbours at her very doors. It is difficult to avoid the conviction that the true explanation of this phenomenon is to be found in the supposition that Rome during this period passed under the rule of powerful Etruscan lords.[3] In the 7th and 6th centuries B.C., and probably earlier still, the Etruscans appear as ruling widely outside the limits of Etruria proper. They were supreme in the valley of the Po until their power there was broken by the irruption of Celtic tribes from beyond the Alps, and while still masters of the plains of Lombardy they established themselves in the rich lowlands of Campania, where they held their ground until the capture of Capua by the Samnite highlanders in 423 B.C. It is on the face of it improbable that a power which had extended its sway from the Alps to the Tiber, and from the Liris to Surrentum, should have left untouched the intervening stretch of country between the Tiber and the Liris. Nor are we without evidence of Etruscan rule in Latium.[4] According to Dionysius there was a time when the Latins were known to the Greeks as Tyrrhenians, and Rome as a Tyrrhenian city.[5] When Æneas landed in Italy the Latins were at feud with Turnus (Turrhenos? Dionys., i. 64) of Ardea, whose close ally is the ruthless Mezentius, prince of Cære, to whom the Latins had been forced to pay a tribute of wine.[6] Cato declared the Volsci to have been once subject to Etruscan rule,[7] and Etruscan remains found at Velitræ,[8] as well as the second name of the Volscian Auxur, Tarracina (the city of Tarchon), tend to confirm his statement. Nearer still to Rome is Tusculum, with its significant name, and at Alba we hear of a prince Ταρχέτιος,[9] lawless and cruel like Mezentius, who consults the "oracle of Tethys in Tyrrhenia." Thus we find the Etruscan power encircling Rome on all sides, and in Rome itself a tradition of the rule of princes of Etruscan origin. The Tarquinii come from South Etruria; their name can hardly be anything else than the Latin equivalent of the Etruscan Tarchon, and is therefore possibly a title (= "lord" or "prince") rather than a proper name.[10] Even Servius Tullius was identified by Tuscan chroniclers with an Etruscan "Mastarna."[11] Again, what we are told of Etruscan conquests does not represent them as moving, like the Sabellian tribes, in large bodies and settling down *en masse* in the conquered districts. We hear rather of military raids led by ambitious chiefs who carve out principalities for themselves with their own good swords, and with their followers rule oppressively over alien and subject peoples.[12] And so at Rome the story of the Tarquins implies not a wave of Etruscan immigration so much as a rule of Etruscan princes over conquered Latins.

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[1] For the references, see Schwegler, i. 646 *sq.*

[2] If the analogy of the "rex sacrorum" is to be trusted, the "king" could only be chosen from the ranks of the "patricii." Cic. *Pro Domo*, 14; Gaius, i. 122.

[3] Cic. *De Rep.*, ii. 13; Dionys., ii. 14, &c.

[4] Varro, *L. L.*, v. 156. For the position of the "comitium," see Smith, *Dict. Geog.*, *s.v.* "Roma," and Jordan, *Topog. d. Stadt Rom.*

[5] Dionys., *l.c.*

[6] Livy, i. 26; Dionys., iii. 22.

[7] Gaius, ii. 101.

[8] Gell., xv. 27.

[9] Gell., v. 19, "Comitia praebentur, quae curiata appellantur." *Cf.* Cic. *Pro Domo*, 13, 14; and see ROMAN LAW.

[10] By far the most complete criticism of the traditional accounts of the first four kings will be found in Schwegler's *Röm. Geschichte*, vol. i.; compare also Ihne's *Early Rome*, and Sir G. C. Lewis's *Credibility of Early Roman History.*

[11] The "fossa Cluilia," 5 miles from Rome (Livy, ii. 39), is regarded by Schwegler (i. 585) and by Mommsen (i. 45) as marking the Roman frontier towards Latium. *Cf.* Ovid., *Fast.*, ii. 681; Strabo, 230, "*μεταξὺ γοῦν τοῦ πέμπτου καὶ τοῦ ἕκτου λίθου* [illegible] . *τόπος Φῆστοι . . . ὅριον τῆς τότε Ῥωμαίων γῆς.*"

The achievements ascribed to the Tarquins are not less characteristic. Their despotic rule and splendour contrast with the primitive simplicity of the native kings. Only Etruscan builders, under the direction of wealthy and powerful Etruscan lords, could have built the great cloaca, the Servian wall, or the Capitoline temple,—monuments which challenged comparison with those of the emperors themselves. Nor do the traces of Greek influence upon Rome during this period[13] conflict with the theory of an Etruscan supremacy; on the contrary, it is at least possible that it was thanks to the extended rule and wide connexions of her Etruscan rulers that Rome was first brought into direct contact with the Greeks, who had long traded with the Etruscan ports and influenced Etruscan culture.[14]

The Servian reform.

These Etruscan princes are represented, not only as having raised Rome for the time to a commanding position in Latium and lavished upon the city itself the resources of Etruscan civilization, but also as the authors of important internal changes. They are represented as favouring new men at the expense of the old patrician families, and as reorganizing the Roman army on a new footing, a policy natural enough in military princes of alien birth, and rendered possible by the additions which conquest had made to the original community. From among the leading families of the conquered Latin states a hundred new members were admitted to the senate, and these gentes thenceforth ranked as patrician, and became known as "gentes minores."[15] The changes in the army begun, it is said, by the elder Tarquin and completed by Servius Tullius were more important. The basis of the primitive military system had been the three tribes, each of which furnished 1000 men to the legion and 100 to the cavalry.[16] Tarquinius Priscus, we are told, contemplated the creation of three fresh tribes and three additional centuries of horsemen with new names,[17] though in face of the opposition offered by the old families he contented himself with simply doubling the strength without altering the names of the old divisions.[18] But the change attributed to

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[1] Livy, i. 36.

[2] Livy, i. 38, 55; Plin., *N. H.*, xxxvi. 15.

[3] This is the view of O. Muller, and more recently of Deecke, Gardthausen, and Zoller; it is rejected by Schwegler. Mommsen accepts the Etruscan origin of the Tarquins, but denies that it proves an Etruscan rule in Rome.

[4] Zoller, *Latium u. Rom*, 166, 189; Gardthausen, *Mastarna* (Leipsic, 1882); Cuno's *Verbreitung d. Etr. Stammes* (Graudenz, 1880) is highly fanciful.

[5] Dionys., i. 29.

[6] Livy, i. 2; Dionys., i. 64, 65; Plut., *Q. R.*, 18.

[7] Cato ap. Serv., *Æn.*, xi. 567.

[8] Helbig, *Ann. d. Inst.*, 1865.

[9] Plut., *Rom.*, 2, *παρανομώτατος καὶ ὠμότατος*; *cf.* Rutulian Tarquitius, Virg., *Æn.*, x. 550.

[10] Müller-Deecke, i. 69, 70; Zoller, *Latium v. Rom*, 168; *cf.* Strabo, p. 219; Serv. on *Æn.*, x. 179, 198. The existence of an independent "gens Tarquinia" of Roman extraction (Schwegler, i. 675) is unproven and unlikely. Nor can "Tarquinius" mean "of Tarquinii"; this would require "Tarquiniersis" as a cognomen.

[11] See speech of Claudius, *Tab. Lugd.*, App. to Nipperdey's edition of the *Annals* of Tacitus, "Tusce Mastarna ei nomen erat." For the painting in the François tomb at Vulci, see Gardthausen, *Mastarna*, 29 *sq.*; *Annali dell. Instit.*, Rome, 1859.

[12] *Cf.* the traditions of Mezentius, of Cæles Vibenna, Porsena, &c.

[13] Schwegler, *R. G.*, i. 679 *sq.*

[14] Schwegler, i. 791, 792. He accepts as genuine, and as representing the extent of Roman rule and connexions under the Tarquins, the first treaty between Rome and Carthage mentioned by Polybius (iii. 22); see, for a discussion of the question, Vollmer, *Rhein. Mus.*, xxxii. 614 *sq.*; Mommsen, *Röm. Chronologie*, 20; Dyer, *Journ. of Philol.*, ix. 238.

[15] Livy, i. 35; Dionys., iii. 67; Cic. *De Rep.*, ii. 20.

[16] Varro, *L. L.*, v. 89.

[17] Livy, i. 36; Dionys., iii. 71.

[18] The six centuries of horsemen were thenceforward known as "primi secundique Ramnes" (Fest., 344; *cf.* Schwegler, i. 685 *sq.*). It is possible that the reforms of Tarquinius Priscus were limited to the cavalry.

Servius Tullius went far beyond this. His famous distribution of all freeholders (assidui) into tribes, classes, and centuries,[1] though subsequently adopted with modifications as the basis of the political system, was at first exclusively military in its nature and objects.[2] It amounted in fact to the formation of a new and enlarged army on a new footing. In this force, excepting in the case of the centuries of the horsemen, no regard was paid either to the old clan divisions, or to the semi-religious semi-political curiæ. In its ranks were included all freeholders within the Roman territory, whether members or not of any of the old divisions, and the organization of this new army of assidui was not less independent of the old system with its clannish and religious traditions and forms. The unit was the "centuria" or company of 100 men; the centuriæ were grouped in "classes" and drawn up in the order of the phalanx.[3] The centuries in front were composed of the wealthier citizens, whose means enabled them to bear the cost of the complete equipments necessary for those who were to bear the brunt of the onset. These centuries formed the first class. Behind them stood the centuries of the second and third classes, less completely armed, but making up together with those of the first class the heavy-armed infantry.[4] In the rear were the centuries of the fourth and fifth classes, recruited from the poorer freeholders, and serving only as light-armed troops. The entire available body of freeholders was divided into two equal portions, a reserve corps of "seniores" and a corps of "juniores" for active service. Each of these corps consisted of 85 centuries or 8500 men, *i.e.*, of two legions of about 4200 men each, the normal strength of a consular legion under the early republic.[5] It is noticeable also that the heavy-armed centuries of the three first classes in each of these legions represented a total of 3000 men, a number which agrees exactly with the number of heavy-armed troops in the legion as described by Polybius. Attached to the legions, but not included in them, were the companies of sappers and trumpeters. Lastly, to the six centuries of horsemen, which still retained the old tribal names, twelve more were added as a distinct body, and recruited from the wealthiest class of citizens.[6] The four "tribes" also instituted by Servius were probably intended to serve as the basis for the levy of freeholders for the new army.[7] As their names show, they corresponded with the natural local divisions of the city territory,[8] but that they included freeholders residing on Roman territory but outside Rome is indicated by the fact that both Ostia and Alba belonged to the Palatine tribe.[9]

Fall of the monarchy

The last of these Etruscan lords to rule in Rome was Tarquin the Proud He is described as a splendid and despotic monarch. His sway extended over Latium as far south as Circeii. Aristodemus, tyrant of Cumæ, was his ally, and kinsmen of his own were princes at Collatia, at Gabii, and at Tusculum. The Volscian highlanders were chastised, and Signia with its massive walls was built to hold them in check. In Rome itself the Capitoline temple and the great cloaca bore witness to his power. But his rule pressed heavily upon the Romans, and at the last, on the news of the foul wrong done by his son Sextus to a noble Roman matron Lucretia, the indignant people rose in revolt. Tarquin, who was away besieging Ardea, was deposed; sentence of exile was passed upon him and upon all his race; and the people swore that never again should a king rule in Rome. Freed from the tyrant, they chose for themselves two yearly magistrates who should exercise the supreme authority, and thus the republic of Rome was founded. Three times the banished Tarquin strove desperately to recover the throne he had lost. First of all the men of Veii and Tarquinii marched to his aid, but were defeated in a pitched battle on the Roman frontier. A year later Lars Porsena, prince of Clusium, at the head of all the powers of Etruria, appeared before the gates of Rome, and closely besieged the city, until, moved by the valour of his foe, he granted honourable terms of peace and withdrew.[10] Once again, by Lake Regillus, the Romans fought victoriously for their liberty against Tarquin's son-in-law Mamilius, prince of Tusculum, and chief of the Latin name. Mamilius was slain; Tarquin in despair found a refuge at Cumæ. and there soon afterwards died.

So, in brief, ran the story of the flight of the kings, as it was told by the chroniclers whom Livy followed Its details are most of them fabulous; it is crowded with inconsistencies and improbabilities; there are no trustworthy dates; the names even of the chief actors are probably fictitious, and the hand of the improver, Greek or Roman, is traceable throughout.[11] The struggle was doubtless longer and sharper, and the new constitution more gradually shaped, than tradition would have us believe. Possibly, too, this revolution in Rome was but a part of a widespreading wave of change in Latium and central Italy, similar to that which in Greece swept away the old heroic monarchies. But there is no room for doubting the main facts of the emancipation of Rome from the rule of alien princes and the final abolition of the kingly office.

II. *The Republic.*

245–48 A.U.C.

PERIOD I.: 509–265 B.C.[12]—(*a*) *The Struggle between the Orders.*—It is characteristic of Rome that the change from monarchy to republic[13] should have been made with the least possible disturbance of existing forms. The title of king was retained, though only as that of a priestly officer (rex sacrorum) to whom some of the religious functions of the former kings were transferred. The two annually elected consuls, or "praetores,"[14] were regarded as joint heirs of the full kingly authority, and as holding the "imperium," and the correlative right of auspices, by direct transmission from the founder of the city. They were, it is true, elected or created by a new assembly, by the army of freeholders voting by their classes and centuries (comitia centuriata), and to this body was given also the right of passing laws; but nevertheless it was still by a vote of the 30 curies (lex curiata) that the supreme authority was formally conferred on the magistrates chosen by the centuries of freeholders, and both the choice of magistrates and the passing of laws still required the sanction of the patrician senators (patrum auctoritas).[1] Nor, lastly, were the legal prerogatives of the senate altered, although it is probable that before long plebeians were admitted to seats, if not to votes, and though its importance was gradually increased by the substitution of an annual magistracy for the life-long rule of a single king. But the abolition of the monarchy brought with it a change of the utmost importance in the actual working of the constitution. Though the distinction between patricians and plebeians was at least as old as the state itself, it is not until the establishment of the republic that it plays any part in the history of Rome. No sooner, however, was the overshadowing authority of the king removed than a struggle commenced between the two orders which lasted for more than two centuries. It was in no sense a struggle between a conquering and a conquered class, or between an exclusive citizen body and an unenfranchised mass outside its pale.[2] Patricians and plebeians were equally citizens of Rome, sprung of the same race and speaking the same tongue. The former were the members of those ancient "gentes" which had possibly been once the "chiefly" families in the small communities which preceded the united state, and which claimed by hereditary right a privileged position in the community. Only patricians could sit in the council of patres, and hence probably the name given to their order.[3] To their representatives the supreme authority reverted on the death of the king; the due transmission of the auspicia and the public worship of the state gods were their special care; and to them alone were known the traditional usages and forms which regulated the life of the people from day to day. To the "plebs" (the multitude, πλῆθος) belonged all who were not members of some patrician gens, whether independent freemen or attached as "clients"[4] to one of the great houses. The plebeian was a citizen, with civil rights and a vote in the assembly of the curies, but he was excluded by ancient custom from all share in the higher honours of the state, and intermarriage with a patrician was not recognized as a properly legal union.

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[1] Cic. *De Rep.*, ii. 22; Livy, i. 42; Dionys., iv. 16.

[2] This is recognized by Mommsen, Genz, and Soltau, as against Niebuhr, Schwegler, and Ihne. Even in the later "comitia centuriata" the traces of the originally military character of the organization are unmistakable.

[3] The century ceased to represent companies of one hundred when the whole organization ceased to be military and became exclusively political.

[4] The property qualification for service in the first class is given at 100,000 asses (Livy), for the second at 70,000, third 50,000, fourth 25,000, fifth 11,000. It was probably originally a certain acreage in land, afterwards translated into terms of money; *cf.* Mommsen, *Röm. Tribus*, 115.

[5] Polyb., vi. 20; Mommsen, *Röm. Trib.*, 132 *sq.*

[6] Livy, i. 43. Dionys. (iv. 18) and Cic. (*De Rep.*, ii. 22) ascribe the whole eighteen to Servius. But the six older centuries remained distinct, as the "sex suffragia" of the comitia centuriata; Cic. *De Rep.*, ii. 22.

[7] Dionys., iv. 14, εἰς τὰς καταγραφὰς τῶν στρατιωτῶν.

[8] Livy, i. 43. The four were Palatina, Suburana, Exquilina, Collina.

[9] See Grotefend, *Imperium R. tributim descriptum*, 27, 67. The inclusion of landless men ("proletarii") in the tribes belongs to a later time, when the tribes had ceased to have a purely military significance; *cf.* the formation of a century of "capite censi."

[10] Livy, ii. 9–14. Pliny (*N. H.*, 34, 14) and Tacitus (*Ann.*, iii. 72) imply the existence of a tradition, possibly that of "Tuscan annalists," according to which Porsena actually made himself master of Rome. The whole story is fully criticized by Schwegler (ii. 181 *sq.*) and Zoller (*Latium u. Rom*, p. 180).

[11] See the exhaustive criticism in Schwegler (ii. pp. 66–203).

[12] The dates in the margin throughout are the years from the foundation of the city.

[13] Schwegler (ii. 92) suggests that the dictatorship formed an intermediate step between the monarchy and the consulate; *cf.* Ihne, *Röm. Forsch.*, 42.

[14] For the title "praetor," see Mommsen, *Staatsrecht*, ii. 70, note.

The revolution which expelled the Tarquins gave the patricians, who had mainly assisted in bringing it about, an overwhelming ascendency in the state. The plebs had indeed gained something. Not only is it probable that the strictness of the old tie of clientship had somewhat relaxed, and that the number of the "clientes" was smaller and their dependence on patrician patrons less complete, but the ranks of the plebs had, under the later kings, been swelled by the admission of conquered Latins, and the freeholders among these had with others been enrolled in the Servian tribes, classes, and centuries. The establishment of the republic invested this military levy of freeholders with political rights as an assembly, for by their votes the consuls were chosen and laws passed, and it was the plebeian freeholders who formed the main strength of the plebs in the struggle that followed. But these gains were greater in appearance than in reality. The plebeian freeholders commanded only a minority of votes in the comitia centuriata. In their choice of magistrates they were limited to the patrician candidates nominated by patrician presiding magistrates, and their choice required confirmation not only by the older and smaller assembly of the curiæ, in which the patricians and their clients predominated, but also by the patrician patres. They could only vote on laws proposed by patrician consuls, and here again the subsequent sanction of the patres was necessary. The whole procedure of the comitia was in short absolutely in the hands of their patrician presidents, and liable to every sort of interruption and suspension from patrician pontiffs and augurs.

But these political disabilities did not constitute the main grievance of the plebs in the early years of the republic. What they fought for was protection for their lives and liberties, and the object of attack was the despotic authority of the patrician magistrates. The consuls wielded the full "imperium" of the kings, and against this "consular authority" the plebeian, though a citizen, had no protection and no appeal, and matters were only worse when for the two consuls was substituted in some emergency a single, all-powerful, irresponsible dictator. In Rome, as in Greece, the first efforts of the people were directed against the arbitrary powers of the executive magistrate.

Lex Valeri
de pro
cation

The history of this struggle between the orders opens with a concession made to the plebs by one of the consuls themselves, a concession possibly due to a desire to secure the allegiance of the plebeian freeholders, who formed the backbone of the army. In the very first year of the republic, according to the received chronology, P. Valerius Poplicola carried in the comitia centuriata his famous law of appeal.[5] It enacted that no magistrate, saving only a dictator, should execute a capital sentence upon any Roman citizen unless the sentence had been confirmed on appeal by the assembly of the centuries. But, though the "right of appeal" granted by this law was justly regarded in later times as the greatest safeguard of a Roman's liberties, it was by no means at first so effective a protection as it afterwards became. For not only was the operation of the law limited to the bounds of the city, so that the consul in the field or on the march was left as absolute as before, but no security was provided for its observance even within the city by consuls resolved to disregard it.

The first
secession
and the
tribunat

It was by their own efforts that the plebeians first obtained any real protection against magisterial despotism. The traditional accounts of the first secession are confused and contradictory,[6] but its causes and results are tolerably clear. The seceders were the plebeian legionaries recently returned from a victorious campaign. Indignant at the delay of the promised reforms, they ignored the order given them to march afresh against Volsci and Æqui, and instead entrenched themselves on a hill across the Anio, some three miles from Rome, and known afterwards as the Mons Sacer. The frightened patricians came to terms, and a solemn agreement (lex sacrata)[7] was concluded between the orders, by which it was provided that henceforth the plebeians should have annual magistrates of their own (tribuni plebis), members of their own order, who should be authorized to protect them against the consuls,[1] and a curse was invoked upon the man who should injure or impede the tribune in the performance of his duties.[2] The number of tribunes was at first two, then 305. five, and before 449 B.C. it had been raised to ten. The fact that the institution of the tribunate of the plebs was the one result of the first secession is strong evidence that the object of the seceders was not economic or agrarian reform but protection against the consuls. The tribunate gave them this protection in a form which has no parallel in history. The tribune was not, and, strictly speaking, never became, a magistrate of the Roman people. His one proper prerogative was that of granting protection to the oppressed plebeian against a patrician officer. This prerogative (jus auxilii) was secured to the tribunes, not by the ordinary constitution, but by a special compact between the orders, and was protected by the ancient oath (vetus jusjurandum),[3] which invoked a curse upon the violator of a tribune. This exceptional and anomalous right the tribunes could only exercise in person, within the limits of the "pomoerium," and against individual acts of magisterial oppression.[4] It was only gradually that it expanded into the later wide power of interference with the whole machinery of government, and was supplemented by the legislative and judicial powers which rendered the tribunate of the last century B.C. so formidable, and the "tribunitia potestas" so essential an element in the authority of the emperors.

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[1] The present writer has adopted the view of the "patrum auctoritas" taken by Mommsen (*Forsch.*, i.). Others identify it with the "lex curiata," or at least closely connect the two.

[2] Here again the present writer has in the main followed Mommsen, as against Schwegler, Ihne, Zoller, and others.

[3] *Cf.* "aedilis," "aedilicius," &c.; Cic. *De Rep.*, ii. 12; Livy, i. 8. For a full discussion of other views, see Soltau, 179 *sq.*; Christensen, *Hermes*, ix. 196.

[4] For the "clientela," see Mommsen (*Forsch.*, i.) and Schwegler (i. 638).

[5] Livy, ii. 8, lex Valeria de provocatione; Cic. *De Rep.*, ii. 31; *cf.* Livy, iii. 20.

[6] Schwegler, ii. 226 sq.

[7] Schwegler, ii. 251, note; Livy, i. 33.

Lex Publilia But from the first the tribunes were for the plebs not only protectors but leaders, under whom they organized themselves in opposition to the patricians. The tribunes convened assemblies of the plebs (concilia plebis), and carried resolutions on questions of interest to the order. This incipient plebeian organization was materially ad- 283 vanced by the Publilian law of 471 B.C.,[5] which appears to have formally recognized as lawful the plebeian concilia, and established also the tribune's right "cum plebe agere," *i.e.*, to propose and carry resolutions in them. These assemblies were "tributa," or, in other words, the voting in them took place not by curies or centuries but by tribes. In them, lastly, after the Publilian law, if not before, the tribunes were annually elected.[6] By this law the foundations were laid both of the powerful "comitia tributa"[7] of later days and also of the legislative and judicial prerogatives of the tribunes. The patricians maintained indeed that resolutions (plebiscita) carried by tribunes in the concilia plebis were not binding on their order, but the moral weight of such resolutions, whether they affirmed a general principle or pronounced sentence of condemnation on some single patrician, was no doubt considerable.

Agrarian agitation. It is at any rate certain that the passing of the Publilian law was followed by increased activity on the part of the tribunes. The attack on the consular authority was continued, and combined with it we have a persistent effort made to secure for the plebs their fair share of the common lands of the state (agri publici). The main object, however, of this early agrarian agitation was not economic but political. Membership in a tribe was now more than ever important for a plebeian, as giving a vote not only in the comitia centuriata but also in the plebeian "concilia," and membership in a tribe was possible as yet only for freeholders.[8] To increase the number of freeholders became therefore a matter of importance, and the simplest mode of increasing the number of freeholders was for the state to create freeholds on the common lands. But such a policy met with bitter opposition from the patricians, who had long enjoyed a virtual monopoly of these lands, and had excluded the plebeians even from those more recently acquired tracts which they had helped to win by their swords. Against this patrician monopoly the tribunes unceasingly protested from a few years after the first secession down to 465 B.C.[9] In that year a compromise 289 was effected by the colonization of Antium, which had been taken the year before, and the plebeians obtained land without any disturbance of patrician occupiers. Eleven years later the common lands on the Aventine were reclaimed and assigned to plebeians by a lex Icilia.[10]

The decemvirate But this agrarian agitation, though destined subsequently to play an important part in the history, was for the time far less fruitful in results than that which was directed against the consular authority.

The proposal of C. Terentilius Arsa (460 B.C.) to appoint 294. a plebeian commission to draw up laws restricting the powers of the consuls[11] was resolutely opposed by the patricians, but after ten years of bitter party strife a compromise was effected. A commission of ten patricians was appointed, who should frame and publish a code of law binding equally on both the orders. These decemviri were to be the sole and supreme magistrates for the year, and the law of appeal was suspended in their favour.[12] The code which they promulgated, the famous XII. Tables, owed little of its importance to any novelties or improvements contained in its provisions. For the most part it seems merely to have reaffirmed existing usages and laws (see ROMAN LAW). But it substituted a public, written law, binding on all citizens of Rome, for an unwritten usage, the knowledge of which was confined to a few patricians, and which had been administered by this minority in their own interests. With the publication of the code the proper work of the decemvirs was finished; nevertheless for the next year a fresh decemvirate was elected, and it is conceivable that the intention was permanently to substitute government by an irresponsible patrician "council of ten" for the old constitution. However this may have been, the tyranny of the decemvirs themselves was fatal to the continuance of their power. We are told of a second secession of the plebs, this time to the Janiculum, and of negotiations with the senate, the result of which was the enforced abdication of the decemvirs. The plebs joyfully chose for themselves tribunes, and in the comitia centuriata two consuls were created.

Valerio-Horatian laws. But this restoration of the old regime was accompanied by legislation which made it an important crisis in the history of the struggle between the orders. With the fall of the decemvirate this struggle enters upon a new phase. The tribunes appear as at once more powerful and more strictly constitutional magistrates; the plebeian "concilia" take their place as formal comitia by the side of the older assemblies; and finally this improved machinery is used not simply in self-defence against patrician oppression but to obtain complete political equality. This change was no doubt due in part to circumstances outside legislation, above all to the expansion of the Roman state, which swelled the numbers and added to the social importance of the plebs as compared with the dwindling forces of the close corporation of patrician gentes. Still the legislation

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[1] Cic. *De Rep.*, ii. 34, "contra consulare imperium creati."

[2] Livy, iii. 55.

[3] Festus, 318; Appian, *B. C.*, i. 138.

[4] Gell., xiii. 12, "ut injuria quae coram fieret arceretur."

[5] Livy, ii. 56, 60; Dionys., ix. 41; Schwegler, ii. 541; Soltau, 493.

[6] For theories as to the original mode of appointing tribunes, see Mommsen, *Forsch.*, i. 185.

[7] It is impossible to accept Mommsen's theory of a patricio-plebeian comitia tributa, as distinct from the plebeian assembly by tribes.

[8] "Proletarii" were not admitted before the decemvirate, and according to Mommsen not until 310 B.C. There were now twenty-one tribes, seventeen having been added shortly after the establishment of the republic. Livy, ii. 21; Soltau, 481.

[9] Whatever the historical value of the story of Sp. Cassius's agrarian law, the existence of a sustained agrarian agitation during this period can hardly be doubted (Mommsen, *Röm. Forsch.*, ii. 153; Schwegler, ii. 455).

[10] Livy, iii. 31; Dionys., x. 31. The Aventine was said to have been previously common woodland.

[11] Livy, iii. 9.

[12] Livy, iii. 32.

of 449 clearly involved more than a restoration of the old form of government. The Valerio-Horatian laws, besides reaffirming the right of appeal and the inviolability of the tribunes, improved the position of the plebeian assemblies by enacting that "plebiscita" passed in them, and, as seems probable, approved by the patres, should be binding on patricians as well as plebeians.[1] By this law the tribunes obtained a recognized initiative in legislation. Henceforth the desired reforms were introduced and carried by tribunes in what were now styled "comitia tributa," and, if sanctioned by the patres, became laws of the state. From this period, too, must be dated the legalization at any rate of the tribune's right to impeach any citizen before the assembly of the tribes.[2] Henceforward there is no question of the tribune's right to propose to the plebs to impose a fine, or of the validity of the sentence when passed. The efficiency of these new weapons of attack was amply proved by the subsequent course of the struggle. Only a few years after the Valerio-Horatian legislation came the lex Canuleia (445 B.C.), by which mixed marriages between patricians and plebeians were declared lawful, and the social exclusiveness of the patriciate broken down. In the same year with this measure, and like it in the interests primarily of the wealthier plebeians, a vigorous attack commenced on the patrician monopoly of the consulate, and round this stronghold of patrician ascendency the conflict raged until the passing of the Licinian laws in 367. The original proposal of Canuleius in 445 that the people should be allowed to elect a plebeian consul was evaded by a compromise. The senate resolved that for the next year, in the stead of consuls, six military tribunes with consular powers should be elected,[3] and that the new office should be open to patricians and plebeians alike. The consulship was thus for the time saved from pollution, as the patricians phrased it, but the growing strength of the plebs is shown by the fact that in fifty years out of the seventy-
310-388. eight between 444 and 366 they succeeded in obtaining the election of consular tribunes rather than of consuls. A good omen for their ultimate success was a victory they won in connexion with the inferior office of the quæstorship. Down to the time of the decemvirate the quæstors had
307. been nominated by the consuls, but in 447 their appointment was transferred to the plebeian "comitia tributa,"
333 and in 421 the first plebeian was elected to the office.[4] Despite, however, these discouragements, the patricians fought on. Each year they strove to secure the creation of consuls rather than consular tribunes, and failing this strained every nerve to secure for their own order at least a majority among the latter. Even the institution of
319. the censorship (435), though rendered desirable by the increasing importance and complexity of the census, was, it is probable, due in part to their desire to discount beforehand the threatened loss of the consulship by diminishing its powers.[5] Other causes, too, helped to protract the struggle. Between the wealthier plebeians, who were ambitious of high office, and the poorer, whose minds were set rather on allotments of land, there was a division of interest of which the patricians were not slow to take advantage, and to this must be added the pressure of war. The death struggle with Veii and the sack of Rome by the Gauls absorbed for the time all the energies of the community. In 377, however, two of the tribunes, 377
C. Licinius Stolo and L. Sextius, came forward with proposals which united all sections of the plebs in their support. Their proposals were as follows:[6]—(1) that consuls and not consular tribunes be elected; (2) that one consul at least should be a plebeian; (3) that the priestly college, which had the charge of the Sibylline books, should consist of ten members instead of two, and that of these half should be plebeians; (4) that no single citizen should hold in occupation more than 500 acres of the common lands, or pasture upon them more than 100 head of cattle and 500 sheep; (5) that all landowners should employ a certain amount of free as well as slave labour on their estates; (6) that interest already paid on debts should be deducted from the principal, and the remainder paid off in three years. The three last proposals were obviously intended to meet the demands of the poorer plebeians, and to secure their support for the first half of the scheme. Ten years of bitter conflict followed, but at last, in 367 387
B.C., the Licinian rogations became law, and one of their authors, L. Sextius, was created the first plebeian consul. For the moment it was some consolation to the patricians that they not only succeeded in detaching from the consulship the administration of civil law, which was entrusted to a separate officer, "praetor urbanus," to be elected by the comitia of the centuries, with an understanding apparently that he should be a patrician, but also obtained the institution of two additional ædiles ("aediles curules"), who were in like manner to be members of their own order.[7] With the opening of the consulship, however, the issue of the long contest was virtually decided, and the next eighty years witnessed a rapid succession of plebeian victories.

Opening of the magistracies.

Now that a plebeian consul might preside at the elections, the main difficulty in the way of the nomination and election of plebeian candidates was removed. The proposed patrician monopoly of the new curule ædileship was almost instantly abandoned. In 356 the first plebeian 398.
was made dictator, in 350 the censorship, and in 337 the 404, 417
prætorship were filled for the first time by plebeians, and lastly, in 300, by the lex Ogulnia, even the sacred colleges of the pontiffs and augurs, the old strongholds of 454.
patrician supremacy, were thrown open to the plebs.[8] The patricians lost also the control they had exercised so long over the action of the people in assembly. The "patrum auctoritas," the sanction given or refused by the patrician senators to laws and to elections, had hitherto been a powerful weapon in their hands. But in 339 a 415.

Publishe laws.

law of Q. Publilius Philo, a plebeian dictator, enacted that this sanction should be given beforehand to all laws;[9] and by a lex Maenia, carried apparently some fifty years later, the same rule was extended to elections. Henceforward the "patrum auctoritas" sank into a meaningless form, though as such it still survived in the time of Livy. A second Publilian law affirmed afresh the validity of "plebiscita," *i.e.*, of measures carried in the plebeian comitia tributa. Apparently, however, their validity was still left subject to some conditions, for in 287 a lex Hortensia, carried by another plebeian dictator, was found necessary finally to settle the question.[10] From 287 onwards it is certain that measures passed by the plebs, voting by their tribes, had the full force of laws without any further conditions whatsoever. The legislative independence of the plebeian assembly was secured, and with this crowning victory ended the long struggle between the orders.

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[1] Livy, iii. 55, "quum veluti in controverso jure esset, tenerenturne patres plebiscitis legem comitiis centuriatis tulere, ut quod tributim plebs jussisset populum teneret, qua lege tribuniciis rogationibus telum acerrimum datum est." What were the precise conditions under which a "plebiscitum" became law, and what was the exact effect of the lex Publilia of 339 and the lex Hortensia of 287, can only be conjectured. One of the two last can hardly have been more than a reaffirmation of a previous law.

[2] After the decemvirate, the tribunes no longer pronounce capital sentences. They propose fines, which are confirmed by the comitia tributa.

[3] Livy, iv. 7; *cf.* Mommsen, *Staatsrecht*, ii. 165.

[4] Livy, iv. 43; Mommsen, *Staatsrecht*, ii. 497.

[5] Mommsen, *ib.*, 304.

[6] Livy, vi. 35, 42; Appian, *B. C.*, i. 8.

[7] Livy, vi. 42.

[8] Livy, vii. 17, 22; viii. 15; ix. 6.

[9] Livy, viii. 12, "ut . . . ante initum suffragium patres auctores fierent," *cf.* Livy, i. 17. For the "lex Maenia," see Cic., *Brut.*, 14; Soltau, 112.

[10] Plin., *N. H.*, xvi. 10; Gell., xv. 27; Gaius, i. 3, "plebiscita lege Hortensia non minus valere quam leges."

(*b*) *Conquest of Italy.*—Twelve years after the passing of the lex Hortensia, King Pyrrhus, beaten at Beneventum, withdrew from Italy, and Rome was left mistress of the peninsula. The steps by which this supremacy had been won have now to be traced. Under the rule of her Etruscan princes Rome spread her sway over the lowlands of Latium, and her arms were a terror to the warlike highlanders of the Sabine and Volscian hills. But with their fall this miniature empire fell also, and at first it seemed as if the infant republic, torn by internal dissensions, must succumb to the foes who threatened it from so many sides at once. It was only after one hundred and fifty years of almost constant war that Rome succeeded in rolling back the tide of invasion and in establishing her supremacy over the neighbouring lowlands and over the hill country which bordered them to the east and south. The close of this first stage in her external growth is conveniently marked by the first collision with the Sabellian peoples beyond the Liris in 343.[1] In marked contrast with the slowness of her advance up to this point is the fact that only seventy-five years more were needed for the virtual subjugation of all the
485. rest of the peninsula (343–269).

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The expulsion of the Tarquins from Rome, followed as it seems to have been by the emancipation from Etruscan supremacy of all the country between the Tiber and the Liris, entirely altered the aspect of affairs. North of the Tiber the powerful Etruscan city of Veii, after a vain attempt to restore the Tarquins, relapsed into an attitude of sullen hostility towards Rome, which, down to the outbreak of the final struggle in 407, found vent in constant and harassing border forays. The Sabines recommenced their raids across the Anio; from their hills to the south-east the Æqui pressed forward as far as the eastern spurs of the Alban range, and ravaged the plain country between that range and the Sabine mountains, the Volsci overran the coast-lands as far as Antium, established themselves at Velitræ, and even ravaged the fields within a few miles of Rome. But the good fortune of Rome did not leave her to face these foes single-handed, and it is a significant fact that the history of the Roman advance begins, not with a brilliant victory, but with a useful and timely alliance. According to Livy, it was in 493, only a few years after the defeat of the prince of Tusculum at Lake Regillus, that a treaty was concluded between Rome and the Latin communities of the Campagna.[2] The alliance was in every respect natural. The Latins were the near neighbours and kinsmen of the Romans, and both Romans and Latins were just freed from Etruscan rule to find themselves as lowlanders and dwellers in towns face to face with a common foe in the ruder hill tribes on their borders. The exact terms of the treaty cannot, any more than the precise circumstances under which it was concluded, be stated with certainty (see LATIUM), but two points seem clear. There was at first a genuine equality in the relations between the allies; Romans and Latins, though combining for defence and offence, did so without sacrificing their separate freedom of action, even in the matter of waging wars independently of each other.[3] But, secondly, Rome enjoyed from the first one inestimable advantage. The Latins lay between her and the most active of her foes, the Æqui and Volsci, and served to protect her territories at the expense of their own. Behind this barrier Rome grew strong, and the close of the Æquian and Volscian wars left the Latins her dependents rather than her allies. Beyond the limits of the Campagna Rome found a second ally, hardly less useful than the Latins, in the tribe of the Hernici ("the men of the rocks"), in the valley of the Trerus, who had equal reason with the Romans and Latins to dread the Volsci and Æqui, while their position midway between the two latter peoples made them valuable auxiliaries to the lowlanders of the Campagna.

The treaty with the Hernici is said to have been concluded in 486,[4] and the confederacy of the three peoples 265. —Romans, Latins, and Hernicans—lasted down to the great Latin war in 340. Confused and untrustworthy as 414 are the chronicles of the early wars of Rome, it is clear that notwithstanding the acquisition of these allies Rome made but little way against her foes during the first fifty years of the existence of the republic. In 474, it is true, 280. an end was put for a time to the harassing border feud with Veii by a forty years' peace, an advantage due not so much to Roman valour as to the increasing dangers from other quarters which were threatening the Etruscan states.[5] But this partial success stands alone, and down to 449 the raids of Sabines, Æqui, and Volsci continue 305 without intermission, and are occasionally carried up to the very walls of Rome. Very different is the impression left by the annals of the next sixty years (449–390). 305–364 During this period there is an unmistakable development of Roman power on all sides.

Capture
of Veii.

In southern Etruria the capture of Veii (396) virtually gave Rome the mastery as far as the Ciminian forest. Sutrium and Nepete, "the gates of Etruria," became 358. her allies and guarded her interests against any attack from the Etruscan communities to the north, while along the Tiber valley her suzerainty was acknowledged as far as Capena and Falerii. On the Anio frontier we hear of no disturbances from 449 until some ten years after the sack of Rome by the Gauls. In 446 the Æqui 308 appear for the last time before the gates of Rome. After 418 they disappear from Mount Algidus, and in 336 the same year the communications of Rome and Latium with the Hernici in the Trerus valley were secured by the capture and colonization of Labicum. Successive invasions, too, broke the strength of the Volsci, and in 393 361 a Latin colony was founded as far south as Circeii. In part, no doubt, these Roman successes were due to the improved condition of affairs in Rome itself, consequent upon the great reforms carried between 450 and 442; but 304–312 it is equally certain that now as often afterwards fortune befriended Rome by weakening, or by diverting the attention of, her opponents. In particular, her rapid advance in southern Etruria was facilitated by the heavy blows inflicted upon the Etruscans during the 5th century B.C. by Celts, Greeks, and Samnites. By the close of this century the Celts had expelled them from the rich plains of what was afterwards known as Cisalpine Gaul, and were even threatening to advance across the Apennines into Etruria proper. The Sicilian Greeks, headed by the tyrants of Syracuse, wrested from them their mastery of the seas, and finally, on the capture of Capua by the Samnites in 423, they lost their possessions in the fertile 331 Campanian plain. These conquests of the Samnites were part of a great southward movement of the highland Sabellian peoples, the immediate effects of which upon the fortunes of Rome were not confined to the weakening of the Etruscan power. It is probable that the cessation of the Sabine raids across the Anio was partly due to the new outlets which were opened southwards for the restless and populous hill tribes which had so long disturbed the peace of the Latin lowlands. We may conjecture, also,

Decline
Etruscan
power

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[1] Livy, vii. 29.

[2] Livy, ii. 33; Cic. *Pro Balbo*, 23.

[3] Livy, viii. 2.

[4] Livy, ii. 40.

[5] From the Celts in the north especially.

that the growing feebleness exhibited by Volsci and Æqui was in some measure caused by the pressure upon their rear of the Sabellian clans which at this time established themselves near the Fucine Lake and along the course of the Liris.

But in 390, only six years after the great victory over her ancient rival Veii, the Roman advance was for a moment checked by a disaster which threatened to alter the course of history in Italy, and which left a lasting impress on the Roman mind. In 391 a Celtic horde left their newly won lands on the Adriatic, and, crossing the Apennines into Etruria, laid siege to the Etruscan city of Clusium (Chiusi). Thence, provoked, it is said, by the conduct of the Roman ambassadors, who, forgetting their sacred character, had fought in the ranks of Clusium and slain a Celtic chief, the barbarians marched upon Rome. On July 18, 390 B.C., only a few miles from Rome, was fought the disastrous battle of the Allia. The defeat of the Romans was complete, and Rome lay at the mercy of her foe. But in characteristic fashion the Celts halted three days to enjoy the fruits of victory, and time was thus given to put the Capitol at least in a state of defence. The arrival of the barbarians was followed by the sack of the city, but the Capitol remained impregnable. For seven months they besieged it, and then in as sudden a fashion as they had come they disappeared. The Roman chroniclers explain their retreat in their own way, by the fortunate appearance of Camillus with the troops which he had collected, at the very moment when famine had forced the garrison on the Capitol to accept terms. More probably the news that their lands across the Apennines were threatened by the Veneti, coupled with the unaccustomed tedium of a long siege and the difficulty of obtaining supplies, inclined the Celts to accept readily a heavy ransom as the price of their withdrawal. But, whatever the reason, it is certain that they retreated, and, though during the next fifty years marauding bands appeared at intervals in the neighbourhood of Rome, and
393-4. even once penetrated as far south as Campania (361–360), the Celts never obtained any footing in Italy outside the plains in the north which they had made their own.

Annexation of southern Etruria.

Nor, in spite of the defeat on the Allia and the sack of the city, was Rome weakened except for the moment by the Celtic attack. The storm passed away as rapidly as it had come on. The city was hastily rebuilt, and Rome dismayed the enemies who hastened to take advantage of her misfortunes by her undiminished vigour. Her conquests in southern Etruria were successfully defended against repeated attacks from the Etruscans to the north.
367. The creation in 387 of four new tribes (Stellatina, Sabatina, Tromentina, Arniensis) marked the final annexation of the territory of Veii and of the lands lying along the Tiber valley. A few years later Latin colonies were established at Sutrium and Nepete for the more effectual
401. defence of the frontier, and finally, in 353, the subjugation of South Etruria was completed by the submission of Cære (Cervetri) and its partial incorporation with the Roman state as a "municipium sine suffragio"—the first, it is said, of its kind.[1]

Successes against Æqui and Volsci.
364-411.

Next to the settlement of southern Etruria, the most important of the successes gained by Rome between 390 and 343 B.C. were those won against her old foes the Æqui and Volsci, and her old allies the Latins and Hernicans. The Æqui indeed, already weakened by their long feud with Rome, and hard pressed by the Sabellian tribes in their rear, were easily dealt with, and after the campaign of 389 we have no further mention of an Æquian war until the last Æquian rising in 304. The Volsci, who in 389 had advanced to Lanuvium, were met and utterly defeated by M. Furius Camillus, the conqueror of Veii, and this victory was followed up by the gradual subjugation to Rome of all the lowland country lying between the hills and the sea as far south as Tarracina. Latin colonies were established at Satricum (385), at Setia (379), and at Antium and Tarracina some time before 348. In 358 two fresh Roman tribes (Pomptina and Publilia) were formed in the same district.[2]

Rome had now nothing more to fear from the foes who a century ago had threatened her very existence. The lowland country, of which she was the natural centre, from the Ciminian forest to Tarracina, was quiet, and within its limits Rome was by far the strongest power. But she had now to reckon with the old and faithful allies to whose loyal aid her present position was largely due. The Latins and Hernicans had suffered severely in the Æquian and Volscian wars; it is probable that not a few of the smaller communities included in the league had either been destroyed or been absorbed by larger states, and the independence of all alike was threatened by the growing power of Rome. The sack of Rome by the Celts gave them an opportunity of reasserting their independence, and we are consequently told that this disaster was immediately followed by the temporary dissolution of the confederacy, and this again a few years later by a series of actual conflicts between Rome and her former allies.
Between 383 and 358 we hear of wars with Tibur, Præneste, 371
Tusculum, Lanuvium, Circeii, and the Hernici. But in all Rome was successful. In 382 Tusculum was fully 37
incorporated with the Roman state by the bestowal of the full franchise[3]; in 358, according to both Livy and 396
Polybius the old alliance was formally renewed with Latins and Hernicans. We cannot, however, be wrong in assuming that the position of the allies under the new league was far inferior to that accorded them by the treaty of Spurius Cassius.[4] Henceforth they were the subjects rather than the equals of Rome, a position which it is evident that they accepted much against their will, and from which they were yet to make one last effort to escape.

We have now reached the close of the first stage in Rome's advance towards supremacy in Italy. By 343 41
B.C. she was already mistress both of the low country stretching from the Ciminian forest to Tarracina and Circeii and of the bordering highlands. Her own territory had largely increased. Across the Tiber the lands of Veii, Capena, and Cære were nearly all Roman, while in Latium she had carried her frontiers to Tusculum on the Alban range and to the southernmost limits of the Pomptine district. And this territory was protected by a circle of dependent allies and colonies reaching northward to Sutrium and Nepete, and southward to Sora on the upper Liris, and to Circeii on the coast. Already, too, she was beginning to be recognized as a power outside the limits of the Latin lowlands. The fame of the capture of Rome by the Celts had reached Athens, and her subsequent victories over marauding Celtic bands had given her prestige in South Italy as a bulwark against northern barbarians. In 354 she had formed her first connexions 400
beyond the Liris by a treaty with the Samnites, and in 348 followed a far more important treaty with the great 406
maritime state of Carthage.[5]

Rome had won her supremacy from the Ciminian forest vance yond Liris, l the mnite as.

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[1] For the status of Cære, and the "Cærite franchise," see Marquardt, *Staatsverw.*, i. 28 *sq.*; Madvig, *R. Verf.*, i. 39; Beloch, *Ital. Bund*, 120.

[2] Livy, vii. 15.

[3] Livy, vi. 26.

[4] Mommsen, *R. G.*, i. 347, note; Beloch, *Ital. Bund*, cap. IX.

[5] Livy, vii. 27. For the whole question of the early treaties with Carthage, see Polybius, iii. 22; Mommsen, *R. G.*, i. 413, and *R. Chronol.*, p. 320; Vollmer, *Rhein. Mus.*, xxxii. 614.

to the Liris as the champion of the comparatively civilized communities of the lowlands against the rude highland tribes which threatened to overrun them, and so, when her legions first crossed the Liris, it was in answer to an appeal from a lowland city against invaders from the hills. While she was engaged in clearing Latium of Volsci and Æqui, the Sabellian tribes of the central Apennines had rapidly spread over the southern half of the peninsula. Foremost among these tribes were the Samnites, a portion of whom had captured the Etruscan city of Capua in 423, the Greek Cumæ in 420, and had since then ruled as masters over the fertile Campanian territory. But in their new homes the conquerors soon lost all sense of relationship and sympathy with their highland brethren. They dwelt in cities, amassed wealth, and inherited the civilization of the Greeks and Etruscans whom they had dispossessed;[1] above all, they had before long to defend themselves in their turn against the attacks of their ruder kinsmen from the hills, and it was for aid against these that the Samnites of Campania appealed to the rising state which had already made herself known as the bulwark of the lowlands north of the Liris, and which with her Latin and Hernican allies had scarcely less interest than the Campanian cities themselves in checking the raids of the highland Samnite tribes.

The Campanian appeal was listened to. Rome with her confederates entered into alliance with Capua and the neighbouring Campanian towns, and war was formally declared (343) against the Samnites.[2] While to the Latins and Hernicans was entrusted apparently the defence of Latium and the Hernican valley against the northerly members of the Samnite confederacy, the Romans themselves undertook the task of driving the invaders out of Campania. After two campaigns the war was ended in 341 by a treaty, and the Samnites withdrew from the lowlands, leaving Rome the recognized suzerain of the Campanian cities which had sought her aid.[3]

There is no doubt that the check thus given by Rome to the advance of the hitherto invincible Sabellian highlanders not only made her the natural head and champion of the low countries, south as well as north of the Liris, but also considerably added to her prestige. Carthage sent her congratulations, and the Etruscan city of Falerii voluntarily enrolled herself among the allies of Rome. Of even greater service, however, was the fact that for fifteen years the Samnites remained quiet, for this inactivity, whatever its cause, enabled Rome triumphantly to surmount a danger which threatened for the moment to wreck her whole position. This danger was nothing less than a desperate effort on the part of nearly all her allies and dependents south of the Tiber to throw off the yoke of her supremacy. The way was led by her ancient confederates the Latins, whose smouldering discontent broke into open flame directly the fear of a Samnite attack was removed. From the Latin Campagna and the Sabine hills the revolt spread westward and southward to Antium and Tarracina, and even to the towns of the Campanian plain, where the mass of the inhabitants at once repudiated the alliance formed with Rome by the ruling class. The struggle was sharp but short. In two pitched battles[4] the strength of the insurrection was broken, and two more campaigns sufficed for the complete reduction of such of the insurgent communities as still held out. The revolt crushed, Rome set herself deliberately to the task of re-establishing on a new and firmer basis her supremacy over the lowlands, and in doing so laid the foundations of that marvellous organization which was destined to spread rapidly over Italy, and to withstand the attacks even of Hannibal. The old historic Latin league ceased to exist, though its memory was still preserved by the yearly Latin festival on the Alban Mount. Most if not all of the common land of the league became Roman territory;[5] five at least of the old Latin cities were compelled to accept the Roman franchise[6] and enter the pale of the Roman state. The rest, with the Latin colonies, were ranked as Latin allies of Rome, but on terms which secured their complete dependence upon the sovereign city. The policy of isolation, which became so cardinal a principle of Roman rule, was now first systematically applied. No rights of "connubium" or "commercium" were any longer to exist between these communities. Their federal councils were prohibited, and all federal action independent of Rome forbidden.[7]

Settlement of Latium

In future they were to have nothing in common but their common connexion with Rome, a connexion based in each case on a separate treaty between the individual Latin community and Rome. The Latin allied state retained its internal independence and the old rights of intermarriage and commerce with Rome, but it lost all freedom of action in external affairs. It could wage no wars, conclude no treaties, and was bound, so the phrase ran, to have always the same foes and friends as Rome herself. In Campania and the coast-lands connecting Campania with Rome, a policy of annexation was considered safer than that of alliance. Of the two frontier posts of the Volsci, Antium and Velitræ, the former was constituted a Roman colony, its long galleys burnt and their prows set up in the Forum at Rome, while the walls of Velitræ were razed to the ground, its leading men banished beyond the Tiber, and their lands given to Roman settlers. Farther south on the route to Campania, Fundi and Formiæ were, after the precedent set in the case of Cære, declared Roman and granted the civil rights of Roman citizenship, while lastly in Campania itself the same status was given to Capua, Cumæ, and the smaller communities dependent upon them.[8] During the ten years from 338 to 328 the work of settlement was steadily continued. Tarracina, like Antium, was made a Roman colony. Privernum, the last Volscian town to offer resistance to Rome, was subdued in 330, part of its territory allotted to Roman citizens, and the state itself forced to accept the Roman franchise. Lastly, to strengthen the lines of defence against the Sabellian tribes, two colonies with the rights of Latin allies were established at Fregellæ and at Cales. The settlement of the lowlands was accomplished. From the Ciminian forest to the southern extremity of the Campanian plain, the lands lying between the sea and the hills were now, with few exceptions, Roman territory, while along the frontiers from Sutrium and Nepete in the north to Cales in the south stretched the protecting line of the Latin allied states and colonies. As a single powerful and compact state with an outer circle of closely dependent allies, Rome now stood in sharp contrast with the disunited and degenerate cities of northern Etruria, the loosely organized tribes of the Apennines, and the decaying and disorderly Greek towns of the south.

and of Campania

416-426

424

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[1] For the Samnites in Campania, see Mommsen, *R. G.*, i. 353; Schwegler-Clason, *R. G.*, v. 98 *sq.*; Beloch, *Campanien*, Berlin, 1879.

[2] Livy, vii. 32.

[3] For the difficulties in the traditional accounts of this war, see Mommsen, *R. G.*, i. 355 note; Schwegler-Clason, *R. G.*, v. 14 *sq.*

[4] At the foot of Mount Vesuvius, Livy, viii. 9; at Trifanum, Id., viii. 11.

[5] Livy, viii. 11.

[6] Livy, viii. 14; Lanuvium, Aricia, Nomentum, Pedum, Tusculum.

[7] Id., *loc. cit.*, "ceteris Latinis populis connubia commerciaque et concilia inter se ademerunt."

[8] For the controversy as to the precise status of Capua and the "equites Campani" (Livy, viii. 14), see Beloch, *Ital. Bund*, 122 *sq.*; Id., *Campanien*, 317; Zumpt, *Comment. Epigraph.*, p. 290

Second Samnite War, 327–304 = 427–450.

The strength of this system was now to be tried by a struggle with the one Italian people who were still ready and able to contest with Rome the supremacy of the peninsula. The passive attitude of the Samnites between 342 and 327 was no doubt largely due to the dangers which had suddenly threatened them in South Italy. But the death of Alexander of Epirus, in 332,[1] removed their only formidable opponent there, and left them free to turn their attention to the necessity of checking the steady advance of Rome. In 327, the year after the ominous foundation of a Roman colony at Fregellæ, a pretext for renewing the struggle was offered them. The Cumæan colony of Palæpolis[2] had incurred the wrath of Rome by its raids into her territory in Campania. The Samnites sent a force to defend it, and Rome replied by a declaration of war. The two opponents were not at first sight unequally matched, and had the Sabellian tribes held firmly together the issue of the struggle might have been different. As it was, however, the Lucanians to the south actually joined Rome from the first, while the northern clans Marsi, Vestini, Pæligni, Frentani, after a feeble and lukewarm resistance, subsided into a neutrality which 450 was exchanged in 304 for a formal alliance with Rome. An even greater advantage to Rome from the outset was the enmity existing between Samnites and the Apulians, the latter of whom from the first joined Rome and thus gave her a position in the rear of her enemy and in a country eminently well fitted for maintaining a large military force. These weaknesses on the Samnite side were amply illustrated by the events of the war.

The first seven or eight years were marked by one serious disaster to the Roman arms, the defeat at the 433, 436 Caudine Forks (321), but, when in 318 the Samnites asked for and obtained a two years' truce, Rome had succeeded not only in inflicting several severe blows upon her enemies but in isolating them from outside help. The Lucanians to the south were her allies. To the east, in the rear of Samnium, Apulia acknowledged the suzerainty of Rome, and Luceria, captured in 320, had been established as a base of Roman operations. Finally to the north the Romans had easily overcome the feeble resistance of the Vestini and Frentani, and secured through their territories a safe passage for their legions to Apulia. On the renewal of hostilities in 316, the Samnites, bent on escaping from the net which was being slowly drawn round them, made a series of desperate efforts to break through the lines of defence which protected Latium and Campania. Sora and Fregellæ on the upper Liris were captured by a sudden attack; the Ausones in the low country near the mouth of the same river were encouraged to revolt by the appearance of the Samnite army; and in Campania another army, attracted by rumours of disturbance, all but defeated the Roman consuls under the very walls of Capua. But these efforts were unavailing. Sora and Fregellæ were recovered as quickly as they had been lost, and the frontier there was strengthened by the establishment of a colony at Interamna. The Ausones were punished by the confiscation of their territory, and Roman supremacy further secured by the two colonies of Suessa and Pontia (312). The construction of the famous Via Appia,[3] the work of the censor Appius Claudius Cæcus, opened a safe and direct route to Campania, while the capture of Nola deprived the Samnites of their last important stronghold in the Campanian lowlands. The failure of these attempts broke the courage even of the Samnites. Their hopes were indeed raised for a moment by the news that Etruria had risen against Rome (310), but their daring scheme of effecting a union with the Etruscans was frustrated by the energy of the Roman generals. Five years later (305) the Romans revenged a 449 Samnite raid into Campania by an invasion of Samnium itself. Arpinum on the frontier was taken, and at last, after a twenty-two years' struggle, the Second Samnite War was closed by a renewal of the ancient treaty with Rome (304).[4] 450

The six years of peace which followed (304–298) 450 were characteristically employed by Rome in still further strengthening her position. Already, two years before the peace, a rash revolt of the Hernici[5] had given Rome a pretext for finally annexing the territory of her ancient allies. The tribal confederacy was broken up, and all the Hernican communities, with the exception of three which had not joined the revolt, were incorporated with the Roman state as municipia, with the civil rights of the Roman franchise. Between the Hernican valley and the frontiers of the nearest Sabellian tribes lay what remained of the once formidable people of the Æqui. In their case, too, a revolt (304) was followed by the annexa- 450. tion of their territory, which was marked in this case by the formation there (301) of two Roman tribes (Aniensis 453. and Teretina).[6] Not content with thus carrying the borders of their own territory up to the very frontiers of the Sabellian country, Rome succeeded in finally detaching from the Sabellian confederacy all the tribes lying[7] between the north-east frontier of Latium and the Adriatic Sea. Henceforward the Marsi, Pæligni, Vestini, Marrucini, and Frentani were enrolled among the allies of Rome, and not only swelled her forces in the field but interposed a useful barrier between her enemies to the north in Etruria and Umbria and those to the south in Samnium, while they connected her directly with the friendly Apulians. Lastly, as a security for the fidelity at least of the nearest of these allies, colonies were planted in the Marsian territories at Carseoli and at Alba Fucentia. A significant indication of the widening range of Rome's influence in Italy, and of the new responsibilities rapidly pressing upon her, is the fact that when in 302 the Spartan Cleonymus landed in 451. the territory of the Sallentini, far away in the south-east, he was met and repulsed by a Roman force.[8]

Thir Sam War, 298– 456–

Six years after the conclusion of the treaty which ended the Second Samnite War, news arrived that the Samnites were harassing the Lucanians. Rome at once interfered to protect her allies. Samnium was invaded in force, the country ravaged, and one stronghold after another captured. Unable any longer to hold their own in a position where they were hedged round by enemies, the Samnite leaders turned as a last hope to the communities of northern Etruria, to the free tribes of Umbria, and to the once dreaded Celts. With a splendid daring they formed the scheme of uniting all these peoples with themselves in a last desperate effort to break the power of Rome.

Rom in N. Etrur 403.

For some forty years after the final annexation of southern Etruria (351 B.C.) matters had remained unchanged in that quarter. Sutrium and Nepete still guarded the Roman frontier, the natural boundary of the Ciminian forest was still intact; and up the valley of the Tiber Rome had not advanced beyond Falerii, a few miles short of the most southerly Umbrian town Ocriculum. But in 311, on the expiry, apparently, of the long truce with Rome, concluded in 351, the northern Etruscans, alarmed no doubt by the rapid advances which Rome was making further south, rose in arms and attacked Sutrium. The attack, however, recoiled disastrously upon the heads of the assailants. A Roman force promptly relieved Sutrium, and its leader, Q. Fabius Rullianus, without awaiting orders from home, boldly plunged into the wilds of the Ciminian forest, and crossing them safely swept with fire and sword over the rich lands to the north. Then turning southward he met and utterly defeated the forces which the Etruscans had hastily raised in the hopes of intercepting him at the Vadimonian Lake.[1] This decisive victory ended the war. The Etruscan cities, disunited among themselves, and enervated by long years of peace, abandoned the struggle for the time, paid a heavy indemnity, and concluded a truce with Rome (309–308). In the same year the promptitude of Fabius easily averted a threatened attack by the Umbrians, but Rome proceeded nevertheless to fortify herself in her invariable fashion against future dangers on this side, by an alliance with Ocriculum, which was followed ten years later by a colony at Nequinum,[2] and an alliance with the Picentes, whose position in the rear of Umbria rendered them as valuable to Rome as the Apulians had proved farther south.

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[1] Livy, viii. 3. 17, 24.
[2] Livy, viii. 22.
[3] Livy, ix. 23.
[4] Livy, ix. 29.
[5] Livy, ix. 45.
[6] Livy, ix. 45.
[7] Livy, x. 9.
[8] Livy, x. 2.

Battle of Sentinum, 295–459. Fourteen years had passed since the battle on the Vadimonian Lake, when the Samnites appeared on the borders of Etruria and called on the peoples of northern Italy to rise against the common enemy. Their appeal, backed by the presence of their troops, was successful. The Etruscans found courage to face the Roman legions once more; a few of the Umbrians joined them; but the most valuable allies to the Samnites were the Celts, who had for some time threatened a raid across the Apennines, and who now marched eagerly into Umbria and joined the coalition. The news that the Celts were in motion produced a startling effect at Rome, and every nerve was strained to meet this new danger. While two armies were left in southern Etruria as reserves, the two consuls, Fabius and Decius, both tried soldiers, marched northwards up the valley of the Tiber and into Umbria at the head of four Roman legions and a still larger force of Italian allies. At Sentinum, on the further side of the Apennines, they encountered the united forces of the Celts and Samnites, the Etruscans and Umbrians having, it is said, been withdrawn for the defence of their own homes. The battle that followed was desperate, and the Romans lost one of their consuls, Decius, and more than 8000 men.[3] But the Roman victory was decisive. The Celts were annihilated, and the fear of a second Celtic attack on Rome removed. All danger from the coalition was over. The Etruscan communities gladly purchased peace by the payment of indemnities. The rising in Umbria, never formidable, died away, and the Samnites were left single-handed to bear the whole weight of the wrath of Rome. During four years more, however, they desperately defended their highland homes, and twice
1, 462. at least, in 293 and 292, they managed to place in the field a force sufficient to meet the Roman legions on equal
64. terms. At last, in 290, the consul M. Curius Dentatus finally exhausted their power of resistance. Peace was concluded, and it is significant of the respect inspired at Rome by their indomitable courage that they were allowed to become the allies of Rome, on equal terms and without any sacrifice of independence.[4]

Between the close of the Third Samnite War and the landing of Pyrrhus in 281 B.C. we find Rome engaged, as her wont was, in quietly extending and consolidating her power. In southern Italy she strengthened her hold on Apulia by planting on the borders of Apulia and Lucania the strong colony of Venusia.[5] In central Italy the annexation of the Sabine country (290) carried her frontiers eastward to the borders of her Picentine allies on the Adriatic.[6] Farther east, in the territory of the Picentes themselves, she established colonies on the Adriatic coast at Hatria and Castrum (285–283).[7] By 469–471
these measures her control of central Italy from sea to sea was secured, and an effectual barrier interposed between her possible enemies in the north and those in the south. North of the Picentes lay the territories of the Celtic Senones, stretching inland to the north-east borders of Etruria, and these too now fell into her hands. Ten years after their defeat at Sentinum (285–284) a Celtic force descended into Etruria, besieged Arretium, and defeated the relieving force despatched by Rome. In 283 the consul L. Cornelius Dolabella was sent to avenge the insult. He completely routed the Senones. Their lands were annexed by Rome, and a colony established at Sena on the coast. This success, followed as it was by the decisive defeat of the neighbouring tribe of the Boii, who had invaded Etruria and penetrated as far south as the Vadimonian Lake, awed the Celts into quiet, and for more than forty years there was comparative tranquillity in northern Italy.[8]

In the south, however, the claims of Rome to supremacy were now to be disputed by a new and formidable foe. At the close of the Third Samnite War the Greek cities on the southern coast of Italy found themselves once more harassed by the Sabellian tribes on their borders, whose energies, no longer absorbed by the long struggles in central Italy, now found an attractive opening southward. Naturally enough the Greeks, like the Capuans sixty years before, appealed for aid to Rome (283–282), 471-2.
and like the Capuans they offered in return to recognize the suzerainty of the great Latin republic. In reply a Roman force under C. Fabricius marched into South Italy, easily routed the marauding bands of Lucanians, Bruttians, and Samnites, and established Roman garrisons in Locri, Croton, Rhegium, and Thurii. At Tarentum, the most powerful and flourishing of the Greek seaports, this sudden and rapid advance of Rome excited the greatest anxiety. Tarentum was already allied by treaty (301) 453.
with Rome, and she had now to decide whether this treaty should be exchanged for one which would place her, like the other Greek communities, under the protectorate of Rome, or whether she should find some ally able and willing to assist in making a last stand for independence. The former course, in Tarentum, as before at Capua, was the one favoured by the aristocratic party; the latter was eagerly supported by the mass of the people and their leaders. While matters were still in suspense, the appearance, contrary to the treaty, of a Roman squadron off the harbour decided the controversy. The Tarentines, indignant at the insult, attacked the hostile fleet, killed the admiral, and sunk most of the ships. Still Rome, relying probably on her partisans in the city, tried negotiation, and an alliance appeared likely after all, when suddenly the help for which the Tarentine democrats had been looking appeared, and war with Rome was resolved upon (281–280).[9]

War with Pyrrhus, 281–275 = 473–479.

King Pyrrhus, whose timely appearance seemed for the moment to have saved the independence of Tarentum, was the most brilliant of the military adventurers whom the disturbed times following the death of Alexander the Great had brought into prominence. High-spirited, generous, and ambitious, he had formed the scheme of rivalling Alexander's achievements in the East, by winning for himself an empire in the West. He aspired not only to unite under his rule the Greek communities of Italy and Sicily, but to overthrow the great Phœnician state of Carthage—the natural enemy of Greeks in the West, as Persia had been in the East. Of Rome it is clear that he knew little or nothing; the task of ridding the Greek seaports of their barbarian foes he no doubt regarded as an easy one; and the splendid force he brought with him was intended rather for the conquest of the West than for the preliminary work of chastising a few Italian tribes, or securing the submission of the unwarlike Italian Greeks. Pyrrhus's first measure was to place Tarentum under a strict military discipline; this done he advanced into Lucania to meet the Roman consul Lævinus. The battle which followed, on the banks of the Liris, ended in the complete defeat of the Roman troops, largely owing to the panic caused by the elephants which Pyrrhus had 474. brought with him (280)[1] The Greek cities expelled their Roman garrisons and joined him, while numerous bands of Samnites, Lucanians, and Bruttians flocked to his standard. But, to the disappointment of his Greek and Italian allies, Pyrrhus showed no anxiety to follow up the advantage he had gained. His heart was set on Sicily and Africa, and his immediate object was to effect such an arrangement with Rome as would at once fulfil the pledges he had given to the Greeks by securing them against Roman interference and set himself free to seek his fortunes westward. But, though his favourite minister Cineas employed all his skill to win the ear of the senate, and, though Pyrrhus himself lent weight to his envoy's 475. words by advancing as near Rome as Anagnia (279), nothing could shake the resolution of the senate, and Cineas brought back the reply that the Romans could not treat with Pyrrhus so long as he remained in arms upon Italian soil. Disappointed in his hopes of peace, 476. Pyrrhus in the next year (278) turned his forces against the Roman strongholds in Apulia.[2] Once more, at Asculum, he routed the legions, but only to find that the indomitable resolution of the enemy was strengthened by defeat. Weary of a struggle which threatened indefinitely to postpone the fulfilment of his dreams of empire, Pyrrhus resolved to quit Italy, and, leaving garrisons in the Greek towns, crossed into Sicily. Here his success at first was such as promised the speedy realization of his hopes. The Sicilian Greeks hailed him as a deliverer; the Carthaginians were driven back to the extreme west of the island, and Eryx and Panormus fell into his hands. But at this point fortune deserted him. His efforts to take Lilybæum were fruitless; the Carthaginians recovered their courage, while the unstable Greeks, easily daunted by the first threatenings of failure, and impatient of the burdens of war, broke out into open murmurs against him. Soured and disappointed, Pyrrhus returned to Italy (276) to find the Roman legions steadily moving southwards, and his Italian allies disgusted by his desertion of their cause. One of the consuls for the year (275), M. Curius Dentatus, the conqueror of Samnium, was encamped at Beneventum awaiting the arrival of his colleague. Here Pyrrhus attacked him, and the closing battle of the war was fought. It ended in the complete victory of the Romans. Pyrrhus, unable any longer to face his opponents in the field, and disappointed of all assistance from his allies, retreated in disgust to Tarentum and thence crossed into Greece.[3]

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[1] Livy, ix. 39. Ihne (*R. G.*, i. 351 *sq.*) throws some doubts on the traditional accounts of this war and of that in 296.

[2] Narnia, Livy, x. 10.

[3] Livy, x. 27.

[4] Livy, *Epit.*, xi., "pacem petentibus Samnitibus foedus quarto *renovatum* est."

[5] Dion. Hal., *Exc.*, 2335; Vell. Pat., i. 14

[6] Livy, *Epit.*, xi., Vell. Pat., i 14

[7] Livy, *Epit.*, xi.

[8] Livy, *Epit.*, xii.; Polyb., ii. 20.

[9] Livy, *Epit.*, xii.; Plut., *Pyrrh.*, 13.

A few years later (272) Tarentum was surrendered to Rome by its Epirot garrison; it was granted a treaty of alliance, but its walls were razed and its fleet handed over to Rome. In 270 Rhegium also entered the ranks of Roman allies, and finally in 269 a single campaign crushed the last efforts at resistance in Samnium. Rome was now at leisure to consolidate the position she had won. 481, 491. Between 273 and 263 three new colonies were founded in 481. Samnium and Lucania—Pæstum in 273, Beneventum in 268, Æsernia in 263. 486, In central Italy the area of Roman territory was increased by the full enfranchisement (268) 486. of the Sabines,[4] and of their neighbours to the east, the Picentes. To guard the Adriatic coast colonies were established at Ariminum (268), at Firmum, and at Castrum 486. Novum (264), while to the already numerous maritime 490. colonies was added that of Cosa in Etruria.[5]

Rome as the mistress of Italy.

Rome was now the undisputed mistress of Italy. The limits of her supremacy to the north were represented roughly by a line drawn across the peninsula from the mouth of the Arno on the west to that of the Æsis on the east.[6] Beyond this line lay the Ligurians and the Celts; all south of it was now united as "Italy" under the rule of Rome.

But the rule of Rome over Italy, like her wider rule over the Mediterranean coasts, was not an absolute dominion over conquered subjects. It was in form at least a confederacy under Roman protection and guidance; and the Italians, like the provincials, were not the subjects, but the "allies and friends" of the Roman people.[7] Marvellous as are the perseverance and skill with which Rome built up, consolidated, and directed this confederacy, it is yet clear that both her success in forming it and its stability when formed were due in part to other causes than Roman valour and policy. The disunion which, in former times, had so often weakened the Italians in their struggles with Rome still told in her favour, and rendered the danger of a combined revolt against her authority remote in the extreme. In some cases, and especially in the city states of Etruria, Campania, and Magna Græcia, where the antagonism of the two political parties, aristocrats and democrats, was keen, Rome found natural and valuable allies in the former. Among the more backward peoples of central Italy, the looseness of their political organization not only lessened their power of resistance, but enabled Rome either to detach tribe after tribe from the confederacy or to attack and crush them singly. Elsewhere she was aided by ancient feuds, such as those between Samnites and Apulians, or Tarentines and Iapygians, or by the imminent dread of a foe—Celt, or Samnite, or Lucanian—whom Roman aid alone could repel. And, while combination against her was thus rendered difficult, if not impossible, by internal dissensions, feuds, differences of interest, of race, of language, and habits, Rome herself, from her position in the centre of Italy, was so placed as to be able to strike promptly, on the first signs of concerted opposition. All these advantages Rome utilized to the utmost. We have no means of deciding how far she applied elsewhere the principle upon which she acted in northern Etruria and Campania, of attaching the aristocratic party in a community to Roman interests, by the grant of special privileges; but it is certain that she endeavoured by every means in her power to perpetuate, and even to increase, the disunion which she had found so useful among her allies. In every possible way she strove to isolate them from each other, while binding them closely to herself. The old federal groups were in most cases broken up, and each of the members united with Rome by a special treaty of alliance. In Etruria, Latium, Campania, and Magna Græcia the city state was taken as the unit; in central Italy, where urban life was non-existent, the unit was the tribe. The northern Sabellian peoples, for instance,—the Marsi, Pæligni, Vestini, Marrucini, Frentani,—were now

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[1] Plin., *N. H.*, viii. 6.

[2] Plut., *Pyrrh.*, 21.

[3] Livy, *Epit.*, xiv.; Plut., *Pyrrh.*, 26.

[4] Vell. Pat., i. 14, "suffragii ferendi jus Sabinis datum."

[5] Vell. Pat., i. 14; Livy, *Epit.*, xv. The present writer has followed Beloch (*Ital. Bund*, 142) in identifying the "Cosa" of Vell., *loc. cit.*, and Livy, *Epit.*, xiv., with Cosa in Etruria; *cf.* Plin., *N. H.*, iii. 8, 51. Mommsen and Madvig both place it in Lucania.

[6] Mommsen, *R. G.*, i. 428, note; Nissen, *Ital. Landeskunde*, p. 71.

[7] Beloch, *Ital. Bund*, 203; Mommsen, *R. G.*, i. 428, note.

constituted as separate communities in alliance with Rome. In many cases, too, no freedom of trade or intermarriage was allowed between the allies themselves, a policy afterwards systematically pursued in the provinces. Nor were all these numerous allied communities placed on the same footing as regarded their relations with Rome herself. To begin with, a sharp distinction was drawn between the "Latini" and the general mass of Italian allies. The "Latins" of this period had little more than the name in common with the old thirty Latin peoples of the days of Spurius Cassius. With a few exceptions, such as Tibur and Præneste, the latter had either disappeared or had been incorporated with the Roman state, and the Latins of 268 B.C. were almost exclusively the "Latin colonies," that is to say, communities founded by Rome, composed of men of Roman blood, and whose only claim to the title "Latin" lay in the fact that Rome granted to them some portion of the rights and privileges formerly enjoyed by the old Latin cities under the Cassian treaty.[1] Though nominally allies, they were in fact offshoots of Rome herself, bound to her by community of race, language, and interest, and planted as Roman garrisons among alien and conquered peoples. The Roman citizen who joined a Latin colony lost his citizenship,—to have allowed him to retain it would no doubt have been regarded as enlarging too rapidly the limits of the citizen body; but he received in exchange the status of a favoured ally. The Latin colony did not indeed enjoy the equality and independence originally possessed by the old Latin cities. It had no freedom of action outside its own territory, could not make war or peace, and was bound to have the same friends and foes as Rome. But its members had the right
86. of commercium and down to 268[2] of connubium also with Roman citizens. Provided they left sons and property to represent them at home, they were free to migrate to Rome and acquire the Roman franchise. In war time they not only shared in the booty, but claimed a portion of any land confiscated by Rome and declared "public." These privileges, coupled with their close natural affinities with Rome, successfully secured the fidelity of the Latin colonies, which became not only the most efficient props of Roman supremacy, but powerful agents in the work
he talian llies. of Romanizing Italy. Below the privileged Latins stood the Italian allies; and here again we know generally that there were considerable differences of status, determined in each case by the terms of their respective treaties with Rome. We are told that the Greek cities of Neapolis and Heraclea were among the most favoured;[3] the Bruttii, on the other hand, seem, even before the Hannibalic war, to have been less generously treated. But beyond this the absence of all detailed information does not enable us to go.

Rome, however, did not rely only on this policy of isolation. Her allies were attached as closely to herself as they were clearly separated from each other, and from the first she took every security for the maintenance of her own paramount authority. Within its own borders, each ally was left to manage its own affairs as an independent state.[4] The badges which marked subjection to Rome in the provinces—the resident magistrate and the tribute—were unknown in Italy. But in all points affecting the relations of one ally with another, in all questions of the general interests of Italy and of foreign policy, the decision rested solely with Rome. The place of a federal constitution, of a federal council, of federal officers, was filled by the Roman senate, assembly, and magistrates. The maintenance of peace and order in Italy, the defence of the coasts and frontiers, the making of war or peace with foreign powers, were matters the settlement of which Rome kept entirely in her own hands. Each allied state, in time of war, was called upon for a certain contingent of men, but, though its contingent usually formed a distinct corps under officers of its own, its numerical strength was fixed by Rome, it was brigaded with the Roman legions, and was under the orders of the Roman consul.[5]

This paramount authority of Rome throughout the peninsula was confirmed and justified by the fact that Rome herself was now infinitely more powerful than any one of her numerous allies. Her territory, as distinct from that of the allied states, covered something like one-third of the peninsula south of the Æsis. Along the west coast it stretched from Cære to the southern borders of Campania. Inland, it included the former territories of the Æqui and Hernici, the Sabine country, and even extended eastward into Picenum, while beyond these limits were outlying districts, such as the lands of the Senonian Celts, with the Roman colony of Sena, and others elsewhere in Italy, which had been confiscated by Rome and given over to Roman settlers. Since the first important annexation of territory after the capture of Veii (396), twelve new tribes had been formed,[6] 358. and the number of male citizens registered at the census had risen from 152,000 to 290,000.[7] Within this enlarged Roman state were now included numerous Colonies and municipia. communities with local institutions and government. At their head stood the Roman colonies ("coloniae civium Romanorum"), founded to guard especially the coasts of Latium and Campania.[8] Next to these eldest children of Rome came those communities which had been invested with the full Roman franchise, such, for instance, as the old Latin towns of Aricia, Lanuvium, Tusculum, Nomentum, and Pedum. Lowest in the scale were those which had not been considered ripe for the full franchise, but had, like Cære, received instead the "civitas sine suffragio," the civil without the political rights.[9] Their members, though Roman citizens, were not enrolled in the tribes, and in time of war served not in the ranks of the Roman legions but in separate contingents. In addition to these organized town communities, there were also the groups of Roman settlers on the public lands, and the dwellers in the village communities of the enfranchised highland districts in central Italy.

The administrative needs of this enlarged Rome were obviously such as could not be adequately satisfied by the system which had done well enough for a small city state with a few square miles of territory. The old centralization of all government in Rome itself had become an impossibility, and the Roman statesmen did their best to meet the altered requirements of the time. The urban communities within the Roman pale, colonies and muni cipia, were allowed a large measure of local self-government. In all we find local assemblies, senates, and magistrates, to whose hands the ordinary routine of local administration was confided, and, in spite of differences in detail, *e.g.*, in the titles and numbers of the magistrates, the same type of constitution prevailed throughout.[1] But these local authorities were carefully subordinated to the higher powers in Rome. The local constitution could be modified or revoked by the Roman senate and assembly, and the local magistrates, no less than the ordinary members of the community, were subject to the paramount authority of the Roman consuls, prætors, and censors. In particular, care was taken to keep the administration of justice well under central control. The Roman citizen in a colony or municipium enjoyed of course the right of appeal to the Roman people in a capital case. We may also assume that from the first some limit was placed to the jurisdiction of the local magistrate, and that cases falling outside it came before the central authorities. But

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[1] For the "coloniae Latinae" founded before the First Punic War, see Beloch, 136 *sq*

[2] The year of the foundation of Ariminum, the first Latin colony with the restricted rights, Cic. *Pro Caec*, 35; Mommsen, *R. G.*, i. 421, note; Marquardt, *Staatsverw.*, i. 53. Beloch, 155-158, takes a different view.

[3] Beloch, *Camp.*, 39; Cic. *Pro Balbo*, 22.

[4] For the relation of the "socii Italici" to Rome, see Mommsen, *R. G.*, i. 422: Beloch, *Ital. Bund.* cap. x.

[5] Beloch, 203. The importance of this duty of the allies is expressed in the phrase "socii nominisve Latini quibus ex formula togatorum milites in terra Italia imperare solent."

[6] Four in South Etruria (387), two in the Pomptine territory (358), two in Latium (332), two in the territory of the southern Volsci and the Ager Falernus (318), two in the Æquian and Hernican territory (299). The total of thirty-five was completed in 241 by formation of the Velina and Quirina, probably in the Sabine and Picentine districts, enfranchised in 268. See Beloch, 32.

[7] Livy, *Epit.*, xvi.; Eutrop., ii. 18; Mommsen, *R. G.*, i. 423; Beloch, cap. iv. p. 77 *sq.*

[8] Ostia, Antium, Tarracina, Minturnæ, Sinuessa, and, on the Adriatic, Sena and Castrum Novum.

[9] To both these classes the term "municipia" was applied.

Prefects.

an additional safeguard for the equitable and uniform administration of Roman law, in communities to many of which the Roman code was new and unfamiliar, was provided by the institution of prefects ("praefecti juri dicundo"),[2] who were sent out annually, as representatives of the Roman prætor, to administer justice in the colonies and municipia. To prefects was, moreover, assigned the charge of those districts within the Roman pale where no urban communities, and consequently no organized local government, existed. In these two institutions, that of municipal government and that of prefectures, we have already two of the cardinal points of the later imperial system of government.

The military system.

A word must lastly be said of the changes which the altered position and increased responsibilities of Rome had effected in her military system.[3] For the most part these changes tended gradually to weaken the old and intimate connexion between the Roman army in the field and the Roman people at home, and thus prepared the way for that complete breach between the two which in the end proved fatal to the republic. It is true that service in the legion was still the first duty and the highest privilege of the fully qualified citizen. Every "assiduus" was still liable to active military service between the ages of seventeen to forty-five, and "proletarii" and freedmen were still called out only in great emergencies,[4] and then but rarely enrolled in the legions. But this service was gradually altering in character. Though new legions were still raised each year for the summer campaigns, this was by no means always accompanied, as formerly, by the disbandment of those already on foot, and this increase in the length of time during which the citizen was kept with the standards had, as early as the siege of Veii, necessitated a further deviation from the old theory of military service—the introduction of pay.[5] Hardly less important than these changes were those which had taken place in the organization of the legion itself. In the early days of the republic the same divisions served for the soldier in the legion and the citizen in the assembly. The Roman army in the field, and the Roman people in the comitia on the Campus, were alike grouped according to their wealth, in classes and centuriæ. But by the time of the Latin war the arrangement of the legion had been wholly altered. In the new manipular system, with its three lines, no regard was paid to civic distinctions, but only to length of service and military efficiency, while at the same time the more open order of fighting which it involved demanded of each soldier greater skill, and therefore a more thorough training in arms than the old phalanx. One other change resulted from the new military necessities of the time, which was as fruitful of results as the incipient separation between the citizen and the soldier. The citizen soldiers of early Rome were commanded in the field by the men whom they had chosen to be their chief magistrates at home, and still, except when a dictator was appointed, the chief command of the legions rested with the consuls of the year. But, as Rome's military operations increased in area and in distance from Rome, a larger staff became necessary, and the inconvenience of summoning home a consul in the field from an unfinished campaign became intolerable. The remedy found, that of prolonging for a further period the imperium of the consul, was first applied in 327 B.C. in the case of Q. Publilius Philo,[6] and between 327 and 264 instances of this "prorogatio imperii" became increasingly common. This proconsular authority, originally an occasional and subordinate one, was destined to become first of all the strongest force in the republic, and ultimately the chief prop of the power of the Cæsars. Already, within the limits of Italy, Rome had laid the foundation stones of the system by which she afterwards governed the world,—the municipal constitutions, the allied states, the proconsuls, and the prefects.

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427-4

PERIOD II: ROME AND THE MEDITERRANEAN STATES, 265-146 B.C.—(*a*) *Conquest of the West.*—Though marked out by her geographical position as the natural centre of the Mediterranean, Italy had hitherto played no active part in Mediterranean politics, but, now that she was for the first time united, it was felt throughout the Mediterranean world that a new power had arisen, and Rome, as the head and representative of Italy, found herself irresistibly drawn into the vortex of Mediterranean affairs. With those of the eastern Mediterranean indeed she was not immediately called upon to concern herself. Her repulse of Pyrrhus, and the news that the Greek cities of South Italy had acknowledged her suzerainty, had, it is true, suddenly revealed to the Eastern world the existence of a powerful Italian state. Egypt sought her alliance, and Greek scholars began to interest themselves keenly in the history, constitution, and character of the Latin republic which had so suddenly become famous. But this was all, and not until fifty years after the retreat of Pyrrhus did Rome seriously turn her attention eastward. Westward of Italy the case was different. The western coasts of the peninsula were the most fertile and populous and wealthy, and it was westward rather than eastward that the natural openings for Italian commerce were to be found. But it was precisely on this side that Rome had serious ground for anxiety. Carthage was now at the height of her power. Her outposts were threateningly near to Italy in Sardinia and in Sicily, while her fleets swept the seas and jealously guarded for the benefit of Carthage alone the hidden treasures of the West. In the east of Sicily, Syracuse still upheld the cause of Greek independence against the hereditary foe of the Greek race; but Syracuse stood alone, and her resources were comparatively small. What Rome had to fear was the establishment, and that at no distant date, of an absolute Carthaginian domination over the Western seas—a domination which would not only be fatal to Italian commerce but would be a standing menace to the safety of the Italian coasts. Rome had indeed long been

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[1] For details, see Beloch, *Ital. Bund*, caps. v., vi., vii. The enfranchised communities in most cases retained the old titles for their magistrates, and hence the variety in their designations.

[2] For the "praefecti," see Mommsen, *R. G.*, i. 419, and *Röm. Staatsrecht*. ii. 569; Beloch, 130-133.

[3] Mommsen, *R. G.*, i. 438; Madvig, *Verf. R. Reichs*, ii. 467 *sq.*; Livy, viii. 8; Polyb., vi. 17-42.

[4] *E.g.*, before the battle of Sentinum (296), Livy, x. 21.

[5] Livy, iv. 59.

[6] Livy, viii. 23, "ut pro consule rem gereret quoad debellatum esset."

connected with Carthage by treaty, and the older purely commercial treaties had quite recently been replaced by a close alliance formed in face of the common danger to which both had been exposed by the adventurous schemes of Pyrrhus. But this danger was past, and it is probable that others besides Pyrrhus foresaw that on the old battleground of Greeks and Phœnicians a struggle must soon be fought out between the Phœnician mistress of the Italian seas and the rulers of the Italian peninsula.

It was above all things essential for Rome that the Carthaginians should advance no farther eastward. But already in 272 Tarentum had almost fallen into their grasp, and seven years later Rome was threatened with a danger at least as serious, the establishment of Carthaginian rule in the east of Sicily, and within sight of the Italian coast. In 265 a body of Campanian mercenaries, who had seized Messana, found themselves hard pressed by Hiero, king of Syracuse. One party among them appealed for aid to Carthage. The Carthaginians readily responded, and a Carthaginian garrison occupied the citadel of Messana. But at Messana, as once at Tarentum, there were others who turned to Rome, and, as Italians themselves, implored the aid of the great Italian republic, offering in return to place Messana under the suzerainty of Rome. The request was a perplexing one. Both Hiero and the Carthaginians were allies of Rome, and Messana, if rescued from the latter, belonged of right to Hiero and not to Rome. Apart, too, from treaty obligations, the Roman senate naturally hesitated before acceding to an appeal which would precipitate a collision with Carthage, and commit Rome to a new and hazardous career of enterprise beyond the sea. Finally, however, all other considerations gave way before the paramount importance of checking the advance of Carthage. The Roman assembly voted that assistance should be sent to the Mamertines, and in 264 the Roman legions for the first time crossed the sea. Messana was occupied, and, after sustaining a defeat, the Carthaginians and Syracusans were forced to raise the siege and withdraw. The opening years of the war which was thus begun gave little promise of the length of the struggle, and it seemed likely at the outset that Rome's immediate object, the expulsion of the Carthaginians from Sicily, would be soon attained. The accession to the Roman side of King Hiero (263) not only confirmed the position which Rome had already assumed in Italy of the champion of the western Greeks against barbarians, but provided her in eastern Sicily with a convenient base of operations and commodious winter quarters, and in Hiero himself with a loyal and effective ally. In the next year (262) followed the capture of Agrigentum, and in 261 the Roman senate resolved on supplementing these successes on land by the formation of a fleet which should not only enable them to attack the maritime strongholds which defied the assaults of their legions, and protect their own coasts, but even to carry the war into Africa itself. In the spring of 260 the first regular Roman fleet, consisting of one hundred quinqueremes and twenty triremes set sail;[1] and the brilliant naval victory off Mylæ, won by the consul C. Duilius in the same year, seemed to promise the Romans as much success by sea as they had won by land. But the promise was not fulfilled; and in 256 the senate, impatient of the slow progress made in Sicily, determined on boldly invading Africa. It was a policy for which, if Africa were once reached, the defenceless state of the Carthaginian territories, the doubtful loyalty of her Libyan subjects, and the unwarlike habits of her own citizens, gave every hope of success, and, but for the blunders of the Romans themselves, it might have succeeded now as it did fifty years later. The passage to Africa was opened by the defeat of the Carthaginian fleet off Ecnomus; the two consuls, L. Manlius Vulso and M. Atilius Regulus, landed in safety and rapidly overran the country. But these successes led the senate, at the close of the summer, into committing the serious blunder of recalling one of the consuls, Manlius, with a large portion of the troops. It was one of many instances in which the rules and traditions of the old republican system proved themselves inconsistent with the new requirements of an extended warfare The consul came back to hold the elections; his soldiers returned, as the custom had been, to their homes after a summer's campaign; but the efficiency of the expedition was fatally impaired. The rashness and over-confidence of Regulus aggravated the effects of the senate's action. Emboldened by further successes, and notwithstanding his diminished forces, he met the Carthaginian proposals for peace by terms so harsh that the latter, though the Romans were almost at their gates, their soldiers disheartened, and the nomad tribes swarming on their frontiers, indignantly broke off the negotiations and prepared to resist to the last. At this crisis, so the story runs, the arrival of Xanthippus, a Spartan soldier of fortune, changed the face of affairs, as that of Gylippus had formerly done at Syracuse. His superior military skill remedied the blunders of the Carthaginian generals; confidence was restored; and in
255 he triumphantly routed the Roman forces a few 499.
miles outside the city. Regulus was taken prisoner,[2] and only a miserable remnant of two thousand men escaped to the Roman camp on the coast. Here they were rescued by a Roman fleet, but their ill-fortune pursued them. On its way home the fleet was wrecked, and all but 80 vessels out of a total of 364 were lost.

Still, though abandoning all thoughts of invading Africa, the Romans were unwilling to renounce all thoughts of facing their enemy on the sea. But fresh disasters
followed. The hopes raised (251) by the capture of 500.
Panormus were dashed to the ground the next year (253) 501.
by the total destruction in a storm of the victorious fleet on its way home from Panormus to Rome. Four years later a second fleet, despatched under P. Claudius to assist in the blockade of Lilybæum, was completely defeated off Drepana, while, to make matters worse, his colleague L. Junius, who had been hastily sent out with reinforcements, was wrecked near the dangerous promontory of Pachynus.

Disheartened by these repeated disasters, the senate resolved to trust only to the legions, and by sheer force of perseverance slowly to force the enemy out of the few positions to which he still clung in Sicily. But, though
for five years (248–243) no fresh naval operations were 506–511.
attempted, no compensating success by land followed. Hamilcar Barca, the new Carthaginian commander, not only ravaged with his fleet the coasts of Italy, but from his impregnable position at Ercte incessantly harassed the Roman troops in the west of the island, and even recaptured Eryx. Convinced once more of the impossibility of driving the Carthaginians out of Sicily as long as their navy swept the seas, the Romans determined on a final effort. The treasury was empty; but by the liberal contributions of private citizens a fleet was equipped, and C. Lutatius Catulus, consul for 242, started for Sicily early in the summer of that year with 200 quinqueremes. From Drepana, whither he had gone to aid in the blockade, he sailed out to meet a Carthaginian fleet, despatched from Africa against him; and a battle took place at the Ægates islands, some 20 miles from the Sicilian coast, in which Catulus completely defeated his enemy. The end

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[1] Mommsen, *R. G.*, i. 515.

[2] For criticisms of the story of Regulus, see Mommsen, i. 523; Ihne, ii. 69; Ranke, *Weltgeschichte*, ii. 185. *Cf.* art. REGULUS.

of the long struggle had come at last. The Carthaginian government, despairing of being able to send further aid to their troops in Sicily, authorized Hamilcar to treat for peace. His proposals were accepted by Catulus, and the terms agreed upon between them were confirmed in all essential points by the commissioners sent out from Rome. The Carthaginians agreed to evacuate Sicily and the adjoining islands, to restore all prisoners, and to pay an indemnity of 2300 talents.

In its duration and its severity the First Punic War is justly ranked by Polybius above all other wars of his own and preceding times, though neither in the military talent displayed nor in the importance of its results can it be compared with the war that followed. It was distinguished by no military achievement comparable with Hannibal's invasion of Italy, and with the single exception of Hamilcar it produced no general of the calibre of Hannibal or Scipio. It was in fact a struggle in which both Rome and Carthage were serving an apprenticeship in a warfare the conditions of which were unfamiliar to both. The Roman legions were foes very unlike any against which the Carthaginian leaders had ever led their motley array of mercenaries, while Rome was called upon for the first time to fight a war across the sea, and to fight with ships against the greatest naval power of the age. The novelty of these conditions accounts for much of the vacillating and uncertain action observable on both sides, and their effect in this direction was increased by the evident doubts felt by both antagonists as to the lengths to which the quarrel should be pushed. It is possible that Hamilcar had already made up his mind that Rome must be attacked and crushed in Italy, but his government attempted nothing more than raids upon the coast. There are indications also that some in the Roman senate saw no end to the struggle but in the destruction of Carthage; yet an invasion of Africa was only once seriously attempted, and then only a halfhearted support was given to the expedition. But these peculiarities in the war served to bring out in the clearest relief the strength and the weakness of the two contending states. The chief dangers for Carthage lay obviously in the jealousy exhibited at home of her officers abroad, in the difficulty of controlling her mercenary troops, and in the ever-present possibility of disaffection among her subjects in Libya,—dangers which even the genius of Hannibal failed finally to surmount. Rome, on the other hand, was strong in the public spirit of her citizens, the fidelity of her allies, the valour and discipline of her legions. What she needed was a system which should make a better use of her splendid materials than one under which her plans were shaped from day to day by a divided senate, and executed by officers who were changed every year, and by soldiers most of whom returned home at the close of each summer's campaign.

The interval between the First and Second Punic Wars was employed by both Rome and Carthage in strengthening their respective positions. Of the islands lying off the coast of Italy, the most important, Sicily, had fallen to Rome as the prize of the recent war. The eastern end of the island was still left under the rule of King Hiero as the ally of Rome, but the larger western portion became directly subject to Rome, and a temporary arrangement seems to have been made for its government, either by one of the two prætors, or possibly by a quæstor.[1] Sardinia and Corsica had not been surrendered to Rome by the treaty of 241, but three years later (238), on the invitation of the Carthaginian mercenaries stationed in the islands, a Roman force occupied them; Carthage protested, but, on the Romans threatening war, she gave way, and Sardinia and Corsica were formally ceded to Rome, though it was some seven or eight years before all resistance on the part of the natives themselves was crushed. In 227, however, the senate considered matters ripe for 527 the establishment of a separate and settled government, not only in Sardinia and Corsica, but also in Sicily. In that year two additional prætors were elected; to one was assigned the charge of western Sicily, to the other that of Sardinia and Corsica,[2] and thus the first stones of the Roman provincial system were laid. Of at least equal importance for the security of the peninsula was the subjugation of the Celtic tribes in the valley of the Po. These, headed by the Boii and Insubres and assisted by levies from the Celts to the westward, had in 225 alarmed 529 the whole of Italy by invading Etruria and penetrating to Clusium, only three days' journey from Rome. Here, however, their courage seems to have failed them. They retreated northward along the Etruscan coast, until at Telamon their way was barred by the Roman legions, returning from Sardinia to the defence of Rome, while a second consular army hung upon their rear. Thus hemmed in, the Celts fought desperately, but were completely defeated and the flower of their tribesmen slain. The Romans followed up their success by invading the Celtic territory. The Boii were easily reduced to submission. The Insubres, north of the Po, resisted more obstinately, but by 222 the war was over, and all the 532 tribes in the rich Po valley acknowledged the supremacy of Rome. The conquered Celts were not enrolled among the Italian allies of Rome, but were treated as subjects beyond the frontier. Three colonies were founded to hold them in check—Placentia and Cremona in the territory of the Insubres, Mutina in that of the Boii; and the great northern road (Via Flaminia) was completed as far as the Celtic border at Ariminum.

On the Adriatic coast, where there was no Carthage to be feared, and no important adjacent islands to be annexed, the immediate interests of Rome were limited to rendering the sea safe for Italian trade. It was with this object that, in 229, the first Roman expedition crossed the 525 Adriatic, and inflicted severe chastisement on the Illyrian pirates of the opposite coast.[3] But the results of the expedition did not end here, for it was the means of establishing for the first time direct political relations between Rome and the states of Greece proper, to many of which the suppression of piracy in the Adriatic was of as much importance as to Rome herself. Alliances were concluded with Corcyra, Epidamnus, and Apollonia; and embassies explaining the reasons which had brought Roman troops into Greece were sent to the Ætolians, the Achæans, and even to Athens and Corinth. Everywhere they were well received, and the admission of the Romans to the Isthmian games[4] (228) formally acknowledged them as the natural 526 allies of the free Greek states against both barbarian tribes and foreign despots, a relationship which was destined to prove as useful to Rome in the East as it had already proved itself to be in the West.

While Rome was thus fortifying herself on all sides, Carthage had acquired a possession which promised to compensate her for the loss of Sicily, Sardinia, and Corsica. The genius of her greatest citizen and soldier, Hamilcar Barca, had appreciated the enormous value of the Spanish peninsula, and conceived the scheme of founding there a Carthaginian dominion which should not only add to the wealth of Carthage, but supply her with troops, and with a base of operations for that war of revenge with Rome on which his heart was set. The conquest of southern and eastern Spain, begun by Hamilcar (236–228), and carried

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[1] Marquardt, *Röm. Staatsver.*, i. 92; Mommsen, *R. G.*, i. 543; Appian, *Sic.*, 2.

[2] Livy, *Epit.* xx.

[3] Polyb., ii. 8 *sq.*

[4] Polyb., ii. 12.

533. on by his kinsman Hasdrubal (228–221), was completed by his son Hannibal, who, with all his father's genius, inherited also his father's hatred of Rome, and by 219 the authority of Carthage had been extended as far as the Ebro. Rome had not watched this rapid advance without anxiety, but, probably owing to her troubles with the Celts, she had contented herself with stipulating (226) that Carthage should not carry her arms beyond the Ebro, so as to threaten Rome's ancient ally, the Greek Massilia, and with securing the independence of the two nominally Greek communities, Emporiæ and Saguntum,[1] on the east coast.

But these precautions were of no avail against the resolute determination of Hannibal, with whom the conquest of Spain was only preliminary to an attack upon Italy, and who could not afford to leave behind him in Spain a state allied to Rome. In 219, therefore, disregarding the protests of a Roman embassy, he attacked and took Saguntum, an act which, as he had foreseen, rendered a rupture with Rome inevitable, while it set his own hands free for a further advance.

A second war with Carthage was no unlooked-for event at Rome; but the senate seems to have confidently expected that it would be waged at a distance from Italy—in Africa 201 and in Spain, where Saguntum would have given them a 553. convenient point of support; and to this hope they clung even after Saguntum was lost. In 218, the first year of the war, one consul, P. Cornelius Scipio, was despatched to Spain, and the other, T. Sempronius Gracchus, to Sicily, and thence to Africa. But Hannibal's secrecy and promptitude baffled all their calculations. Leaving New Carthage early in 218, in the space of five months he crossed the Pyrenees, reached the Rhone just as Scipio arrived at Massilia on his way to Spain, passed the Alps in spite of endless difficulties and hardships, and startled Italy by descending into the plains of Cisalpine Gaul. In two battles on the Ticinus and the Trebia he defeated the forces hastily collected to bar his progress southwards; the Celtic tribes rallied to his standard; and at the beginning of the next year he prepared to realize the dream of his life and carry fire and sword into Italy itself. His own force numbered 26,000 men; the total available strength of Rome and her allies was estimated at over 700,000.[2] But Hannibal's hope lay in the possibility that by the rapidity of his movements he might be able to strike a decisive blow before Rome could mobilize her levies, or get her somewhat cumbrous military machinery into working order. From a first success he expected no less a result than the break up of the Roman confederacy, and the isolation of Rome herself, while it would also increase the readiness of his own government to render him effective support. His trust in himself and his army was not misplaced, for to the last he had the advantage over the Roman legions wherever he met them in person. Except, however, in South Italy, his brilliant victories and dashing marches brought him no allies, and it was his inability to shake the loyalty of northern and central Italy and of the Latin colonies everywhere, even more than the indomitable perseverance of Rome and the supineness of Carthage, which caused his ultimate failure.

In the spring of 217 Hannibal crossed the Apennines and marched southwards through the lowlands of eastern Etruria, the route taken before him by the Celtic hordes. In April he annihilated Flaminius and his army at the Trasimene Lake,[3] and pushed on to Spoletium, only a few days' march from Rome. But Rome was not yet his goal; from Spoletium, which had closed its gates against him, he moved rapidly eastward, ravaging the territories of Roman allies as he went, till he reached the Adriatic and the fertile lands of northern Apulia, where supplies and especially remounts for his Numidian cavalry[4] were plentiful, and communication with Carthage easy, and where, moreover, he was well placed for testing the fidelity of the most recent and the least trustworthy of the Italian allies of Rome. A second victory here, on the scale of that at the Trasimene Lake, might be the signal for a general revolt against Roman rule. It was not, however, until the summer of the next year that his opportunity came. The patient tactics of Q. Fabius Cunctator had become unpopular at Rome; and the consuls of 216, L. Æmilius Paulus and M. Terentius Varro, took the field in Apulia, at the head of a larger force than Rome had yet raised, and with orders to fight and crush the daring invader. The result realized for the moment Hannibal's highest hopes. The Roman army was annihilated at Cannæ; and South Italy, with the exception of the Latin colonies and the Greek cities on the coast, came over to his side. Nor did the Roman misfortunes end here. Philip of Macedon concluded an alliance with Hannibal (215), 539 and threatened an invasion of Italy. In the very next year Syracuse, no longer ruled by the faithful Hiero, revolted, and a Carthaginian force landed in Sicily; lastly, in 212 came the loss of the Greek cities on the south 542. coast. But the truth of Polybius's remark that the Romans are most to be feared when their danger is greatest was never better illustrated than by their conduct in the face of these accumulated disasters. Patiently and undauntedly they set themselves to regain the ground they had lost. Philip of Macedon was first of all forced to retire from the allied city of Apollonia which he had attacked (214), and 540. then effectually diverted from all thoughts of an attack on Italy, by the formation of a coalition against him in Greece itself (211); Syracuse was recaptured in 212, after a 543, 542 lengthy siege, and Roman authority re-established in Sicily. In Italy itself the Roman commanders took advantage of Hannibal's absence in the extreme south to reconquer northern Apulia; but their main efforts were directed to the recovery of Campania, and above all of Capua. The imminent danger of Capua, which he had named as the successor of Rome in the headship of Italy, recalled Hannibal from the south, where he was besieging a Roman garrison in the citadel of Tarentum. Failing to break through the lines which enclosed it, he resolved, as a last hope of diverting the Roman legions from the devoted city, to advance on Rome itself. But his march, deeply as it impressed the imagination of his contemporaries by its audacity and promptitude, was without result. Silently and rapidly he moved along the course of the Latin Way, through the heart of the territory of Rome, to within 3 miles of the city, and even rode up with his advanced guard to the Colline gate. Yet no ally joined him; no Roman force was recalled to face him; no proposals for peace reached his camp; and, overcome, it is said, by the unmoved confidence of his foe, he withdrew, as silently and rapidly as he had advanced, to his headquarters in the south. The fall of Capua followed inevitably (211),[5] and the Roman senate saw with relief the seat of war removed to Lucania and Bruttium, and a prospect opening of some relief from the exhausting exertions of the last five years. Their hopes were quickly dashed to the ground. The faithful Massiliots sent word that Hasdrubal, beaten in Spain, was marching to join Hannibal in Italy. The anxiety at Rome was intense, and every nerve was strained to prevent the junction of the two brothers. Equally great was the relief when the news arrived that the bold march of the consul Claudius had succeeded, and that Hasdrubal had been defeated and slain on the river Metaurus (207). The war in Italy was now virtually ended, for, though during four years more Hannibal stood at bay in a corner of Bruttium, he was powerless to prevent the restoration of Roman authority throughout the peninsula. Sicily was once more secure: and finally in 206, the year after the victory on the Metaurus, the successes of the young P. Scipio in Spain (211–206) were crowned by the complete expulsion of the Carthaginians from the peninsula. Nothing now remained to Carthage outside Africa but the ground on which Hannibal desperately held out, and popular opinion at Rome warmly supported Scipio when on his return from Spain he eagerly urged an immediate invasion of Africa. The senate hesitated. Many were jealous of Scipio's fame, and resented his scarcely concealed intention of appealing to the people, should the senate decline his proposals. Others, like the veteran Q. Fabius, thought the attempt hazardous, with exhausted resources, and while Hannibal was still on Italian soil. But Scipio gained the day. He was elected consul for 205, and given the province of Sicily, with permission to cross into Africa if he thought fit. Voluntary contributions of men, money, and supplies poured in to the support of the popular hero; and by the end of 205 Scipio had collected in Sicily a 550. sufficient force for his purpose. In 204 he crossed to Africa, where he was welcomed by the Numidian prince Masinissa, whose friendship he had made in Spain. In 551. 203 he twice defeated the Carthaginian forces, and a large party at Carthage were anxious to accept his offer of negotiations. But the advocates of resistance triumphed. Hannibal was recalled from Italy, and with him his brother Mago, who had made a last desperate attempt to create a diversion in Italy by landing in Liguria. Mago died on the voyage, but Hannibal returned to fight his last battle against Rome at Zama, where Scipio, who had been 552. continued in command as proconsul for 202 by a special vote of the people, won a complete victory. The war was over. The Roman assembly gladly voted that the Carthaginian request for peace should be granted, and entrusted the settlement of the terms to its favourite Scipio and a commission of ten senators. Carthage was allowed to retain her own territory in Africa intact; but she undertook to wage no wars outside Africa, and none inside without the consent of Rome. She surrendered all her ships but ten triremes, her elephants, and all prisoners of war. Finally she agreed to pay an indemnity of 10,000 talents in fifty years. Masinissa was rewarded by an increase of territory, and was enrolled among the "allies and friends" of the Roman people.[1]

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[1] Livy, xxi. 2, 5; Polyb., iii. 15, 31.

[2] Polybius (ii. 24 *sq.*) enumerates the forces of Rome and her allies at the time of the Celtic invasion of 225. For a criticism of his account see Mommsen, *R. Forsch.*, ii. 398; Beloch, *Ital. Bund.* 80. For Hannibal's force, see Polyb., iii. 35, 56.

[3] For the date see Ovid, *Fast.*, vi. 765; Weissenborn on Livy, xxii. 5; Mommsen, *R. G.*, i. 594.

[4] Livy, xxiv. 20.

[5] Livy, xxvi. 16, 33, gives the sentence passed on Capua: "Ager omnis et tecta publica P. R. facta, habitari tantum tanquam urbem, corpus nullum civitatis esse." For the condition of Capua subsequently, see Cic., *L. Agr.*, i. 6; compare *C. I. L.*, 566 *sq.*

The battle of Zama decided the fate of the West. The power of Carthage was broken, and her supremacy passed by the right of conquest to Rome. Henceforth Rome had no rival to fear westward of Italy, and it rested with herself to settle within what limits her supremacy should be confined, and what form it should take. The answer to both these questions was largely determined for her by circumstances. For the next fifty years Rome was too deeply involved in the affairs of the East to think of extending her rule far beyond the limits of the rich inheritance which had fallen to her by the defeat of Carthage; and it was not until 125 that she commenced a fresh career of conquest in the West by invading Transalpine Gaul. But within this area considerable advance was made in the organization and consolidation of her rule. The rate of progress was indeed unequal. In the case of Sicily and Spain, the immediate establishment of a Roman government was imperatively necessary, if these possessions were not either to fall a prey to internal anarchy, or be recovered for Carthage by some second Hamilcar. Accordingly, we find that in Sicily the former dominions of Hiero were at once united with the western half of the island as a single province, under the rule of a Roman prætor (201),[2] and that in Spain, after nine years of a 553. provisional government (206–197), two provinces were in 548-5 197[3] definitely established, and each, like Sicily, assigned to one of the prætors for the year, two additional prætors being elected for the purpose. But here the resemblance between the two cases ends. From 201 down to the out- 553. break of the Slave War in 136 there was unbroken peace 618. in Sicily, and its part in the history is limited to its important functions in supplying Rome with corn and in provisioning and clothing the Roman legions.[4] It became every year a more integral part of Italy; and a large proportion even of the land itself passed gradually into the hands of enterprising Roman speculators. The governors of the two Spains had very different work to do from that which fell to the lot of the Sicilian prætors. Although the coast towns readily acquiesced in Roman rule, the restless and warlike tribes of the interior were in a constant state of ferment, which from time to time broke out into open revolt. In Sicily the ordinary prætorian authority, with at most a few cohorts, was sufficient, but the condition of Spain required that year after year the prætors should be armed with the consular authority, and backed by a standing force of four legions, while more than once the presence of the consuls themselves was found necessary. Still, in spite of all difficulties, the work of pacification proceeded. To the elder Cato (consul 195), and to Tiberius Sempronius Gracchus (prætor and 559. proprætor 180–179), father of the two tribunes, is mainly 574- due the credit of quieting the Celtiberian tribes of central Spain, and the government of Gracchus was followed by thirty years of comparative tranquillity. The insurrection headed by Viriathus in 149 was largely caused by the 605. exactions of the Roman magistrates themselves, while its obstinate continuance down to the capture of Numantia in 133, was almost as much the result of the incapacity of 621. the Roman commanders. But the re-settlement of the country by Scipio Africanus the younger in that year left all Spain, with the exception of the highland Astures and Cantabri in the north-west, finally and tranquilly subject to Rome. Meanwhile the disturbed state of the interior had not prevented the spread of Roman civilization on the seaboard. Roman traders and speculators flocked to the seaport towns and spread inland. The mines became centres of Roman industry; the Roman legionaries quartered in Spain year after year married Spanish wives, and when their service was over gladly settled down in Spain, in preference to returning to Italy. The first Roman communities established outside Italy were both planted in Spain, and both owed their existence to the Roman legions.[5] Spain even in 133 gave promise of becoming in time "more Roman than Rome itself."

Africa—Third Punic War, 153-14 605-60

In Africa there was no question at first of the introduction of Roman government by the formation of a province. Carthage, bound hand and foot by the treaty of 201, was placed under the jealous watch of the loyal prince of Numidia, who himself willingly acknowledged the suzerainty of Rome. But it was impossible for this arrangement to be permanent. Every symptom of reviving prosperity at Carthage was regarded at Rome with feverish anxiety, and .59. neither the expulsion of Hannibal in 195 nor his death in 71: 183 did much to check the growing conviction that Rome would never be secure while her rival existed. It was therefore with grim satisfaction that many in the Roman senate watched the increasing irritation of the Carthaginians under the harassing raids and encroachments of their favoured neighbour Masinissa, and waited for the moment when Carthage should, by some breach of the conditions imposed upon her, supply Rome with a pretext for interference. At last in 151 came the news that Carthage, in defiance of treaty obligations, was actually at war with Masinissa. The anti-Carthaginan party in the senate, headed by M. Porcius Cato, eagerly seized the opportunity, and, in spite of the protests of Scipio Nasica and others, war was declared, and nothing short of the destruction of their city itself was demanded from the despairing Carthaginians. This demand, as the senate no doubt foresaw, was refused, and in 149 the siege of Carthage begun. During the next two years little progress was 307. made, but in 147 P. Cornelius Scipio Æmilianus, son of L. Æmilius Paulus, conqueror of Macedonia, and grandson by adoption of the conqueror of Hannibal was, at the age of thirty-seven, and though only a candidate for the ædileship, elected consul, and given the command in 308. Africa. In the next year (146) Carthage was taken and razed to the ground. Its territory became the Roman province of Africa, while Numidia, now ruled by the three sons of Masinissa, remained as an allied state under Roman suzerainty, and served to protect the new province against the raids of the desert tribes. Within little more than a century from the commencement of the First Punic War, the whole of the former dominions of Carthage had been brought under the direct rule of Roman magistrates, and were regularly organized as Roman provinces.

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[1] Livy, xxx. 43; Polyb., xv. 18.

[2] Livy, xxvi. 40. The union was apparently effected in 210; but the first prætor of all Sicily was sent there in 201.

[3] Livy, xxxii. 27; *cf.* Marquardt, *Staatsverw.*, i. 100, and Hübner in *Hermes*, i. 105 *sq.*

[4] Livy, xxvii. 5, "pace ac bello fidissimum annonae subsidium"; *cf.* xxxii. 27.

[5] Italica (206), Appian, *Iber.*, 38; Carteia (171), Livy, xliii. 3.

Italy. In Italy itself the Hannibalic war was inevitably followed by important changes, and these changes were naturally enough in the direction of an increased Roman predominance. In the north the Celtic tribes paid for their sympathy with Hannibal with the final loss of all separate political existence. Cispadane Gaul, studded with colonies, and flooded with Roman settlers, was rapidly Romanized. Beyond the Po in Polybius's time, about sixty years after the Hannibalic war, Roman civilization was already widely spread. In the extreme northeast the Latin colony of Aquileia, the last of its kind, 573. was founded in 181, to hold in check the Alpine tribes, while in the north-west the Ligurians, though not finally subdued until a later time, were held in check by the 574. colony of Luna (180), and by the extensive settlements of Roman citizens and Latins made on Ligurian territory in 581. 173.[1] In southern Italy the effects of the war were not less marked. The depression of the Greek cities on the coast, begun by the raids of the Sabellian tribes, was completed by the repeated blows inflicted upon them during the Hannibalic struggle. Some of them lost territory;[2] all suffered from a decline of population and loss of trade; and their place was taken by such new Roman settlements as Brundusium and Puteoli.[3] In the interior the southern Sabellian tribes suffered scarcely less severely. The Bruttii were struck off the list of Roman allies, and nearly all their territory was confiscated.[4] To the Apulians and Lucanians no such hard measure was meted out; but their strength had been broken by the war, and their numbers dwindled; large tracts of land in their territories were seized by Rome, and allotted to Roman settlers, or occupied by Roman speculators. That Etruria also suffered from declining energy, a dwindling population, and the spread of large estates is clear from the state of things existing there in 133. It was indeed in central Italy, the home 621 of the Latins and their nearest kinsmen, and in the new Latin and Roman settlements throughout the peninsula that progress and activity were henceforth concentrated, and even within this area the Roman, and not the strictly Latin, element tended to preponderate. Of the twenty colonies founded between 201 and 146 only four were Latin. 553–608.

(*b*) *Rome in the East*, 200–133.—Ever since the re- 554–621. pulse of Pyrrhus from Italy, Rome had been slowly drifting into closer contact with the Eastern states. With one of the three great powers which had divided between them the empire of Alexander, with Egypt, she had formed an alliance in 273, and the alliance had been cemented by the growth of commercial intercourse between the two countries.[5] In 228 her chastisement of 526. the Illyrian pirates had led naturally enough to the establishment of friendly relations with some of the states of Greece proper. Further than this, however, Rome for the time showed no desire to go. The connexions already formed were sufficient to open the eastern ports to her trade, and the engrossing struggle with Carthage left her neither leisure nor strength for active interference in the incessant feuds and rivalries which had made up Eastern politics since the falling asunder of Alexander's empire. In 214 the alliance between Philip 540. and Hannibal, and the former's threatened attack on Italy, forced her into war with Macedon, but even then she contented herself with heading a coalition of the Greek states against him, which effectually frustrated his designs against herself; and at the first opportunity (205), she 549. ended the war by a peace which left the position unchanged. The results of the war were not only to draw closer the ties which bound Rome to the Greek states, but to inspire the senate with a genuine dread of Philip's restless ambition, and with a bitter resentment against him for his union with Hannibal. The events of the next four years served to deepen both these feelings. In 205 549. Philip entered into a compact with Antiochus of Syria for the partition between them of the dominions of Egypt,[6] now left by the death of Ptolemy Philopator to the rule of a boy king. Antiochus was to take Cœle-Syria and Phœnicia, while Philip claimed for his share the districts subject to Egypt on the coasts of the Ægean and the Greek islands. Philip no doubt hoped to be able to secure these unlawful acquisitions before the close of the Second Punic War should set Rome free to interfere with his plans. But the obstinate resistance offered by Attalus of Pergamum and the Rhodians upset his calculations. In 201 Rome made peace with Carthage, and the senate had leisure to listen to the urgent appeal for assistance which reached her from her Eastern allies. With Antiochus indeed the senate was not yet prepared to quarrel; Egypt was assured of the continued friendship of Rome, but Antiochus was allowed to work his will in Cœle-Syria.[7] With Philip it is clear that the senate had no thoughts of a peaceful settlement. Their animosity against him had been deepened by the assistance he had recently rendered to Carthage. Always an unsafe and turbulent neighbour, he would, if allowed to become supreme in the Ægean, prove as dangerous to her interests in the East as Carthage had been in the West; nor, lastly, could Rome, in honour, look quietly on at the ill-treatment of states which, as Greeks and as allies of her own, had a double claim on her protection. To cripple or at least to stay the growth of Philip's power was in the eyes of the senate a necessity, but it was only by representing a Macedonian invasion of Italy as imminent that they persuaded the assembly, which was longing for peace, to pass a declaration of war[1] (200), an ostensible pretext for which was found in the invasion by Macedonian troops of the territory of Rome's ally, Athens.

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[1] Livy, xlii. 4.

[2] *E.g.*, Tarentum, Livy, xliv. 16. A Roman colony was established at Croton in 194, and a Latin colony (Copia) at Thurii in 193 (Livy, xxxiv. 45, 53).

[3] Brundusium was established after the First Punic War. Puteoli was fortified during the Second Punic War, and became a Roman colony in 194 (Livy, xxxiv. 45).

[4] Appian, *Hann.*, 61; Aul. Gell., x. 3; *cf.* Beloch, *Ital. Bund.*

[5] Egypt had supplied corn to Italy during the Second Punic War (Polyb., ix. 44).

[6] Polyb., iii. 2, xv. 20; Livy, xxxi. 14.

[7] Livy, xxxiii. 19.

The war commenced in the summer of 200 B.C., and, though the landing of the Roman legions in Epirus was not followed, as had been hoped, by any general rising against Philip, yet the latter had soon to discover that, if they were not enthusiastic for Rome, they were still less inclined actively to assist himself. Neither by force nor diplomacy could he make any progress south of Bœotia. The fleets of Pergamum and Rhodes, now the zealous allies of Rome, protected Attica and watched the eastern coasts. The Achæans and Nabis of Sparta were obstinately neutral, while nearer home in the north the Epirots and Ætolians threatened Thessaly and Macedonia. His own resources both in men and in money had been severely strained by his constant wars,[2] and the only ally who could have given him effective assistance, Antiochus, was fully occupied with the conquest of Cœle-Syria. It is no wonder then that, in spite of his dashing generalship and high courage, he made but a brief stand. T. Quinctius
556. Flamininus (consul 198), in his first year of command, defeated him on the Aous, drove him back to the pass of Tempe, and in the next year utterly routed him at Cynoscephalæ. Almost at the same moment the Achæans, who had now joined Rome, took Corinth, and the Rhodians defeated his troops in Caria.[3] Further resistance was impossible; Philip submitted, and early the next year a Roman commission reached Greece with instructions to arrange terms of peace. These were such as effectually secured Rome's main object in the war, the removal of all danger to herself and her allies from Macedonian aggression.[4] Philip was left in possession of his kingdom, but was degraded to the rank of a second-rate power, deprived of all possessions in Greece, Thrace, and Asia
553 Minor, and forbidden, as Carthage had been in 201, to wage war without the consent of Rome, whose ally and friend he now became. Macedon thus weakened could no longer be formidable, but might yet be useful, not only as a barrier against Thracians and Celts,[5] but as a check upon anti-Roman intrigues in Greece.

The liberation of Greece.

The second point in the settlement now effected by Rome was the liberation of the Greeks. The "freedom of Greece" was proclaimed at the Isthmian games amid a scene of wild enthusiasm,[6] which reached its height when two years later (194) Flamininus withdrew his troops even from the "three fetters of Greece"—Chalcis, Demetrias, and Corinth.[7] There is no reason to doubt that, in acting thus, not only Flamininus himself, but the senate and people at home were influenced, partly at any rate, by feelings of genuine sympathy with the Greeks and reverence for their past. It is equally clear that no other course was open to them. For Rome to have annexed Greece, as she had annexed Sicily and Spain, would have been a flagrant violation of the pledges she had repeatedly given both before and during the war; the attempt would have excited the fiercest opposition, and would probably have thrown the Asiatic as well as the European Greeks into the arms of Antiochus. But a friendly and independent Greece would be at once a check on Macedon, a barrier against aggression from the East, and a promising field for Roman commerce. Nor while liberating the Greeks did Rome abstain from such arrangements as seemed necessary to secure the predominance of her own influence. In the Peloponnese, for instance, the Achæans were rewarded by considerable accessions of territory; and it is possible that the Greek states, as allies of Rome, were expected to refrain from war upon each other without her consent. The failure of the policy, after all, was due to the impracticability of the Greeks, and the intensity of their civic and tribal feuds. To suppose as some have done that Rome intended it to fail is to attribute to the statesmen of the generation of Scipio and Flamininus even more than the cynicism of the time of L. Mummius.[8]

War w Antioc 192–1 562–5.

Antiochus III. of Syria, Philip's accomplice in the proposed partition of the dominions of their common rival, Egypt, returned from the conquest of Cœle-Syria (198) to learn first of all that Philip was hard pressed by the Romans, and shortly afterwards that he had been decisively beaten at Cynoscephalæ. It was already too late to assist his former ally, but Antiochus resolved at any rate to lose no time in securing for himself the possessions of the Ptolemies in Asia Minor and in eastern Thrace, which Philip had claimed, and which Rome now pronounced free and independent. In 197–196 he overran 557-8. Asia Minor and crossed into Thrace.[9] But Antiochus was pleasure-loving, irresolute, and above all no general, and it was not until 192 that the urgent entreaties of the 562. Ætolians, and the withdrawal of the Roman troops from Greece, nerved him to the decisive step of crossing the Ægean; and even then the force he took with him was so small as to show that he completely failed to appreciate the nature of the task before him.[10] At Rome the prospect of a conflict with Antiochus excited great anxiety, and it was not until every resource of diplomacy had been exhausted that war was declared.[11] At a distance, indeed, Antiochus, the great king, the lord of all the forces of Asia, seemed an infinitely more formidable opponent than their better known neighbour Philip, and a war against the vaguely known powers of the East a far more serious matter than a campaign in Thessaly. War, however, was unavoidable, unless Rome was to desert her Greek allies, and allow Antiochus to advance unopposed to the coasts of the Adriatic. And the war had no sooner commenced than the real weakness which lay behind the magnificent pretensions of the "king of kings" was revealed.

Had Antiochus acted with energy when in 192 he 562 landed in Greece, he might have won the day before the Roman legions appeared. As it was, in spite of the warnings of Hannibal,[12] who was now in his camp, and of the Ætolians, he frittered away valuable time between his pleasures at Chalcis and useless attacks on petty Thessalian towns. In 191 Glabrio landed at the head of an imposing force; and a single battle at Thermopylæ broke the courage of Antiochus, who hastily recrossed the sea to Ephesus, leaving his Ætolian allies to their fate. But Rome could not pause here. The safety of her faithful allies, the Pergamenes and Rhodians, and of the Greek cities in Asia Minor, as well as the necessity of chastising Antiochus, demanded an invasion of Asia. A Roman fleet had already (191) crossed the Ægean, and in concert with the fleets of Pergamum and Rhodes worsted the navy of Antiochus. In 190 the new consul L. Scipio, accompanied by his famous brother, the conqueror of Africa, led the Roman legions for the first time into Asia. At Magnesia, near Mount Sipylus in Lydia, he met and defeated the motley and ill-disciplined hosts of the great king.[1] For the first time the West, under Roman leadership, successfully encountered the forces of the East, and the struggle began which lasted far on into the days of the emperors. The terms of the peace which followed the victory at Magnesia tell their own story clearly enough. There is no question, any more than in Greece, of annexation; the main object in view is that of securing the predominance of Roman interests and influence throughout the peninsula of Asia Minor, and removing to a safe distance the only Eastern power which could be considered dangerous.[2] The line of the Halys and the Taurus range, the natural boundary of the peninsula eastward, was established as the boundary between Antiochus and the kingdoms, cities, and peoples now enrolled as the allies and friends of Rome. This line Antiochus was forbidden to cross; nor was he to send ships of war farther west than Cape Sarpedon in Cilicia. Immediately to the west of this frontier lay the small states of Bithynia and Paphlagonia and the immigrant Celtic Galatæ, and these frontier states, now the allies of Rome, served as a second line of defence against attacks from the east. The area lying between these "buffer states" and the Ægean was organized by Rome in such a way as should at once reward the fidelity of her allies and secure both her own paramount authority and safety from foreign attack. Pergamum and Rhodes were so strengthened—the former by the gift of the Chersonese, Lycaonia, Phrygia, Mysia, and Lydia, the latter by that of Lycia and Caria—as not only amply to reward their loyalty, but to constitute them effective props of Roman interests and effective barriers alike against Thracian and Celtic raids in the north and against aggression by Syria in the south. Lastly, the Greek cities on the coast, except those already tributary to Pergamum, were declared free, and established as independent allies of Rome.

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[1] Livy, xxxi. 6, 7.

[2] Livy, xxxiii. 3.

[3] *Ib.*, 17.

[4] Polyb., xviii. 44-47; Livy, xxxiii. 30-34.

[5] Polyb., xviii. 37.

[6] Livy, xxxiii. 32, 33.

[7] Livy, xxxiv. 48-52.

[8] For the conflicting views of moderns on the action of Rome, see Mommsen, *R. G.*, i. 718, and on the other side Ihne, *R. G.*, iii. 52–63, and C. Peter, *Studien zur Röm. Gesch.*, Halle, 1863, pp. 158 *sq.*

[9] Livy, xxxiii. 38; Polyb., xviii. 50.

[10] Livy, xxxv. 43.

[11] Livy, xxxv. 20, xxxvi. i.

[12] Livy, xxxvi. 11

-565.

In a space of little over eleven years (200–189) Rome had broken the power of Alexander's successors and established throughout the eastern Mediterranean a Roman protectorate. It remained to be seen whether this protectorate could be maintained, or whether Rome would be driven to that policy of annexation which she had adopted from the first in Sicily and Spain.

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It was in the western half of the protectorate in European Greece that the first steps in the direction of annexation were taken. The enthusiasm provoked by the liberation of the Greeks had died away, and its place had been taken by feelings of dissatisfied ambition or sullen resentment. Internecine feuds and economic distress had brought many parts of Greece to the verge of anarchy, and, above all, the very foundations of the settlement effected in 197 were threatened by the reviving power and aspirations of Macedon. Loyally as Philip had aided Rome in the war with Antiochus, the peace of Magnesia brought him nothing but fresh humiliation. He was forced to abandon all hopes of recovering Thessaly, and he had the mortification to see the hated king of Pergamum installed almost on his borders as master of the Thracian Chersonese. Resistance at the time was unavailing, but from 189 until his death (179) he laboured patiently and quietly to increase the internal resources of his own kingdom,[3] and to foment, by dexterous intrigue, feelings of hostility to Rome among his Greek and barbarian neighbours. His successor, Perseus, his son by a left-handed alliance, continued his father's work. He made friends among the Illyrian and Thracian princes, connected himself by marriage with Antiochus IV. of Syria and with Prusias of Bithynia, and, among the Greek peoples, strove, not without success, to revive the memories of the past glories of Greece under the Macedonian leadership of the great Alexander.[4] The senate could no longer hesitate. They were well aware of the restlessness and discontent in Greece; and after hearing from Eumenes of Pergamum, and from their own officers, all details of Perseus's intrigues and preparations they declared war.[5] The struggle, in spite of Perseus's courage and the incapacity at the outset of the Roman commanders, was short and decisive. The sympathy of the Greeks with Perseus, which had been encouraged by the hitherto passive attitude assumed by Rome, instantly evaporated on the news that the Roman legions were on their way to Greece. No assistance came from Prusias or Antiochus, and Perseus's only allies were the Thracian king Cotys and the Illyrian Genthius. The victory gained by L. Æmilius Paulus at Pydna (168) 586. ended the war.[6] Perseus became the prisoner of Rome, and as such died in Italy a few years later.[7] Rome had begun the war with the fixed resolution no longer of crippling but of destroying the Macedonian state. Perseus's repeated proposals for peace during the war had been rejected; and his defeat was followed by the final extinction of the kingdom of Philip and Alexander.[8] Macedonia, though it ceased to exist as a single state, was not definitely constituted a Roman province.[9] On the contrary, the mistake was made of introducing some of the main principles of the provincial system—taxation, disarmament, and the isolation of the separate communities—without the addition of the element most essential for the maintenance of order—that of a resident Roman governor. The four petty republics now created were each autonomous, and each separated from the rest by the prohibition of commercium and connubium, but no central controlling authority was substituted for that of the Macedonian king. The inevitable result was confusion and disorder, resulting finally (149–146) in the attempt of a pretender, Andriseus, who claimed to be a son of Perseus, to resuscitate the ancient monarchy.[10] On his defeat in 146 the senate hesitated no longer, and Macedonia became a Roman province, with a Roman magistrate at its head.[11]

605–8
Macedonia a Roman province.

Affairs in Greece.
565–587.

The results of the protectorate in Greece, if less dangerous to Roman supremacy, were quite as unfavourable to the maintenance of order. But from 189 to the defeat of Perseus in 167, no formal change of importance in the status of the Greek states was made by Rome. The senate, though forced year after year to listen to the mutual recriminations and complaints of rival communities and factions, contented itself as a rule with intervening just enough to remind the Greeks that their freedom was limited by its own paramount authority, and to prevent any single state or confederacy from raising itself too far above the level of general weakness which it was the interest of Rome to maintain. After the victory at Pydna, however, the sympathy shown for Perseus, exaggerated as it seems to have been by the interested representations of the Romanizing factions in the various states, was made the pretext for a more emphatic assertion of Roman ascendency. All those suspected of Macedonian leanings were removed to Italy, as hostages for the loyalty of their several communities,[1] and the real motive for the step was made clear by the exceptionally severe treatment of the Achæans, whose loyalty was not really doubtful, but whose growing power in the Peloponnese and growing independence of language had awakened alarm at Rome. A thousand of their leading men, among them the historian Polybius, were carried off to Italy (see POLYBIUS). In Ætolia the Romans connived at the massacre by their so-called friends of 500 of the opposite party. Acarnania was weakened by the loss of Leucas, while Athens was rewarded for her unambitious loyalty by the gift of Delos and Samos.

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[1] Livy (xxxvii. 40) describes the composition of Antiochus's army.

[2] Livy, xxxvii. 55, xxxviii. 38; Polyb., xxi. 17.

[3] Livy, xxxix. 24.

[4] Livy, xlii. 5.

[5] Livy, xlii. 19, 36.

[6] Livy, xliv. 36–41; Plut., *Æmil.*, 15 *sq.*

[7] Diod., xxxi. 9; Livy, xlv. 42; Polyb., xxxvii. 16.

[8] Livy, xlv. 9.

[9] Livy, xlv. 17, 29; Plut., *Æmil.*, 28; Mommsen, *R. G.*, i. 769; Ihne, *R. G.*, iii. 216; Marquardt, *Röm. Staatsverw.*, i. 160.

[10] Polyb., xxxvii. 2; Livy, *Epit.*, l.

[11] For the boundaries of the province, see Ptolemy, iii. 13; Marquardt, *loc. cit.*, 161.

Settlement of Greece, 146 = 608.

But this somewhat violent experiment only answered for a time. In 148 the Achæans rashly persisted, in spite of warnings, in attempting to compel Sparta by force of arms to submit to the league. When threatened by Rome with the loss of all that they had gained since Cynoscephalæ, they madly rushed into war.[2] They were easily defeated, and a "commission of ten," under the presidency of L. Mummius, was appointed by the senate thoroughly to resettle the affairs of Greece.[3] Corinth, by orders of the senate, was burnt to the ground, and its territory confiscated. Thebes and Chalcis were destroyed, and the walls of all towns which had shared in the last desperate outbreak were razed to the ground. All the existing confederacies were dissolved; no "commercium" was allowed between one community and another. Everywhere an aristocratic type of constitution, according to the invariable Roman practice, was established, and the payment of a tribute imposed. Into Greece, as into Macedonia 587 in 167, the now familiar features of the provincial system were introduced—disarmament, isolation, and taxation. The Greeks were still nominally free, and no separate province with a governor of its own[4] was established, but the needed central control was provided by assigning to the neighbouring governor of Macedonia a general supervision over the affairs of Greece. From the Adriatic to the Ægean, and as far north as the river Drilo and Mount Scardus, the whole peninsula was now under direct Roman rule.[5]

The Roman protectorate in Asia, 189-146 = 565-608.

Beyond the Ægean the Roman protectorate worked no better than in Macedonia and Greece, and the demoralizing recriminations, quarrels, and disorders which flourished under its shadow were aggravated by its longer duration, and by the still more selfish view taken by Rome of the responsibilities connected with it.[6] At one period indeed, after the battle of Pydna, it seemed as if the more vigorous, if harsh, system then initiated in Macedon and Greece was to be adopted farther east also. The levelling policy pursued towards Macedon and the Achæans was applied with less justice to Rome's two faithful and favoured allies, Rhodes and Pergamum. The former had rendered themselves obnoxious to Rome by their independent tone, and still more by their power and commercial prosperity. On a charge of complicity with Perseus they were threatened with war, and though this danger was averted[7] they were forced to exchange their equal alliance with Rome for one which placed them in close dependence upon her, and to resign the lucrative possessions in Lycia and Caria given them in 189. Finally, 565. their commercial prosperity was ruined by the establishment of a free port at Delos,[8] and by the short-sighted acquiescence of Rome in the raids of the Cretan pirates. With Eumenes of Pergamum no other fault could be found than that he was strong and successful; but this was enough. His brother Attalus was invited, but in vain, to become his rival. His turbulent neighbours, the Galatæ, were encouraged to harass him by raids. Pamphylia was declared independent, and favours were heaped upon Prusias of Bithynia. These and other annoyances and humiliations had the desired effect. Eumenes and his two successors—his brother and son, Attalus II. and Attalus III.—contrived indeed by studious humility and dexterous flattery to retain their thrones, but Pergamum ceased to be a powerful state, and its weakness, added to that of Rhodes, increased the prevalent disorder in Asia Minor. During the same period we have other indications of a temporary activity on the part of Rome. The frontier of the protectorate was pushed forward to the confines of Armenia and to the upper Euphrates by alliances with the kings of Pontus and Cappadocia beyond the Halys. In Syria, on the death of Antiochus Epiphanes (164), Rome intervened to place a minor, Antiochus 59 Eupator, on the throne, under Roman guardianship.[9] In 168 Egypt formally acknowledged the suzerainty of 586. Rome,[10] and in 163 the senate, in the exercise of this new 591. authority, restored Ptolemy Philometor to his throne, but at the same time weakened his position by handing over Cyrene and Cyprus to his brother Euergetes.[11]

But this display of energy was short-lived From the death of Eumenes in 159 down to 133 Rome, secure 595 in the absence of any formidable power in the East, and busy with affairs in Macedonia, Africa, and Spain, relapsed into an inactivity the disastrous results of which revealed themselves in the next period, in the rise of Mithradates of Pontus, the spread of Cretan and Cilician piracy, and the advance of Parthia. To the next period also belongs the conversion, on the death of Attalus III., of the kingdom of Pergamum into the Roman province of Asia.

Both the western and eastern Mediterranean now acknowledged the suzerainty of Rome, but her relations with the two were from the first different. The West fell to her as the prize of victory over Carthage, and, the Carthaginian power broken, there was no hindrance to the immediate establishment in Sicily, Sardinia, Spain, and finally in Africa, of direct Roman rule. To the majority, moreover, of her Western subjects she brought a civilization as well as a government of a higher type than any before known to them. And so in the West she not only formed provinces but created a new and wider Roman world. To the east, on the contrary, she came as the liberator of the Greeks; and it was only slowly that in this part of the empire her provincial system made way. In the East, moreover, the older civilization she found there obstinately held its ground. Her proconsuls governed and her legions protected the Greek communities, but to the last the East remained in language, manners, and thought Greek and not Roman.

PERIOD III.: THE PERIOD OF THE REVOLUTION (146-49 B.C.).—In the course of little more than a century, Rome had become the supreme power in the civilized world. By all men, says Polybius, it was taken for granted that nothing remained but to obey the commands of the Romans.[12] For the future the interest of Roman history centres in her attempts to perform the two Herculean tasks which this unique position laid upon her,—the efficient government of the subject peoples, and their defence against the barbarian races which swarmed around them on all sides. They were tasks under which the old republican constitution broke down, and which finally overtaxed the strength even of the marvellous organization framed and elaborated by Augustus and his successors.

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[1] Livy, xlv. 31. [2] Livy, *Epit.*, li., lii.

[3] Livy, *Epit.*, lii.; Polyb., xl. 9 *sq.*; Pausanias, vii. 16; Mommsen, *R. G.*, ii. 47 *sq.*

[4] Mommsen, *loc. cit.*, note; Marquardt, *Rom. Staatsverw.*, i. 164 *sq.*; A. W. Zumpt, *Comment. Epigraph.*, ii. 153.

[5] North of the Drilo, the former kingdom of Perseus's ally Genthius had been treated as Macedon was in 167 (Livy, xlv., 26); *cf.* Zippel, *Rom. Herrschaft in Illyrien*, Leipsic 1877. Epirus, which had been desolated after Pydna (Livy, xlv. 34), went with Greece; Marquardt, i. 164. [6] Mommsen, *R. G.*, i. 771-780, ii. 50-67.

[7] Livy, xlv. 20; Polyb., xxx. 5.

[8] Polyb., xxxi. 7. The Rhodian harbour dues suffered severely.

[9] Rome had already intervened between Syria and Egypt; Livy, xlv. 12; Polyb., xxix. 11, xxxi. 12.

[10] Livy, xiv. 13, "Regni maximum praesidium in fide populi Romani." [11] Livy, *Epit.*, xlvi., xlvii.

[12] Polyb., iii. 4.

At the outset the difficulties of Rome were increased by the rapidity with which her new duties came upon her. From a century, first of deadly struggle, and then of dazzlingly easy success, she emerged to find herself called upon to govern a world with the primitive machinery of a small city state, and to deal with new and complicated administrative problems which she had as yet had no leisure to study. Nor was it until her own political system had been remodelled that she was able to deal effectively with the government of the empire at large. During the period which has now to be considered, the period of the so-called Revolution, but little advance was made towards a better imperial organization, and that little was made by men who, like Cæsar and Pompey, belonged, both in the methods and aims of their policy and in the position they held, to the empire rather than to the republic.

sti- onal nges, -146 -608.

Although in its outward form the old constitution had undergone little change during the age of war and conquest from 265 to 146,[1] the causes, both internal and external, which brought about its fall had been silently at work throughout. Its form was in strictness that of a moderate democracy. The patriciate had ceased to exist as a privileged caste,[2] and there was no longer any order of nobility recognized by the constitution. The senate and the offices of state were in law open to all,[3] and the will of the people in their comitia had been in the most explicit and unqualified manner declared to be supreme alike in the election of magistrates, in the passing of laws, and in all matters touching the "caput" of a Roman citizen. But in practice the constitution had become an oligarchy. The senate, not the assembly, ruled Rome, and both the senate and the magistracies were in the hands of a class which, in defiance of the law, arrogated to itself the title and the privileges of a nobility.[4] The ascendency of the senate is too obvious and familiar a fact to need much illustration here. It is but rarely that the assembly was called upon to decide questions of policy, and then the proposal was usually made by the magistrate in obedience to the express directions of the senate.[5] In the enormous majority of cases the matter was settled by a senatus consultum, without any reference to the people at all. The assembly decides for war or peace[6], but the conduct of the war and the conditions of peace are matters left to the senate. Now and then the assembly confers a command upon the man of its choice, or prolongs the imperium of a magistrate,[7] but, as a rule, these and all questions connected with foreign affairs are settled within the walls of the senate house. It is the senate which year after year assigns the commands and fixes the number and disposition of the military forces,[8] directs the organization of a new province,[9] conducts negotiations, and forms alliances. Within Italy, though its control of affairs was less exclusive, we find that, besides supervising the ordinary current business of administration, the senate decides questions connected with the Italian allies, sends out colonies, allots lands, and directs the suppression of disorders. Lastly, both in Italy and abroad it managed the finances.[10] Inseparably connected with this monopoly of affairs to the exclusion of the assembly was the control which in practice, if not in theory, the senate exercised over the magistrates. The latter had become what Cicero wrongly declares they were always meant to be, merely the subordinate ministers of the supreme council,[11] which assigned them their departments, provided them with the necessary equipment, claimed to direct their conduct, prolonged their commands, and rewarded them with triumphs. It was now at once the duty and the interest of a magistrate to be "in auctoritate senatus," "subject to the authority of the senate," and even the once formidable "tribuni plebis" are found during this period actively and loyally supporting the senate, and acting as its spokesmen in the assembly.[12]

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The causes of this ascendency of the senate are not to be found in any additions made by law to its constitutional prerogatives, but first of all in the fact that the senate was the only body capable of conducting affairs in an age of incessant war. The voters in the assembly, a numerous, widely scattered body, many of whom were always away with the legions abroad, could not readily be called together, and when assembled were very imperfectly qualified to decide momentous questions of military strategy and foreign policy. The senate, on the contrary, could be summoned in a moment,[13] and included in its ranks all the skilled statesmen and soldiers of the commonwealth, while its forms of procedure were at least better fitted than those of the comitia for securing the careful discussion and prompt decision of the question before it. The subordination of the magistrates was equally the result of circumstances, though it suited the senatorial advocates of a later day to represent it as an original principle of the constitution, and though it was encouraged and confirmed by the policy of the senate itself.[14] For, as the numbers of the magistrates, and also the area of government, increased, some central controlling power became absolutely necessary to prevent collisions between rival authorities, and to secure a proper division of labour, as well as to enforce the necessary concert and co-operation,[15] nor could such a power be found anywhere in the republican system but in the senate, standing as it necessarily did in the closest relations with the magistrate, and composed as it was increasingly of men who were or had been in office.

Once more, behind both senate and magistrates lay the whole power and influence of the new nobility.[1] These "nobiles" are essentially distinct from the older and more legitimate patrician aristocracy. Every patrician was of course noble, but the majority of the "noble families" in 146 were not patrician but plebeian.[2] The title had been gradually appropriated, since the opening of the magistracies, by those families whose members had held curule office, and had thereby acquired the "jus imaginum." It was thus in theory within the reach of any citizen who could win election even to the curule ædileship, and, moreover, it carried with it no legal privileges whatsoever. Gradually, however, the ennobled plebeian families drew together, and combined with the older patrician gentes to form a distinct order. Office brought wealth and prestige, and both wealth and prestige were liberally employed in securing for this select circle a monopoly of political power, and excluding new men.[3] Already by the close of the period it is rare for any one but a noble to find his way into high office or into the senate. The senate and magistrates are the mouthpieces of this order, and are identified with it in policy and interest. Lastly, it must be allowed that both the senate and the nobility had to some extent justified their power by the use they made of it. It was their tenacity of purpose and devoted patriotism which had carried Rome through the dark days of the Hannibalic war. The heroes of the struggle with Carthage belonged to the leading families; the disasters at the Trasimene Lake and at Cannæ were associated with the blunders of popular favourites.

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[1] The most important change was the assimilation of the division by classes and centuries with that by tribes, a change effected apparently by the censors in their revision of the register, and probably effected gradually. For a full discussion of the point, see Mommsen, *R. G.*, i. 818; Lange, *Röm. Alterth.*, ii. 463 (where the literature is given); Madvig, *Verf. d. Röm. Reichs*, i. 117. A second constitutional question was the franchise of the freedmen; see Nitzsch, *Die Gracchen*, 132 (Berlin, 1847)

[2] A few offices of a more or less priestly character were still filled only by patricians, *e.g.*, rex sacrorum, flamen Dialis. A plebeian first became "curio maximus" in 209 (545 A.U.C.); Livy, xxvii. 8; see Mommsen, *Röm. Forsch.*, i. 77-127.

[3] The "lectio senatus" was in the hands of the censors, but whether before Sulla's time their choice was subject to legal restrictions is doubtful. *Cf.* Cicero *Pro Sestio*, 65, "Deligerentur in id consilium ab universo populo."

[4] Mommsen, *R. G.*, i. 781 *sq.*; Lange, *Röm. Alterth.*, ii.

[5] "Ex auctoritate senatus." The lex Flaminia agraria of 232 was an exception, Cic. *De Senect.*, 4; Polyb., ii. 21

[6] Livy, xxxi. 5, xxxiii. 25, xxxvii. 55.

[7] Livy, xxix. 40, xxx. 27, 41, xxxi. 50.

[8] Livy, xxvi. 1, "consules de republica, de administratione belli. de provinciis exercitibusque patres consuluerunt."

[9] Livy, xlv. 18.

[10] Ihne, *R. G.*, iv. 43; Polyb., vi. 13.

[11] *Pro Sestio*, 65, "quasi ministros gravissimi consilii."

[12] Livy, xxvii. 5, xxviii. 45.

[13] Livy, xxii. 7; in 191 the senators were forbidden to leave Rome for more than a day. Nor were more than five to be absent at once; Livy, xxxvi. 3.

[14] *E.g.*, the abandonment of the dictatorship and the growing infrequency of re-election after the Second Punic War.

[15] Livy, xxvii. 35; xxxv. 42, 48.

From the first however, there was an inherent weakness in this senatorial government. It had no sound constitutional basis, and with the removal of its accidental supports it fell to the ground. Legally the senate had no positive authority. It could merely advise the magistrate when asked to do so, and its decrees were strictly only suggestions to the magistrate, which he was at liberty to accept or reject as he chose.[4] It had it is true become customary for the magistrate not only to ask the senate's advice on all important points, but to follow it when given. But it was obvious that if this custom were weakened, and the magistrates chose to act independently, the senate was powerless. It might indeed anathematize[5] the refractory official, or hamper him if it could by setting in motion against him a colleague or the tribunes, but it could do no more, and these measures, though as a rule effective in the case of magistrates stationed in Rome, failed just where the senate's control was most needed and most difficult to maintain—in its relations with the generals and governors of provinces abroad. The virtual independence of the proconsul was before 146 already exciting the jealousy of the senate and endangering its supremacy.[6] Nor again had the senate any legal hold over the assembly. Except in certain specified cases, it rested with the magistrate to decide whether any question should be settled by a decree of the senate or a vote of the assembly.[7] If he decided to make a proposal to the assembly, he was not bound except by custom to obtain the previous approval of the senate, and[8] the constitution set no limits to the power of the assembly to decide any question whatsoever that was laid before it. The right of the people to govern was still valid, and though it had long lain dormant any year might see a magistrate in office resolved on recalling the people to a larger share in the conduct of affairs by consulting them rather than the senate, and an assembly bent on the exercise of its lawful prerogatives.

And from 167 at least, onwards, there were increasing indications that both the acquiescence of the people and the loyalty of the magistrates were failing. The absorbing excitement of the great wars had died away; the economic and social disturbance and distress which they produced were creating a growing feeling of discontent; and at the same time the senate provoked inquiries into its title to govern by its failure any longer to govern well. In the East there was growing confusion; in the West a single native chieftain defied the power which had crushed Carthage. At home the senate was becoming more and more simply an organ of the nobility, and the nobility were becoming every year more exclusive, more selfish, and less capable and unanimous.[9]

But if the senate was not to govern, the difficulty arose of finding an efficient substitute, and it was this difficulty that mainly determined the issue of the struggles which convulsed Rome from 133 to 49. As the event showed, 621 neither the assembly nor the numerous and disorganized magistracy were equal to the work; the latter were gradually pushed aside in favour of a more centralized authority, and the former became only the means by which this new authority was first encouraged in opposition to the senate and finally established in a position of impregnable strength. The assembly which made Pompey and Cæsar found out too late that it could not unmake them.

It is possible that these constitutional and administrative difficulties would not have proved so rapidly fatal to the republic had not its very foundations been sapped by the changes which followed more or less directly on the conquest of the world. These changes can only be glanced at here. Civic equality and solidarity were alike destroyed by the concentration of wealth in a few hands, the disappearance of the small independent freeholder, and the growing numbers of freedmen and clients. The Roman community became not only unmanageably large, but hopelessly divided by class distinctions and interests, and wide differences in habits of life and modes of thought. The old traditions, beliefs, and usages inseparably connected with the republican regime, and essential to its continuance, lost ground daily before the incoming flood of new fashions, intellectual and social, from Greece and the East. Before the republic fell, Roman society was already in structure, temper, and mind thoroughly unrepublican.

The first systematic attack upon the senatorial government is connected with the names of Tiberius and Gaius Gracchus, and its immediate occasion was an attempt to deal with no less a danger than the threatened disappearance of the class to which of all others Rome owed most in the past.[1] For, while Rome had been extending her sway westward and eastward, while the treasury had been enriched, and while her nobles and merchants were amassing colossal fortunes abroad, the small freeholders throughout the greater part of Italy were sinking deeper into ruin under the pressure of accumulated difficulties. The Hannibalic war had laid waste their fields and thinned their numbers, and when peace returned to Italy it brought with it no revival of prosperity. The heavy burden of military service still pressed ruinously upon them,[2] and in addition they were called upon to compete with the foreign corn imported from beyond the sea,[3] and with the foreign slave-labour purchased by the capital of wealthier men. Farming became unprofitable, and the hard laborious life with its scanty returns was thrown into still darker relief when compared with the stirring life of the camps with its opportunities of booty, or with the cheap provisions, frequent largesses, and gay spectacles to be had in the large towns. The small holders went off to follow the eagles or swell the proletariate of the cities, and their holdings were left to run waste or merged in the vineyards, oliveyards, and above all in the great cattle-farms, of the rich, and their own place was taken by slaves. The evil was not equally serious in all parts of Italy. It was least felt in the central highlands, in Campania, and in the newly settled fertile valley of the Po. It was worst in Etruria and in southern Italy; but everywhere it was serious enough to demand the earnest attention of Roman statesmen. Of its existence the government had received plenty of warning in the declining numbers of able-bodied males returned at the census,[4] in the increasing difficulties of recruiting for the legions,[5] in servile outbreaks in Etruria and Apulia,[6] and between 200 and 160 a good deal was attempted by way of remedy. In addition to the foundation of twenty colonies,[7] there were frequent allotments of land to veteran soldiers, especially in Apulia and Samnium.[8] In 180 40,000 Ligurians were removed from their homes and settled on vacant lands once the property of a Samnite tribe,[9] and in 160 the Pomptine marshes were drained for the purpose of cultivation.[10] But these efforts were only partially successful. The colonies planted in Cisalpine Gaul and in Picenum flourished, but of the others the majority slowly dwindled away, and two required recolonizing only eight years after their foundation.[11] The veterans who received land were unfitted to make good farmers; and large numbers, on the first opportunity, gladly returned as volunteers to a soldier's life. Moreover, after 160 even these efforts ceased, and with the single exception of the colony of Auximum in Picenum (157) nothing was done to check the spread of the evil, until in 133 Tiberius Gracchus, on his election to the tribunate, set his hand to the work.

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[1] Mommsen, *R. G.*, i. 782 *sq.*

[2] *E.g.*, Livii, Sempronii, Cæcilii, Licinii, &c.

[3] Livy, xxii. 34, "plebeios nobiles . . . contemnere plebem, ex quo contemni a patribus desierint, coepisse"; *cf.* Sall., *Jug.*, 41, "paucorum arbitrio belli domique agitabatur penes eosdem aerarium, provinciae, magistratus." Mommsen, *R. G.*, i. 792, 793. The number of new families ennobled dwindles rapidly after 200 B.C.; Willems, *Le Sénat de la République Romaine*, i. 366 *sq.* (Paris, 1878).

[4] The senators' whole duty is "sententiam dicere." The senator was asked "quid censes?" the assembly "quid velitis jubeatis?" *Cf.* also the saving clause, "Si eis videretur" (sc. consulibus, &c.) in Scta., *e.g.*, Cic., *Phil.*, v. 19.

[5] By declaring his action to be "contra rempublicam." The force of this anathema varied with circumstances. It had no legal value.

[6] Livy, xxxviii. 42, of Cn. Manlius Vulso in Asia, 189 B.C.; *cf.* also the position of the two Scipios.

[7] Hence the same things, *e.g.*, founding of colonies, are done in one year by a Sctum., in another by a "lex"; *cf.* Cic. *De Rep.*, ii. 32; *Phil.*, i. 2, of Antony as consul, "mutata omnia, nihil per senatum, omnia per populum."

[8] There was no legal necessity, before Sulla's time, for getting the "senatus auctoritas" for a proposal to the assembly.

[9] See generally Mommsen, *R. G.*, i. bk. iii. cap. 6; Lange, *Röm. Alterth.*, vol. ii.; Ihne, v. cap. i. The first law against bribery at elections was passed in 181 B.C. (Livy, xl. 20), and against magisterial extortion in the provinces in 149 (Lex Calpurnia de pecuniis repetundis). The senators had special seats allotted to them in the theatre in 194 B.C.; Livy, xxxiv. 44, 54.

The remedy proposed by Gracchus[12] amounted in effect to the resumption by the state of as much of the "common land" as was not held in occupation by authorized persons and conformably to the provisions of the Licinian law. Unauthorized occupiers were to be evicted; in other cases the occupation was reduced to a maximum size of 1000 acres;[13] the public pastures were reclaimed for agriculture.[14] And the land thus rescued for the community from the monopoly of a few was to be distributed in allotments.[15] It was a scheme which could quote in its favour ancient precedent as well as urgent necessity. Of the causes which led to its ultimate failure something will be said later on; for the present we must turn to the constitutional conflict which it provoked. The senate from the first identified itself with the interests of the wealthy occupiers, and Tiberius found himself forced into a struggle with the senate, which had been no part of his original plan. He fell back on the legislative sovereignty of the assembly; he resuscitated the half-forgotten powers of interference vested in the tribunate in order to paralyse the action of the senatorial magistrates, and finally lost his life in an attempt to make good one of the weak points in the tribune's position by securing his own re-election for a second year. But the conflict did not end with his death. It was renewed on a wider scale, and with a more deliberate aim by his brother Gaius, who on his election to the tribunate (123) at once came forward as the avowed enemy of the senate. The latter suddenly found its control of the administration threatened at a variety of points. On the invitation of the popular tribune the assembly proceeded to restrict the senate's freedom of action in assigning the provinces.[16] It regulated the taxation of the province of Asia[17] and altered the conditions of military service.[18] In home affairs it inflicted two serious blows on the senate's authority by declaring the summary punishment of Roman citizens by the consuls on the strength of a senatus consultum to be a violation of the law of appeal,[19] and by taking out of the senate's hands the control of the newly established court for the trial of cases of magisterial misgovernment in the provinces.[20] Tiberius had committed the mistake of relying too exclusively on the support of one section only of the community; his brother endeavoured to enlist on the popular side every available ally. The Latins and Italians had opposed an agrarian scheme which took from them land which they had come to regard as rightfully theirs, and gave them no share in the benefit of the allotments.[21] Gaius not only removed this latter grievance,[22] but ardently supported and himself brought forward the first proposals made in Rome for their enfranchisement.[23]

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[1] Mommsen, i. bk. iii. cap. 12, bk. iv. cap. 2; Ihne, iv. 173 *sq.*, v. 1–25; Nitzsch, *Die Gracchen*; Long, *Decline and Fall of the Roman Republic*; Beesly, *The Gracchi, Marius, and Sulla.*

[2] To Spain alone more than 150,000 men were sent between 196 and 169 (Ihne, iii. 319); compare the reluctance of the people to declare war against Macedon in 200 B.C., and also the case of Spurius Ligustinus in 171 (Livy, xlii. 34).

[3] Mommsen, i. 837 *sq.* Ihne, v. 16, thinks that Mommsen has exaggerated the depressing effects of foreign competition, but hardly makes out his case.

[4] Beloch, *Ital. Bund*, 80 *sq.*

[5] Livy, xliii. 14; *Epit.*, xlviii., lv. During the period the minimum qualification for service in the legion was reduced from 11,000 to 4000 asses.

[6] Livy, xxxii. 26, xxxiii. 36, xxxix. 29, 41.

[7] Sixteen Roman and four Latin colonies. See Marquardt, *Staatsverw.*, i.

[8] *E.g.*, Livy, xxxi. 4, 12, 39, xxxii. 1.

[9] Livy, xl. 38.

[10] Livy, *Epit.*, xlvi.

[11] Sipontum and Buxentum in 186; Livy, xxxix. 23.

[12] Plut., *T. G.*, 9–14; Appian, *B. C.*, i. 9–13; Livy, *Epit.*, lviii.; Cic., *L. Agr.*, ii. 31. Compare also Mommsen, *R. G.*, ii. 68 *sq.*; Ihne, v. 25; Marquardt, *Röm. Staatsverw.*, i. 437 *sq.*; Lange, *Röm. Alterth.*, iii. 8 *sq.*; Nitzsch, *Gracchen*, 294; Dureau de la Malle, *Écon. politique des Romains*, ii. 280.

[13] Or possibly 750; it was in excess of the limit fixed by the Licinian law; App., *B. C.*, i. 9.

[14] Compare the inscription of Popillius Lænas, consul 132, *C. I. L.*, i. 551; Wordsworth, *Fragments of Early Latin*, p. 221.

[15] The allotments were to be inalienable, and were charged with payment of a quit-rent. App., *B. C.*, i. 10; Plut., *C. G.*, 9. Their size is not stated. It is doubtful if the thirty jugera held "agri colendi causa" (compare the lex agraria, 111 B.C.) refer to the Sempronian allotments. See *C. I. L.*, i. 200, and Mommsen's notes

[16] Lex Sempronia de provinciis consularibus; Cic. *Pro Domo*, 9; *De Prov. Cons.*, 2, 7; Sallust, *Jug.*, 27.

[17] Lex de provincia Asia; Cic. *Verr.*, 3, 6; Fronto *Ad Ver.*, ii. p. 125.

[18] Plut., *C. G.*, 5; Diod., xxxiv. 25.

[19] Plut., *C. G.*, 4; Cic. *Pro Domo*, 31; *Pro Rab. Perd.*, 4.

[20] Quæstio de repetundis, est. 149 B.C. See Plut., *C. G.*, 5; Livy, *Epit.*, lx.; Tac., *Ann.*, xii. 60; App., *B. C.*, i. 21. For the kindred lex Acilia, see *C. I. L.*, i. 198; Wordsworth, *Fragm.*, 424.

[21] They had succeeded in 129 in suspending the operations of the agrarian commission. App., *B. C.*, i. 18; Livy, *Epit.*, lix.; Cic. *De Rep.*, iii. 41; *cf. Lex Agraria*, line 81; *C. I. L.*, i. 200

[22] Lange, *R. A.*, iii. 32; *Lex Agr.*, lines 3, 15, 21.

[23] The rogatio Fulvia, 125 B.C.; *Val. Max.*, ix. 5, 1; App., *B. C.*, i. 21.

The indifference of the city populace, to whom the prospect of small holdings in a remote district of Italy was not a tempting one, was overcome by the establishment of regular monthly doles of corn at a low price.[1] Finally, the men of business—the publicans, merchants, and money-lenders—were conciliated by the privilege granted to them of collecting the tithes of the new province of Asia, and placed in direct rivalry with the senate by the substitution of men of their own class as judges in the "quaestio de repetundis," in place of senators.[2] The organizer of this concerted attack upon the position of the senate fell, like his brother, in a riot.

The agrarian reforms of the two Gracchi had little permanent effect.[3] Even in the lifetime of Gaius the clause in his brother's law rendering the new holdings inalienable was repealed, and the process of absorption recommenced.[4] In 118 a stop was put to further allotment of occupied lands,[5] and finally, in 111, the whole position of the agrarian question was altered by a law which converted all land still held in occupation into private land.[6] The old controversy as to the proper use of the lands of the community was closed by this act of alienation. The controversy in future turns, not on the right of the poor citizens to the state lands, but on the expediency of purchasing other lands for distribution at the cost of the treasury.[7]

But, though the agrarian reform failed, the political conflict it had provoked ended only with the dictatorship of Cæsar, and the lines on which it was waged were in the main those laid down by Gaius Gracchus. The sovereignty of the assembly continued to be the watchword of the popular party, and a free use of the tribunician powers of interference and of legislation remained the most effective means of giving effect to their aims. At the same time the careers of both Tiberius and Gaius had illustrated the weak points of their position,—the uncertain temper and varying composition of the assembly, the limited tenure of office enjoyed by the tribunes[8] and the possibility of disunion in their own body, and, lastly, the difficulty of keeping together the divergent interests which Gaius had for a moment united in hostility to the senate.

Marius, 118–100 = 636–654.

Ten years after the death of Gaius the populares once more summoned up courage to challenge the supremacy of the senate; and it is important as marking a step in advance that it was on a question not of domestic reform but of foreign administration that the conflict was renewed. The course of affairs in the client state of Numidia since 636. Micipsa's death in 118 had been such as to discredit a stronger government than that of the senate.[9] In open defiance of Roman authority, and relying on the influence of his own well-spent gold, Jugurtha had murdered both his legitimate rivals, Hiempsal and Adherbal, and made himself master of Numidia. The declaration of war wrung from the senate (112) by popular indignation had 642. been followed by the corruption of a consul[10] (111) and 643. the crushing defeat of the proconsul Albinus.[11] On the news of this crowning disgrace the storm burst, and on the proposal of the tribunes a commission of inquiry was appointed into the conduct of the war.[12] But the popular leaders did not stop here. Cæcilius Metellus, who as consul (109) had succeeded to the command in Numidia, was 645 an able soldier but a rigid aristocrat; and they now resolved to improve their success by entrusting the command instead to a genuine son of the people. Their choice fell on Gaius Marius (see MARIUS), an experienced officer and administrator, but a man of humble birth, wholly illiterate, and one who, though no politician, was by temperament and training a hater of the polished and effeminate nobles who filled the senate.[13] He was triumphantly elected, and, in spite of a decree of the senate continuing Metellus as proconsul, he was entrusted by a vote of the assembly with the charge of the war against Jugurtha.[14]

Jugurtha was vanquished; and Marius, who had been a second time elected consul in his absence, arrived at Rome in January 104, bringing the captive prince with him in 650. chains.[15] But further triumphs awaited the popular hero. The Cimbri and Teutones were at the gates of Italy; they had four times defeated the senatorial generals, and Marius was called upon to save Rome from a second invasion of the barbarians.[16] After two years of suspense the victory at Aquæ Sextiæ (102), followed by that on the 652. Raudine plain (101), put an end to the danger by the 653. annihilation of the invading hordes; and Marius, now consul for the fifth time, returned to Rome in triumph. There the popular party welcomed him as a leader, and as one who would bring to their aid the imperium of the consul and all the prestige of a successful general. Once more, however, they were destined to a brief success followed by disastrous defeat. Marius became for the sixth time consul;[17] of the two popular leaders Glaucia became prætor and Saturninus tribune. But neither Marius nor his allies were statesmen of the stamp of the Gracchi; and the laws proposed by Saturninus had evidently no other serious aim in view than that of harassing the senate.

Satu ninus and t Appu laws.

His corn law merely reduced the price fixed in 123 for the 631. monthly dole of corn, and the main point of his agrarian law lay in the clause appended to it requiring all senators to swear to observe its provisions.[18] The laws were carried; the senators with the exception of Metellus took the oath; but the triumph of the popular leaders was short-lived. Their recklessness and violence had alienated all classes in Rome; and their period of office was drawing to a close. At the elections fresh rioting took place, and at last Marius as consul was called upon by the senate to protect the state against his own partisans. In despair Saturninus and Glaucia surrendered, but while the senate was discussing their fate they were surrounded and murdered by the populace.

The popular party had been worsted once more in their struggle with the senate, but none the less their alliance with Marius, and the position in which their votes placed him, marked an epoch in the history of the revolution.

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[1] Plut., *C. G.*, 5 ; App., i. 21 ; Livy, *Epit.*, lx. ; Festus, 290.

[2] Hence Gaius ranked as the founder of the equestrian order. Plin., *N. H.*, xxxiii. 34, "judicum appellatione separare eum ordinem . . instituere Gracchi;" Varro ap. Non., 454, "bicipitem civitatem fecit."

[3] Traces of the work of the commission survive in the Miliarium Popilianum, *C. I. L.*, i. 551, in a few Gracchan "termini," *ib.*, 552, 553, 554, 555, in the "limites Gracchani," *Liber Colon.*, ed. Lachmann, pp. 209, 210, 211, 229, &c. Compare also the rise in the numbers of the census of 125 B.C.; Livy, *Epit.*, lx.

[4] Lex Minucia, 121 B.C.; App., i. 27 ; Oros., v. 12 ; Festus, 201.

[5] The so-called lex Thoria ; App., i. 27 ; Cic. *Brut.*, 36 ; *cf.* Wordsworth, *Fragm.*, 441.

[6] The "lex agraria," still extant in a fragmentary condition in the museum at Naples. See Mommsen, *C. I. L.*, i. 200 ; Wordsworth, 441 *sq.*; Bruns, *Fontes Juris Rom.*, 54–67 ; App., i. 27.

[7] Cic., *Lex Agr.*, ii. sect. 65.

[8] Efforts were repeatedly made to get over this difficulty, *e.g.*, the lex Papiria, 131 B.C.; Livy, *Epit.*, lix. Gaius was himself tribune for two years, 110–109 (*cf.* Sall., *Jug.*, 37, "tribuni continuare magistratum nitebantur)", and Saturninus in 100 B.C.

[9] Sallust, *Jug.*, 5 *sq.*; Livy, *Epit.*, lxii., lxiv

[10] Calpurnius Bestia; Sall., *Jug.*, 28.

[11] *Ib.*, 38. 39.

[12] *Ib.*, 40.

[13] Sallust, *Jug.*, 63 ; Plut., *Marius*, 2, 3. For the question as to the position of his parents, see Madvig, *Verfas.*, i. 170 ; Diod., xxxiv. 38.

[14] Sallust, *Jug.*, 73.

[15] *Ib.*, 114. For the chronology of the Jugurthine war, see Mommsen, *R. G.*, ii. 146 note ; Pelham, *Journ. of Phil.*, vii. 91.

[16] Livy, *Epit.*, lxvii. ; Plut., *Mar.*, 12 ; Mommsen, ii. 171 *sq.*

[17] Livy, *Epit.*, lxix. ; App., *B. C.*, i. 28 *sq.*

[18] For the "leges Appuleiae," see Livy, *Epit.*, lxix. ; App., i. 29 ; Cic. *Pro Balbo*, 21 ; Auct. *Ad Herennium*, i. 12, 21. They included also allotments to Marius's veterans ; Auct. *De Vir. Ill.*, 62.

The six consulships of Marius represented not merely a party victory but a protest against the system of divided and rapidly-changing commands, which was no doubt the system favoured by the senate, but was also an integral element of the republican constitution, and in assailing it the populares weakened the republic even more than they irritated the senate. The transference of the political leadership to a consul who was nothing if not a soldier was at once a confession of the insufficiency of the purely civil authority of the tribunate and a dangerous encouragement of military interference in political controversies. The consequences were already foreshadowed by the special provisions made by Saturninus for Marius's veterans, and in the active part taken by them in the passing of his laws. Indirectly too Marius, though no politician, played an important part in this new departure. His military reforms[1] at once democratized the army and attached it more closely to its leader for the time being. He swept away the last traces of civil distinctions of rank or wealth within the legion, admitted to its ranks all classes, and substituted voluntary enlistment under a popular general for the old-fashioned compulsory levy. The efficiency of the legion was increased at the cost of a complete severance of the ties which bound it to the civil community and to the civil authorities.

The defeat of Saturninus was followed by several years of quiet; nor was the next important crisis provoked directly by any efforts of the discredited popular party. It was due partly to the rivalry which had been growing more bitter each year since 122 between the senate and the commercial class, and secondly to the long impending question of the enfranchisement of the Italian allies. The publicani, negotiatores, and others, who constituted what was now becoming known as the equestrian order, had made unscrupulous use of their control of the courts and especially of the "quaestio de repetundis" against their natural rivals, the official class in the provinces. The threat of prosecution before a hostile jury was held over the head of every governor, legate, and quæstor who ventured to interfere with their operations in the provinces. The average official preferred to connive at their exactions; the bolder ones paid with fines and even exile for their courage. In 93 the necessity for a reform was proved beyond a doubt by the scandalous condemnation of P. Rutilius Rufus,[2] ostensibly on a charge of extortion, in reality as the reward of his efforts to check the extortions of the Roman equites in Asia.

The need of reform was clear, but it was not so easy to carry a reform which would certainly be opposed by the whole strength of the equestrian order, and which, as involving the repeal of a Sempronian law, would arouse the resentment of the popular party. The difficulties of the Italian question were more serious. That the Italian allies were discontented was notorious. After nearly two centuries of close alliance, of common dangers and victories, they now eagerly coveted as a boon that complete amalgamation with Rome which they had at first resented as a dishonour. But, unfortunately, Rome had grown more selfishly exclusive in proportion as the value set upon Roman citizenship increased. The politic liberality with which the franchise had once been granted had disappeared. The allies found their burdens increasing and their ancient privileges diminishing, while the resentment with which they viewed their exclusion from the fruits of the conquests they had helped to make was aggravated by the growingly suspicious and domineering attitude of the Roman government.[3] During the last forty years feelings of hope and disappointment had rapidly succeeded each other; Marcus Fulvius, Gaius Gracchus, Saturninus, had all held out promises of relief—and nothing had yet been done. On each occasion they had crowded to Rome, full of eager expectation, only to be harshly ejected from the city by the consul's orders.[4] The justice of their claims could hardly be denied, the danger of continuing to ignore them was obvious—yet the difficulties in the way of granting them were formidable in the extreme. The temper of senate and people alike was still jealously exclusive, and from a higher than a merely selfish point of view there was much to be said against the revolution involved in so sudden and enormous an enlargement of the citizen body.

Marcus Livius Drusus, who as tribune gallantly took up the task of reform, is claimed by Cicero[5] as a member of that party of the centre to which he belonged himself. Noble, wealthy, and popular, he seems to have hoped to be able by the weight of his position and character to rescue the burning questions of the day from the grasp of extreme partisans and to settle them peacefully and equitably. But he, like Cicero after him, had to find to his cost that there was no room in the fierce strife of Roman politics for moderate counsels. His proposal to reform the law courts excited the equestrian order and their friends in the senate to fury. The agrarian and corn laws which he coupled with it[6] alienated many more in the senate, and roused the old anti-popular party feeling; finally, his known negotiations with the Italians were eagerly misrepresented to the jealous and excited people as evidence of complicity with a wide-spread conspiracy against Rome. His laws were carried, but the senate pronounced them null and void.[7] Drusus was denounced in the senate house as a traitor, and on his way home was struck down by the hand of an unknown assassin.

The knights retained their monopoly of the courts, but this and all other domestic controversies were silenced for the time by the news which followed hard upon the murder of Drusus that the Italians were in open revolt against Rome. His assassination was the signal for an outbreak which had been secretly prepared for some time before. Throughout the highlands of central and southern Italy the flower of the Italian peoples rose as one man.[8] Etruria and Umbria held aloof; the isolated Latin colonies stood firm; but the Sabellian clans, north and south, the Latinized Marsi and Pæligni, as well as the still Oscan-speaking Samnites and Lucanians, rushed to arms. No time was lost in proclaiming their plans for the future. A new Italian state was to be formed. The Pælignian town of Corfinium was selected as its capital and re-christened with the proud name of Italica. All Italians were to be citizens of this new metropolis, and here were to be the place of assembly and the senate house. A senate of 500 members and a magistracy resembling that of Rome completed a constitution which adhered closely to the very political traditions which its authors had most reason to abjure.

Now, as always in the face of serious danger, the action

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[1] Sallust, *Jug.*, 86, "ipse interea milites scribere, non more majorum neque ex classibus, sed uti cujusque cupido erat, capite censos plerosque." For details, *cf.* Mommsen, ii. 192; Madvig, *Verf.*, ii. 468, 493; Marquardt, *Staatsv.*, ii. 417, 421.

[2] Livy, *Epit.*, lxx.; Vell. Pat., ii. 13; Cicero, *Brut.*,

[3] Mommsen, ii. 218; Ihne, iv. 151, v. 253; Marquardt, *Staats verw.*, i. 57, 58.

[4] Lex Junia, Cic. *De Off.*, iii. 11; lex Licinia Mucia, Cic. *Pro Corn.*, fr. 10; Ascon., p. 67.

[5] Cic. *De Orat.*, i. 25, and *De Domo*, 50; Appian, *B. C.*, i. 35; Diod Sic., xxxvii. 10; Ihne, v. 242.

[6] For the provisions of the "leges Liviae," see App., *B. C.*, i. 35. Livy, *Epit.*, lxxi. They included, according to Pliny, *N. H.*, xxxiv 3, a proposal for the debasement of the coinage.

[7] Cic. *Pro Domo*, 16.

[8] For the Social War, see, besides Mommsen, Ihne, Lange: also Kiene, *D. Römische Bundesgenossenkrieg*, Leipsic, 1845.

of Rome was prompt and resolute. Both consuls took the field;[1] with each were five legates, among them the veteran Marius and his destined rival L. Cornelius Sulla, and even freedmen were pressed into service with the legions. But the first year's campaign opened disastrously. In central Italy the northern Sabellians, and in the south the Samnites, defeated the forces opposed to them. And though before the end of the year Marius and Sulla in the north, and the consul Cæsar himself in Campania, succeeded in inflicting severe blows on the enemy, and on the Marsi especially, it is not surprising that, with an empty treasury, with the insurgents' strength still unbroken, and with rumours of disaffection in the loyal districts, opinion in Rome should have turned in the direction of the more liberal policy which had been so often scornfully rejected and in favour of some compromise which should check the spread of the revolt, and possibly sow discord among their enemies. Towards the close of
664 the year 90 the consul Cæsar carried the "lex Julia,"[2] by which the Roman franchise was offered to all communi-
Lex Julia and lex Plautia Papiria. 665 ties which had not as yet revolted; early in the next year (89) the Julian law was supplemented by the "lex Plautia Papiria," introduced by two of the tribunes, which enacted that any citizen of an allied community then domiciled in Italy might obtain the franchise by giving in his name to a prætor in Rome within sixty days. A third law (lex Calpurnia) apparently passed at the same time empowered Roman magistrates in the field to bestow the franchise there and then upon all who were willing to receive it. This sudden opening of the closed gates of Roman citizenship was completely successful, and its effects were at once visible in the diminished vigour of the insurgents. By
665. the end of 89 the Samnites and Lucanians were left alone in their obstinate hostility to Rome, and neither, thanks to Sulla's brilliant campaign in Samnium, had for the moment any strength left for active aggression.

The termination of the Social War brought with it no peace in Rome. The old quarrels were renewed with increased bitterness, and the newly enfranchised Italians themselves complained as bitterly of the restriction[3] which robbed them of their due share of political influence by allowing them to vote only in a specified number of tribes. The senate itself was distracted by violent personal rivalries —and all these feuds, animosities, and grievances were aggravated by the widespread economic distress and ruin which affected all classes.[4] Lastly, war with Mithradates had been declared; it was notorious that the privilege of commanding the force to be sent against him would be keenly contested, and that the contest would lie between the veteran Marius and L. Cornelius Sulla.[5]

P. Sulpicius Rufus, 88 – 666 It was in an atmosphere thus charged with the elements of disturbance that P. Sulpicius Rufus as tribune[6] brought forward his laws. He proposed—(1) that the command of the Mithradatic war should be given to Marius, (2) that the new citizens should be distributed through all the tribes, (3) that the freedmen should no longer be confined to the four city tribes, (4) that any senator owing more than 2000 denarii should lose his seat, (5) that those exiled on suspicion of complicity with the Italian revolt should be recalled. Whatever may have been Sulpicius's intentions, these proposals inevitably provoked a storm. The old voters bitterly resented the swamping of the existing constituency; the senate rallied its forces to oppose the alteration in the franchise of the freedmen and the proposed purging of its own ranks; and, lastly, both the senate and Sulla himself, now one of the consuls, prepared to resist the transference of the Asiatic command to Marius. Both sides were ominously ready for violent measures. The consuls, in order to prevent legislation, proclaimed a public holiday.[7] Sulpicius replied by arming his followers and driving the consuls from the forum. The proclamation was withdrawn and the laws carried, but Sulpicius's triumph was short-lived. From Nola in Campania, where lay the legions commanded by him in the Social War, Sulla advanced on Rome, and for the first time a Roman consul entered the city at the head of the legions of the republic. Resistance was hopeless. Marius and Sulpicius fled,[8] and Sulla, summoning the assembly of the centuries, proposed the measures he considered necessary for the public security, the most important being a provision that the sanction of the senate should be necessary before any proposal was introduced to the assembly.[9] Then, after waiting in Rome long enough to hold the consular elections, he left for Asia early in 87. 667.

Sulla had conquered, but his victory cost the republic Marius and Cinna. dear. He had first taught political partisans to look for final success, not to a majority of votes in the forum or campus, but to the swords of the soldiery; and he had shown that the legions, composed as they now were, could be trusted to regard nothing but the commands of a favourite leader. The lesson was well learnt. Shortly after his departure, Cinna as consul revived the proposals of Sulpicius;[10] his colleague Octavius at the head of an armed force fell upon the new citizens who had collected in crowds to vote, and the forum was heaped high with the bodies of the slain.[11] Cinna fled, but fled like Sulla to the legions. When the senate declared him deposed from his consulship, he replied by invoking the aid of the soldiers in Campania in behalf of the violated rights of the people and the injured dignity of the consulship, and, like Sulla, found them ready to follow where he led. The neighbouring Italian communities, who had lost many citizens in the recent massacre, sent their new champion men and money;[12] while from Africa, whither he had escaped after Sulla's entry into Rome, came Marius with 1000 Numidian horsemen. He landed in Etruria, where his old veterans flocked to his standard, and at the head of some 6000 men joined Cinna before the gates of Rome. The senate had prepared for a desperate defence, but fortune was adverse, and after a brief resistance they gave way. Cinna was acknowledged as consul, the sentence of outlawry passed on Marius was revoked, and Cinna and Marius entered Rome with their troops. Marius's thirst for revenge was gratified by a frightful massacre, and he lived long enough to be nominated consul for the seventh time. But he held his consulship only a few weeks. Early in 86 he died, and for the next three years Cinna ruled Rome. Constitutional government was virtually suspended. For 85 and 84 Cinna nominated himself and a trusted colleague as consuls.[1] The state was, as Cicero[2] says, without lawful authority.[3] One important matter was carried through—the registration in all the tribes of the newly enfranchised Italians,[4] but beyond this little was done. The attention of Cinna and his friends was in truth engrossed by the ever-present dread of Sulla's return from Asia. The consul of 86, Valerius Flaccus, sent out to supersede him, was murdered by his own soldiers at Nicomedia.[5] In 85 Sulla, though disowned by his government, concluded a peace with Mithradates.[6] In 84, after settling affairs in Asia and crushing Flaccus's successor Fimbria, he crossed into Greece, and in the spring of 83 landed at Brundusium with 40,000 soldiers and a large following of emigré nobles. Cinna was dead,[7] murdered like Flaccus by his mutinous soldiers; his most trusted colleague Carbo was commanding as proconsul in Cisalpine Gaul; and the resistance offered to Sulla's advance was slight. At Capua Sulla routed the forces of one consul, Norbanus; at Teanum the troops of the other went over in a body to the side of the outlawed proconsul. After a winter spent in Campania he pressed forward to Rome, defeated the younger Marius (consul 82) near Præneste, and entered the city without further opposition. In North Italy the success of his lieutenants Metellus, C. Pompeius, and Marcus Crassus had been fully as decisive. Cisalpine Gaul, Umbria, and Etruria had all been won for Sulla, and the two principal leaders on the other side, Carbo and Norbanus, had each fled, one to Rhodes, the other to Africa. Only one foe remained to be conquered. The Samnites and Lucanians whom Cinna had conciliated, and who saw in Sulla their bitterest foe, were for the last time in arms, and had already joined forces with the remains of the Marian army close to Rome. The decisive battle was fought under the walls of the city, and ended in the complete defeat of the Marians and Italians.[8]

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[1] App., *B. C.*, i. 39-49; Livy, *Epit.*, lxxii.-lxxvi.

[2] For the lex Julia, see Cicero *Pro Balbo*, 8; Gell., iv. 4; App., *B. C.*, i. 49. For lex Plautia Papiria, see Cic. *Pro Archia*, 4, and Schol. Bob., p. 353.

[3] Vell. Pat., ii. 20; App., *B. C.*, i. 49, 53. Madvig (*R. Verf.*, i. 27) follows Appian in holding that the tribes to which the new voters were confined were newly created tribes. *Cf.* Mommsen, *Röm. Tribus*, ii.

[4] App., *B. C.*, i. 54, and *Mithr.* 22; Oros., v. 18; Livy, *Epit.*, lxxiv.

[5] It had been already declared a consular province for 87, and early in 88 seems to have been assigned to Sulla by decree of the senate.

[6] *Cf.* Cic. *De Orat.*, i. 25, iii. 31, and *Brutus*, 214; Vell. Pat., ii. 18, for Sulpicius himself. For his laws, see App., *B. C.*, i. 55 *sq.*; Livy, *Epit.*, lxxvii.; Plutarch, *Sulla*, 8 *sq.*

[7] App., *loc. cit.*, *ἡμερῶν ἀργίας πολλῶν*—a favourite stroke of policy. *Cf.* Cicero *Ad Q. F.*, ii. 4, 4, "dies comitiales exemit omnes . . . . Latinae instaurantur, nec deerant supplicationes."

[8] Marius finally escaped to Africa (see MARIUS); Sulpicius was taken and killed; App., i. 60.

[9] App., *B. C.*, i. 59, *μηδὲν ἔτι ἀπροβούλευτον ἐς τὸν δῆμον ἐσφέρεσθαι*. For the other laws mentioned by Appian, see Mommsen, ii. 258.

[10] Livy, *Epit.*, lxxix.; Vell., ii. 20.

[11] Cic. *Pro Sestio*, 77; *Catil.*, iii. 24.

[12] Tibur and Præneste especially.

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Sulla's dictatorship, 81 =673.

For a period of nearly ten years Rome and Italy had been distracted by civil war. Constitutional government, whether by senate or assembly, had been in abeyance, while the opposing parties fought out their quarrels with the sword, under the leadership of generals at the head of legions ready and willing to follow them against their fellow citizens and against the established authorities of the state. The strife had spread from the Roman forum to Italy, and from Italy to the provinces; and for the first time the integrity of the empire was threatened by the conflicts of rival governors.[9] The tottering fabric of Italian prosperity had been rudely shaken by the ravages of war. Class hatreds and personal feuds distracted the community, while the enfranchisement of the Italians was in itself a revolution which affected the very foundations of the republic. Such was the situation with which Sulla was now called upon to deal. It was for him to heal the divisions which rent the state asunder, to set in working again the machinery of civil government, and above all so to modify it as to meet the altered conditions, and to fortify it against the dangers which visibly threatened it in the future. The real charge against Sulla[10] is not that he failed to accomplish all this, for to do so was beyond the powers even of a man so able, resolute, and self-confident as Sulla, armed though he was with absolute authority and backed by overwhelming military strength and the prestige of unbroken success. He stands convicted rather of deliberately aggravating some and culpably ignoring others of the evils he should have tried to cure, and of contenting himself with a party triumph when he should have aimed at the regeneration and confirmation of the whole state. His victory was instantly followed, not by any measures of conciliation, but by a series of massacres, proscriptions, and confiscations, of which almost the least serious consequence was the immediate loss of life which they entailed.[11] From this time forward the fear of proscription and confiscation recurred as a possible consequence of every political crisis, and it was with difficulty that Cæsar himself dissipated the belief that his victory would be followed by a Sullan reign of terror. The legacy of hatred and discontent which Sulla left behind him was a constant source of disquiet and danger. In the children of the proscribed, whom he excluded from holding office, and the dispossessed owners of the confiscated lands, every agitator found ready and willing allies.[12] The moneyed men of the equestrian order were more than ever hostile to the senatorial government, which they now identified with the man who cherished towards them a peculiar hatred,[13] and whose creatures had hunted them down like dogs. The attachment which the new Italian citizens might in time have learnt to feel for the old republican constitution was nipped in the bud by the massacres at Præneste and Norba, by the harsh treatment of the ancient towns of Etruria, and by the ruthless desolation of Samnium and Lucania.[14] Quite as fatal were the results to the economic prosperity of the peninsula. Sulla's confiscations, following on the civil and social wars, opened the doors wide for a long train of evils. The veterans whom he planted on the lands he had seized[15] did nothing for agriculture, and swelled the growing numbers of the turbulent and discontented.[16] The "Sullan men" became as great an object of fear and dislike as the "Sullan reign."[17] The "latifundia" increased with startling rapidity—whole territories passing into the hands of greedy partisans.[18] Wide tracts of land, confiscated but never allotted, ran to waste.[19] In all but a few districts of Italy the free population finally and completely disappeared from the open country; and life and property were rendered insecure by the brigandage which now developed unchecked, and in which the herdsmen slaves played a prominent part. The outbreaks of Spartacus in 73, and of Catiline ten years later, were significant commentaries on this part of Sulla's work.[20] His constitutional legislation, while it included many useful administrative reforms, is marked by as violent a spirit of partisanship, and as apparently wilful a blindness to the future. The re-establishment on a legal basis of the ascendency which custom had so long accorded to the senate was his main object. With this purpose he had already, when consul in 88, made the "senatus auctoritas" legally necessary for proposals to the assembly. He now as dictator[1] followed this up by crippling the power of the magistracy, which had been the most effective weapon in the hands of the senate's opponents. The legislative freedom of the tribunes was already hampered by the necessity of obtaining the senate's sanction; in addition, Sulla restricted their wide powers of interference (intercessio) to their original purpose of protecting individual plebeians,[2] and discredited the office by prohibiting a tribune from holding any subsequent office in the state.[3] The control of the courts (quaestiones perpetuae) was taken from the equestrian order and restored to the senate.[4] To prevent the people from suddenly installing and keeping in high office a second Marius, he re-enacted the old law against re-election,[5] and made legally binding the custom which required a man to mount up gradually to the consulship through the lower offices.[6] His increase of the number of prætors from six to eight,[7] and of quæstors to twenty,[8] though required by administrative necessities, tended, by enlarging the numbers and further dividing the authority of the magistrates, to render them still more dependent upon the central direction of the senate. Lastly, he replaced the pontifical and augural colleges in the hands of the senatorial nobles, by enacting that vacancies in them should, as before the lex Domitia (104), be filled up by co-optation.[9] This policy of deliberately altering the constitution, so as to make it pronounce in favour of his own party, was open to two grave objections. It was not to be expected that the new legal safeguards would protect the senate any more efficiently than the established custom and tradition which the Gracchi had broken down; and, secondly, it was inevitable that the popular party would on the first opportunity follow Sulla's example, and alter the constitution to suit themselves. Still less was Sulla successful in fortifying the republican system against the dangers which menaced it from without. He accepted as an accomplished fact the enfranchisement of the Italians,[10] but he made no provision to guard against the consequent reduction of the comitia to an absurdity, and with them of the civic government which rested upon them, or to organize an effective administrative system for the Italian communities.[11] Of all men, too, Sulla had the best reason to appreciate the dangers to be feared from the growing independence of governors and generals in the provinces, and from the transformation of the old civic militia into a group of professional armies, devoted only to a successful leader, and with the weakest possible sense of allegiance to the state. He had himself, as proconsul of Asia, contemptuously and successfully defied the home government, and he, more than any other Roman general, had taught his soldiers to look only to their leader, and to think only of booty.[12] Yet, beyond a few inadequate regulations, there is no evidence that Sulla dealt with these burning questions, the settlement of which was among the greatest of the achievements of Augustus.[13] One administrative reform of real importance must, lastly, be set down to his credit. The judicial procedure first established in 149 for the trial of cases of magisterial extortion in the provinces, and applied between 149 and 81 to cases of treason and bribery, Sulla extended so as to bring under it the chief criminal offences, and thus laid the foundations of the Roman criminal law.[14]

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[1] The consuls of 86, 85, 84 were all nominated without election. Livy, *Epit.*, lxxx., lxxxiii.; App., i. 75.

[2] *Brut.*, 227.

[3] The nobles had fled to Sulla in large numbers; Velleius, ii. 23.

[4] This work was accomplished apparently by the censors of 86; but *cf.* Lange, iii. 133; Mommsen, ii. 315; Livy, *Epit.*, lxxxiv.

[5] Livy, *Epit.*, lxxxii. Appian, *Mithr.*, 52; Plut., *Sulla*, 23.

[6] Livy, *Epit.*, lxxxiii.; Vell., ii. 23; Plut., *Sull.*, 22.

[7] In 84; App., *B. C.*, i. 78; Livy, *Epit.*, lxxxiii.

[8] Livy, *Epit.*, lxxxviii., "cum Samnitibus ante portam Collinam debellavit;" Plut., *Sulla*, 29, and *Crassus*, 6. According to App., i. 93, and Livy, *loc. cit.*, 8000 captives were massacred. Florus, iii. 21, gives 4000. Præneste surrendered, was razed to the ground, and its population put to the sword.

[9] In Asia between Sulla and Fimbria. In 82 Pompey crushed the Marian leader Carbo in Africa. In Spain Q. Sertorius maintained himself for ten years (82–72).

[10] Compare especially Mommsen's brilliant chapter, which is, however, too favourable (ii. 335–377), and also Lange (iii. 144 *sq.*), where most of the special literature on the Sullan legislation is given.

[11] App., i. 95 *sq.*; Dio Cassius, fr. 109; Plut., *Sulla*, 31. The number of the proscribed is given as 4700 (Valer. Max.), including, according to Appian, 2600 members of the equestrian order.

[12] *E.g.*, Catiline, in 63. Sall., *Cat.*, 21, 37. For the "liberi proscriptorum," see Velleius, ii. 28.

[13] Cic. *Pro Cluent.*, 151.

[14] Cic., *Phil.*, v. 43, "tot municipiorum maximae calamitates." Cic. *Pro Domo*, 30; Cic. *Ad Att.*, i. 19; Florus, iii. 21; Strabo, p. 223, 254.

[15] Livy, *Epit.*, lxxxix.; App., *B. C.*, i. 100; Cicero, *Catil.*, ii. 20.

[16] Sall., *Cat.*, 28.

[17] Cic., *Lex Agr.*, ii. 26.

[18] Cic., *Lex Agr.*, ii. 26, 28, iii. 2,—the territories of Præneste and of the Hirpini.

[19] Cic., *Lex Agr.*, ii. 27, iii. 3.

[20] See especially Cicero's oration *Pro Tullio*. For the "pastores" of Apulia, Sall., *Cat.*, 28.

Over-throw of the Sullan consti-tion, 7 –684

The Sullan system stood for nine years, and was then overthrown—as it had been established—by a successful soldier. It was the fortune of Cn. Pompeius, a favourite officer of Sulla, first of all to violate in his own person the fundamental principles of the constitution re-established by his old chief, and then to overturn it. In Spain the Marian governor Q. Sertorius (see SERTORIUS) had defeated one after another of the proconsuls sent out by the senate,
and was already in 77 master of all Hither Spain.[15] To 677
meet the crisis, the senate itself took a step which was in fact the plainest possible confession that the system sanctioned afresh by Sulla was inadequate to the needs of the state. Pompey, who was not yet thirty, and had never held even the quæstorship, was sent out to Spain with proconsular authority.[16] Still Sertorius held out,
until in 73 he was foully murdered by his own officers. 681.
The native tribes who had loyally stood by him submitted,
and Pompey early in 71 returned with his troops to Italy, 683.
where, during his absence in Spain, an event had occurred which had shown Roman society with startling plainness
how near it stood to revolution. In 73 Spartacus,[17] a 681
Thracian slave, escaped with seventy others from a gladiators' training school at Capua. In an incredibly short time he found himself at the head of a numerous force

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[1] For Sulla's dictatorship as in itself a novelty, see App., i. 98; Plut., *Sulla*, 33; Cic. *Ad Att.*, 9, 15; Cic. *De Legg.*, i. 15.

[2] Cic. *De Legg.*, iii. 22, "injuriae faciendae potestatem ademit, auxilii ferendi reliquit." *Cf.* Cic., *Verr.*, i. 60; Livy, *Epit.*, lxxxix.

[3] Cic. *Pro Cornel.*, fr. 78; Ascon. *In Corn.*, 78; Appian, i. 100.

[4] Velleius, ii. 32; Tac., *Ann.*, xi. 22; Cic., *Verr.*, i. 13.

[5] App., *B. C.*, i. 100; *cf.* Livy, vii. 42 (342 B.C.), "ne quis eundem magistratum intra decem annos caperet."

[6] The custom had gradually established itself. *Cf.* Livy, xxxii. 7. The "certus ordo magistratuum" legalized by Sulla was—quæstorship, prætorship, consulate; App., i. 100.

[7] Pompon., *De Orig. Juris* (*Dig.*, i. 2, 2); Velleius, ii. 89. Compare also Cicero *In Pison.*, 15, with Id. *Pro Milone*, 15. The increase was connected with his extension of the system of "quaestiones perpetuae," which threw more work on the prætors as the magistrates in charge of the courts.

[8] Tac., *Ann.*, xi. 22. The quæstorship henceforward carried with it the right to be called up to the senate. By increasing the number of quæstors, Sulla provided for the supply of ordinary vacancies in the senate and restricted the censors' freedom of choice in filling them up. Fragments of the "lex Cornelia de XX quaestoribus" survive. See *C. I. L.*, 108.

[9] Dio Cass., xxxvii. 37; Ps. Ascon., 102 (Orelli). He also increased their numbers; Livy, *Epit.*, lxxxix.

[10] He did propose to deprive several communities which had joined Cinna of the franchise, but the deprivation was not carried into effect; Cic. *Pro Domo*, 30, and *Pro Cæcina*, 33, 35.

[11] There is no evidence to show that Sulla's legislation touched at all upon municipal government in Italy; *cf.* Mommsen, ii. 361 *sq.*

[12] Sall., *Cat.*, ii., "L. Sulla exercitum, quo sibi fidum faceret, contra morem majorum luxuriose nimisque liberaliter habuerat."

[13] There was a "lex Cornelia de provinciis ordinandis," but only two of its provisions are known :—(1) that a magistrate sent out with the imperium should retain it till he re-entered the city (Cic. *Ad Fam.*, i. 9, 25), a provision which increased rather than diminished his freedom of action; (2) that an outgoing governor should leave his province within thirty days after his successor's arrival (Cic. *Ad Fam.*, iii. 6, 4). A "lex Cornelia de majestate" contained, it is true, a definition of treason evidently framed in the light of recent experience. The magistrate was forbidden "exire de provincia, educere exercitum, bellum sua sponte gerere, in regnum injussu populi ac senatus accedere;" Cic. *In Pis.*, 21. Sulla also added one to the long list of laws dealing with extortion in the provinces. But the danger lay, not in the want of laws, but in the want of security for their observance by an absolutely autocratic proconsul. The present writer cannot agree with those who would include among Sulla's laws one retaining consuls and prætors in Rome for their year of office and then sending them out to a province. This was becoming the common practice before 81. After 81 it is invariable for prætors, as needed for the judicial work, and invariable but for two exceptions in the case of consuls; but nowhere is there a hint that there had been any legislation on the subject, and there are indications that it was convenience and not law which maintained the arrangement. Mommsen, ii. 355; Marquardt, *Staatsverw.*, i. 378.

[14] For this, the most lasting of Sulla's reforms, see Mommsen, ii. 359; Rein, *Criminal-Recht*; Zumpt, *Criminal-Prozess d. Römer.*

[15] For the Sertorian War, see Plutarch, *Sertorius.*

[16] Plut., *Pomp.*, 17; Livy, *Epit.*, xci. For Pompey's earlier life, see POMPEY.

[17] App., i. 116; Livy, *Epit.*, xcv.; Plut., *Crass.*, 8 *sq.*

of runaway slaves, outlaws, brigands, and impoverished peasants. By the end of 73 he had 70,000 men under his command, had twice defeated the Roman troops, and was master of southern Italy. In 72 he advanced on Rome, but, though he again routed the legions led against him by the consuls in person, he abandoned his scheme and established himself in the now desolate country near Thurii, already the natural home of brigandage. At length in 71 the prætor Crassus, who had been sent against him with no less than six legions, ended the war. Spartacus was defeated and slain in Apulia. In Rome itself the various classes and parties hostile to the Sullan system had, ever since Sulla's death in 78, been incessantly agitating for the repeal of his most obnoxious laws, and needed only a leader in order successfully to attack a government discredited by failure at home and abroad. With the return of Pompey from Spain their opportunity came. Pompey, who understood politics as little as Marius, was anxious to obtain—what the senate was more than likely to refuse to give him, and what he was not legally entitled to—a triumph, the consulship for the next year (70), and as the natural consequence of this an important command in the East. The opposition wanted his name and support, and a bargain was soon struck. Pompey and with him Marcus Crassus, the conqueror of Spartacus, were elected consuls, almost in the presence of their troops, which lay encamped outside the gates in readiness to assist at the triumph and ovation granted to their respective leaders. Pompey lost no time in performing his part of the agreement. The tribunes regained their prerogatives.[1] The "perpetual courts" were taken out of the hands of the senatorial judices, who had outdone the equestrian order in scandalous corruption,[2] and finally the censors, the first since 86 B.C., purged the senate of the more worthless and disreputable of Sulla's partisans.[3] The victory was complete; but for the future its chief significance lay in the clearness with which it showed that the final decision in matters political lay with neither of the two great parties in Rome, but with the holder of the military authority. The recognition of this fact was fatal to the dignity of politics in the city. In proportion as the mass of the Roman community in Italy, and able aspirants to power, like Cæsar, became conscious of the unreality of the old constitutional controversies, they became indifferent to the questions which agitated the forum and the curia and contemptuously ready to alter or disregard the constitution itself, when it stood in the way of interests nearer to their hearts. Of this growing indifference to the traditional politics of the republic, against which Cicero struggled in vain, Pompey is an excellent example. He was absolutely without interest in them, except in so far as they led up to important military commands, and, though he was never revolutionary in intention, his own career, in its quiet defiance of all the established rules of the constitution, did almost more than the direct attacks of others to render the republic impossible.

mpey consul.

When his consulship ended, Pompey impatiently awaited at the hands of the politicians he had befriended the further gift of a foreign command. He declined an ordinary province, and from the end of 70 to 67 he remained at 684-7. Rome in a somewhat affectedly dignified seclusion.[4] But in 67 and 66 the laws of Gabinius and Manilius gave him 687, 688. all and more than all that he expected. The ravages of the pirates, encouraged in the first instance by the inactivity which had marked Roman policy in the East after 167, and by the absence of any effective Roman navy in the Mediterranean, had now risen to an intolerable height, and the spasmodic efforts made since 81 had done little to check them. The trade of the Mediterranean was paralysed, and even the coasts of Italy were not safe from their raids.[5] Aulus Gabinius, a tribune, and a follower of Pompey, now proposed to the people to entrust Pompey with the sole command against the pirates.[6] His command was to last for three years. He was to have supreme authority over all Roman magistrates in the provinces throughout the Mediterranean and over the coasts for 50 miles inland. Fifteen legati, all of prætorian rank, were assigned to him, with two hundred ships, and as many troops as he thought desirable. These powers were still further enlarged in the next year by the Manilian law, which transferred from Lucullus and Glabrio to Pompey the conduct of the Mithradatic war in Asia, and with it the entire control of Roman policy and interests in the East.[7] The unrepublican character of the position thus granted to Pompey, and the dangers of the precedent established, were clearly enough pointed out by such moderate men as Q. Lutatius Catulus, the "father of the senate," and by the orator Hortensius—but in vain. Both laws were supported, not only by the tribunes and the populace, but by the whole influence of the "publicani" and "negotiatores," whose interests in the East were at stake.

Pompey left Rome in 67, and did not return to Italy Cæsar. till towards the end of 62. The interval was marked in 687, 692. Rome by the rise to political importance of Cæsar and Cicero; and by Catiline's attempt at revolution. When in 70 684. the removal of the restrictions placed upon the tribunate restored to the popular party their old weapons of attack, Cæsar was already a marked man. In addition to his patrician birth, and his reputation for daring and ability, he possessed, as the nephew of Marius and the son-in-law of Cinna, a strong hereditary claim to the leadership of the popular and Marian party. He had already taken part in the agitation for the restoration of the tribunate; he had supported the Manilian law; and, when Pompey's withdrawal left the field clear for other competitors, he stepped at once into the front rank on the popular side.[8] He took upon himself, as their nearest representative, the task of clearing the memory and avenging the wrongs of the great popular leaders, Marius, Cinna, and Saturninus. He publicly reminded the people of Marius's services, and set up again upon the Capitol the trophies of the Cimbric War. He endeavoured to bring to justice, not only the ringleaders in Sulla's bloody work of proscription, but even the murderers of Saturninus, and vehemently pleaded the cause of the children of the proscribed. While thus carrying on in genuine Roman fashion the feud of his family, he attracted the sympathies of the Italians by his efforts to procure the Roman franchise for the Latin communities beyond the Po, and won the affections of the populace in Rome and its immediate neighbourhood by the splendour of the games which he gave as curule ædile (65), and by his lavish expenditure upon the improvement of the Appian Way. But it is characteristic of Cæsar and of his time that these measures were with him only means to the further end of creating for himself a position such as that which Pompey had already won; and this ulterior aim he pursued with a skill, and with an audacious indifference to constitutional forms and usages, unsurpassed even by Sulla. His coalition with Crassus, soon after Pompey's departure, secured him an ally whose colossal wealth and wide financial connexions were of inestimable value, and whose vanity and inferiority of intellect rendered him a willing tool. The story of his attempted *coup d'état* in January 65 is probably false,[1] but it is evident that by the beginning of 63 he was bent on reaping the reward of his exertions by obtaining from the people an extraordinary command abroad, which should secure his position before Pompey's return; and the agrarian law proposed early that year by the tribune Rullus had for its real object the creation, in favour of Cæsar and Crassus, of a commission with powers so wide as to place its members almost on a level with Pompey himself.[2] It was at this moment, when all seemed going well, that Cæsar's hopes were dashed to the ground by Catiline's desperate outbreak, which not only discredited every one connected with the popular party, but directed the suspicions of the well-to-do classes against Cæsar himself, as a possible accomplice in Catiline's revolutionary schemes.[3]

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[1] The exact provisions of Pompey's law are nowhere given; Livy, *Epit.*, xcvii., "tribuniciam potestatem restituerunt." *Cf.* Velleius, ii. 30. A "lex Aurelia," in 75, had already repealed the law disqualifying a tribune for further office; Cic., *Corn.*, fr. 78.

[2] This was the work of L. Aurelius Cotta, prætor in this year. The "judices" were to be taken in equal proportions from senators, equites, and "tribuni aerarii." For the latter and for the law generally, see Madvig, *Verf.*, i. 182, ii. 222; Lange, *R. Alt.*, iii. 193. Compare also Cicero's language, *In Verr.*, i. 1, 15. The prosecution of Verres shortly preceded the lex Aurelia.

[3] Livy, *Epit.*, xcviii. Sixty-four senators were expelled. *Cf.* Plut., *Pomp.*, 22; Cic. *In Verr.*, i. 1, 15.

[4] Velleius, ii. 31; Plut., *Pomp.*, 23.

[5] See the brilliant sketch by Mommsen, *R. G.*, iii. 39 *sq.*

[6] Plut., *Pomp.*, 25; Dio, xxxvi. 6; Livy, *Epit.*, c.

[7] Cic. *Pro Lege Manilia*; Dio, xxxvi. 25; Plut., *Pomp.*, 30.

[8] Prof. Beesly, in his essay on Catiline, has vainly endeavoured to show that Catiline and not Cæsar was the popular leader from 67 to 63. That this is the inference intentionally conveyed by Sallust, in order to screen Cæsar, is true, but the inference is a false one.

The same wave of indignation and suspicion which for the moment checked Cæsar's rise carried Marcus Tullius Cicero to the height of his fortunes. Cicero, as a politician, has been equally misjudged by friends and foes. That he was deficient in courage, that he was vain, and that he attempted the impossible, may be admitted at once. But he was neither a brilliant and unscrupulous adventurer nor an aimless trimmer, nor yet a devoted champion merely of senatorial ascendency.[4] He was a representative man, with a numerous following, and a policy which was naturally suggested to him by the circumstances of his birth, connexions, and profession, and which, impracticable as it proved to be, was yet consistent, intelligible, and high-minded. Born at Arpinum, he cherished like all Arpinates the memory of his great fellow-townsman Marius, the friend of the Italians, the saviour of Italy, and the irreconcilable foe of Sulla and the nobles. A "municipal" himself, his chosen friends and his warmest supporters were found among the well-to-do classes in the Italian towns.[5] Unpopular with the Roman aristocracy, who despised him as a "peregrinus,"[6] and with the Roman populace, he was the trusted leader of the Italian middle class, "the true Roman people," as he proudly styles them. It was they who carried his election for the consulship[7] (63), who in 58 insisted on his recall from exile,[8] and it was his influence with them which made Cæsar so anxious to win him over in 49. He represented their antipathy alike to socialistic schemes and to aristocratic exclusiveness, and their old-fashioned simplicity of life in contrast with the cosmopolitan luxury of the capital.[9] By birth, too, he belonged to the equestrian order, the foremost representatives of which were indeed still the publicani and negotiatores, but which since the enfranchisement of Italy included also the substantial burgesses of the Italian towns and the smaller "squires" of the country districts. With them, too, Cicero was at one in their dread of democratic excesses and their social and political jealousy of the "nobiles."[10] Lastly, as a lawyer and a scholar, he was passionately attached to the ancient constitution. His political ideal was the natural outcome of these circumstances of his position. He advocated the maintenance of the old constitution, but not as it was understood by the extreme politicians of the right and left. The senate was to be the supreme directing council,[11] but the senate of Cicero's dreams was not an oligarchic assemblage of nobles, but a body freely open to all citizens, and representing the worth of the community.[12] The magistrates, while deferring to the senate's authority, were to be at once vigorous and public-spirited; and the assembly itself which elected the magistrates and passed the laws was to consist, not of the "mob of the forum," but of the true Roman people throughout Italy.[13] For the realization of this ideal he looked, above all things, to the establishment of cordial relations between the senate and nobles in Rome and the great middle class of Italy represented by the equestrian order, between the capital and the country towns and districts. This was the "concordia ordinum," the "consensus Italiae," for which he laboured.[14] He failed because his ideal was impracticable. The inveterate selfishness and exclusiveness of the nobles, the indifference of the Italians to constitutional questions, and their suspicious dislike of Roman politicians, above all the incompetency of the old machinery, even if reformed as he would have had it reformed, to govern the empire and control the proconsuls and the army, were insuperable obstacles in his way.

Th con spi Ca 63

Cicero's election to the consulship for 63 over the heads of Cæsar's nominees, Antonius and Catiline, was mainly the work of the Italian middle class, already rendered uneasy both by the rumours which were rife of revolutionary schemes and of Cæsar's boundless ambition, and by the numerous disquieting signs of disturbance noticeable in Italy. The new consul vigorously set himself to discharge the trust placed in him. He defeated the insidious proposals of Rullus for Cæsar's aggrandizement, and assisted in quashing the prosecution of Rabirius. But with the consular elections in the autumn of 63 a fresh danger arose from a different quarter. The "conspiracy[15] of Catiline" (see CATILINE) was not the work of the popular party, and still less was it an unselfish attempt at reform; L. Sergius Catilina himself was a patrician, who had held high office, and possessed considerable ability and courage; but he was bankrupt in character and in purse, and two successive defeats in the consular elections had rendered him desperate. To retrieve his broken fortunes by violence was a course which was only too readily suggested by the history of the last forty years, and materials for a conflagration abounded on all sides. The danger to be feared from his intrigues lay in the state of Italy, which made a revolt against society and the established government only too likely if once a leader presented himself, and it was such a revolt that Catiline endeavoured to organize. Bankrupt nobles like himself, Sullan veterans and the starving peasants whom they had dispossessed of their holdings, outlaws of every description, the slave population of Rome, and the wilder herdsmen-slaves of the Apulian pastures, were all enlisted under his banner, and attempts were even made to excite disaffection among the newly-conquered people of southern Gaul and the warlike tribes who still cherished the memory of Sertorius in Spain. In Etruria, the seat and centre of agrarian distress and discontent, a rising actually took place headed by a Sullan centurion, but the spread of the revolt was checked by Cicero's vigorous measures. Catiline fled from Rome, and died fighting with desperate courage at the head of his motley force of old soldiers, peasants, and slaves. His accomplices in Rome were arrested, and, after an unavailing protest from Cæsar, the senate authorized the consuls summarily to put them to death.

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[1] The story is so told by Suetonius, *Jul.*, 8. In Sallust, *Cat.*, 18, it appears as an intrigue originating with Catiline, and Cæsar's name is omitted.

[2] Cic., *Lex Agr.*, ii. 6, "nihil aliud actum nisi ut decem reges constituerentur."

[3] That Cæsar and Crassus had supported Catiline for the consulship in 65 is certain, and they were suspected naturally enough of favouring his designs in 63, but their complicity is in the highest degree improbable.

[4] Mommsen is throughout unfair to Cicero, as also are Drumann and Prof. Beesly. The best estimate of Cicero's political position known to the present writer is that given by Prof. Tyrrell in the Introduction to his edition of Cicero's *Letters*.

[5] Cic. *Ad Att.*, i. 191, "locupletes . . . noster exercitus."

[6] Cic. *Pro Sulla*, 7; Sall., *Cat.*, 31, "inquilinus urbis Romae."

[7] See the *De Petitione Consulatus*, *passim*.

[8] *De Domo*, 28; *Pro Plancio*, 97.

[9] Cic. *Pro Quinctio*, 31; *Pro Cluentio*, 46, 153.

[10] Cic. *In Verr.*, ii. 73; *De Pet. Cons.*, i. He shared with them their dislike to Sulla, as the foe of their order; *Pro Cluentio*, 55.

[11] *De Rep.*, ii. 36; *De Legg.*, iii. 12.

[12] *Pro Sestio*, 65; *De Legg.*, iii. 4.

[13] *Pro Sestio*, 49.

[14] *Ad Att.*, i. 18.

[15] For Catiline's conspiracy, see Sallust, *Catiline*; Cicero *In Catilinam*; Plut., *Cicero*; Mommsen, *R. G.*, iii. 164 *sq.*; and especially C. John, *Entstehung d. Catilinarischen Verschwörung* (Leipsic, 1876).

The Catilinarian outbreak had been a blow to Cæsar, whose schemes it interrupted, but to Cicero it brought, not only popularity and honour, but, as he believed, the realization of his political ideal. The senate and the equestrian order, the nobles of Rome and the middle class in the country, had made common cause in the face of a common danger; and the danger had been averted by the vigorous action of a consul sprung from the people, under the guidance of a united senate, and backed by the mass of good citizens.

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But Pompey was now on his way home,[1] and again as in 70 the political future seemed to depend on the attitude which the successful general would assume; Pompey himself looked simply to the attainment by the help of one political party or another of his immediate aims, which at present were the ratification of his arrangements in Asia and a grant of land for his troops. It was the impracticable jealousy of his personal rivals in the senate, aided by the versatility of Cæsar, who presented himself not as his rival but as his ally, which drove Pompey once more, in spite of Cicero's efforts, into the camp of what was still nominally the popular party. In 60, on Cæsar's return from his proprætorship in Spain, the coalition was formed which is known by the somewhat misleading title of the first triumvirate.[2] Pompey was ostensibly the head of this new alliance, and in return for the satisfaction of his own demands he undertook to support Cæsar's candidature for the consulship. The wealth and influence of Crassus were enlisted in the same cause, but what he was to receive in exchange is not clear. Cicero was under no illusions as to the significance of this coalition. It scattered to the winds his dreams of a stable and conservative republic. Pompey, whom he had hoped to enlist as the champion of constitutional government, had been driven into the arms of Cæsar. The union between the senate and the equestrian order had been dissolved, and the support of the publicani lost by an untimely quarrel over the price to be paid for collecting the taxes of Asia, and, to crown all, both his own personal safety and the authority of the senate were threatened by the openly avowed intentions of Catiline's friends to bring the consul of 63 to account for his unconstitutional execution of Catiline's accomplices. His fears were fully justified by the results. The year 59 saw the republic powerless in the hands of three citizens. Cæsar as consul procured the ratification of Pompey's acts in Asia, conciliated the publicani by granting them the relief refused by the senate, and carried an agrarian law of the new type, which provided for the purchase of lands for allotment at the cost of the treasury, and for the assignment of the rich "ager Campanus."[3] But Cæsar aimed at more than the carrying of an agrarian law in the teeth of the senate or any party victory in the forum. An important military command was essential to him, and he judged correctly enough that in the West there was work to be done which might enable him to win a position such as Pompey had achieved in the East. An obedient tribune was found, and by the lex Vatinia he was given for five years the command of Cisalpine Gaul and Illyricum, to which was added by a decree of the senate Transalpine Gaul also.[4] It was a command which not only opened to him a great military career, but enabled him, as the master of the valley of the Po, to keep an effective watch on the course of affairs in Italy.

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Banishment and recall of Cicero, 58–57—696–7.

Early the next year the attack upon himself which Cicero had foreseen was made. P. Clodius as tribune brought forward a law enacting that any one who had put a Roman citizen to death without trial by the people should be interdicted from fire and water. Cicero finding himself deserted even by Pompey left Rome in a panic, and by a second Clodian law he was declared to be outlawed.[5] With Cæsar away in his province, and Cicero banished, Clodius was for the time master in Rome. But, absolute as he was in the streets, and recklessly as he parodied the policy of the Gracchi by violent attacks on the senate, his tribunate merely illustrated the anarchy which now inevitably followed the withdrawal of a strong controlling hand. A reaction speedily followed. Pompey, bewildered and alarmed by Clodius's violence, at last bestirred himself. Cicero's recall was decreed by the senate, and early in August 57 in the comitia centuriata, to which his Italian supporters flocked in crowds, a law was passed revoking the sentence of outlawry passed upon him.

Renewal of the coalition, 56—698

Intoxicated by the acclamations which greeted him, and encouraged by Pompey's support, and by the salutary effects of Clodius's excesses, Cicero's hopes rose high, and a return to the days of 63 seemed not impossible.[6] With indefatigable energy he strove to reconstruct a solid constitutional party, but only to fail once more. Pompey was irritated by the hostility of a powerful party in the senate, who thwarted his desires for a fresh command and even encouraged Clodius in insulting the conqueror of the East. Cæsar became alarmed at the reports which reached him that the repeal of his agrarian law was threatened and that the feeling against the coalition was growing in strength; above all he was anxious for a renewal of his five years' command. He acted at once, and in the celebrated conference at Luca (56) the alliance of the three self-constituted rulers of Rome was renewed. Cicero succumbed to the inevitable and withdrew in despair from public life. Pompey and Crassus became consuls for 55. Cæsar's command was renewed for another five years, and to each of his two allies important provinces were assigned for a similar period—Pompey

698.

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[1] For the history of the next eighteen years, the most important ancient authority is Cicero in his letters and speeches.

[2] Misleading, because the coalition was unofficial. The "triumvirs" of 43 were actual magistrates, "IIIviri reipublicae constituendae causa."

[3] For the lex Julia Agraria and the lex Campana, see Dio Cass., xxxviii. 1; App., *B. C.*, ii. 10; Suet., *Cæsar*, 20; Cic. *Ad Att.*, ii. 16, 18.

[4] Suet., *Cæsar*, 22; Dio Cass., xxxviii. 8; App., *B. C.*, ii. 13; Plut., *Cæs.*, 14.

[5] Both laws were carried in the "comitia tributa." The first merely reaffirmed the right of appeal, as the law of Gaius Gracchus had done. The second declared Cicero to be already by his own act in leaving Rome "interdicted from fire and water,"—a procedure for which precedents could be quoted. Clodius was within the letter of the law.

[6] Cicero's speech *Pro Sestio* gives expression to these feelings; it contains a passionate appeal to all good citizens to rally round the old constitution. The acquittal of Sestius confirmed his hopes. See *Ad Q. Fr.*, ii. 4.

receiving the two Spains and Africa, and Crassus Syria.[1] The coalition now divided between them the control of the empire. For the future the question was, how long the coalition itself would last. Its duration proved to be short. In 53 Crassus was defeated and slain by the Parthians at Carrhæ, and in Rome the course of events slowly forced Pompey into an attitude of hostility to Cæsar. The year 54 brought with it a renewal of the riotous anarchy which had disgraced Rome in 58–57. Conscious of its own helplessness, the senate, with the eager assent of all respectable citizens, dissuaded Pompey from leaving Italy. His provinces were left to his legates, and he himself remained at home to maintain order by the weight of his influence. It was a confession that the republic could not stand alone. But Pompey's mere presence proved insufficient. The anarchy and confusion grew worse, and even strict constitutionalists like Cicero talked of the necessity of investing Pompey with some Pompey sole consul, 52–702. extraordinary powers for the preservation of order.[2] At last in 52 he was elected sole consul, and not only so, but his provincial command was prolonged for five years more, and fresh troops were assigned him.[3] The rôle of "saviour of society" thus thrust upon Pompey was one which flattered his vanity, but it entailed consequences which it is probable he did not foresee, for it brought him into close alliance with the senate, and in the senate there was a powerful party who were resolved to force him into heading the attack they could not successfully make without him upon Cæsar. It was known that the latter, 705. whose command expired in March 49, but who in the ordinary course of things would not have been replaced 706. by his successor until January 48, was anxious to be allowed to stand for his second consulship in the autumn Proposed recall of Cæsar. of 49 without coming in person to Rome.[4] His opponents in the senate were equally bent on bringing his command to an end at the legal time, and so obliging him to disband his troops and stand for the consulship as a private person, or, if he kept his command, on preventing his 703–704. standing for the consulship. Through 51 and 50 the discussions in the senate and the negotiations with Cæsar 705. continued, but with no result. On 1st January 49 Cæsar made a last offer of compromise. The senate replied by requiring him on pain of outlawry to disband his legions. Two tribunes who supported him were ejected from the senate house, and the magistrates with Pompey were authorized to take measures to protect the republic. Cæsar crosses the Rubicon, 49–705. Cæsar hesitated no longer; he crossed the Rubicon and invaded Italy. The rapidity of his advance astounded and bewildered his foes. Pompey, followed by the consuls, by the majority of the senate and a long train of nobles, abandoned Italy as untenable, and crossed into Greece.[5] At the end of March Cæsar entered Rome as the master of Italy. The story of the civil war which followed, down to the victory at Munda in the spring of 45, has been told elsewhere.[6] We are concerned here with the work which Cæsar achieved in the brief intervals of rest allowed him during these stormy years, and with the place which his dictatorship holds in the history of Rome.

Dictat ship Cæsar 48–4 706–7

The task which Cæsar had to perform was no easy one. It came upon him suddenly; for there is no sufficient reason to believe that Cæsar had long premeditated revolution, or that he had previously aspired to anything more than such a position as that which Pompey had already won, a position unrepublican indeed, but accepted by republicans as inevitable.[7] War was forced upon him as the alternative to political suicide, but success in war brought the responsibilities of nearly absolute power, and Cæsar's genius must be held to have shown itself in the masterly fashion in which he grasped the situation, rather than in the supposed sagacity with which he is said to have foreseen and prepared for it. In so far as he failed, his failure was mainly due to the fact that his tenure of power was too short for the work which he was required to perform. From the very first moment when Pompey's ignominious retreat left him master of Italy, he made it clear that he was neither a second Sulla nor even the reckless anarchist which many believed him to be.[8] The Roman and Italian public were first startled by the masterly rapidity and energy of his movements, and then agreeably surprised by his lenity and moderation. No proscriptions or confiscations followed his victories, and all his acts evinced an unmistakable desire to effect a sober and reasonable settlement of the pressing questions of the hour; of this, and of his almost superhuman energy, the long list of measures he carried out or planned is sufficient proof. The "children of the proscribed" were at length restored to their rights,[9] and with them many of the refugees[10] who had found shelter in Cæsar's camp during the two or three years immediately preceding the war; but the extreme men among his supporters soon realized that their hopes of "novae tabulae" and grants of land were illusory. In allotting lands to his veterans, Cæsar carefully avoided any disturbance of existing owners and occupiers,[11] and the mode in which he dealt with the economic crisis produced by the war seems to have satisfied all reasonable men.[12] It had been a common charge against Cæsar in former days that he paid excessive court to the populace of Rome, and now that he was master he still dazzled and delighted them by the splendour of the spectacles he provided, and by the liberality of his largesses. But he was no indiscriminate flatterer of the mob. The popular clubs and guilds which had helped to organize the anarchy of the last few years were dissolved.[13] A strict inquiry was made into the distribution of the monthly doles of corn, and the number of recipients was reduced by one half;[14] finally, the position of the courts of justice was raised by the abolition of the popular element among the judices.[15] Nor did Cæsar shrink from the attempt, in which so many had failed before him, to mitigate the twin evils which were ruining the prosperity of Italy,—the concentration of a pauper population in the towns, and the denudation and desolation of the country districts. His strong hand carried out the scheme so often proposed by the popular leaders since the days of Gaius Gracchus, the colonization of Carthage and Corinth. Allotments of land on a large scale were made in Italy; decaying towns were reinforced by fresh drafts of settlers; on the large estates and cattle farms the owners were required to find employment for a certain amount of free labour; and a slight and temporary stimulus was given to Italian industry by the reimposition of harbour dues upon foreign goods.[1] To these measures must be added his schemes for the draining of the Fucine Lake and the Pomptine Marshes, for a new road across the Apennines, and for turning the course of the Tiber.[2] It is true that these vigorous efforts to revive the agrarian prosperity of Italy were made along the old lines laid down eighty years before by the Gracchi, and that their final success was no greater than that of preceding efforts in the same direction, but they are a proof of the spirit in which Cæsar understood the responsibilities of absolute power, and their failure was due to causes which no legislation could remove. The reform of the calendar, which has been described elsewhere,[3] completes a record of administrative reform which entitles Cæsar to the praise of having governed well, whatever may be thought of the validity of his title to govern at all. But how did Cæsar deal with what was after all the greatest problem which he was called upon to solve, the establishment of a satisfactory government for the empire? One point indeed was already settled—the necessity, if the empire was to hold together at all, of placing the army, the provinces, and the control of the foreign policy in more vigorous hands than those of a number of changing magistrates independent of each other, and only very imperfectly controlled by the senate at home. Some centralization of the executive authority was indispensable, and this part of his work Cæsar thoroughly performed. From the moment when he seized the moneys in the treasury on his first entry into Rome[4] down to the day of his death he recognized no other authority but his throughout the empire. He alone directed the policy of Rome in foreign affairs; the legions were led, and the provinces governed, not by independent magistrates, but by his "legates;"[5] and the title "imperator" which he adopted was intended to express the absolute and unlimited nature of the "imperium" he claimed, as distinct from the limited spheres of authority possessed by republican magistrates.[6] In so centralizing the executive authority over the empire at large, Cæsar was but developing the policy implied in the Gabinian and Manilian laws, and the precedent he established was closely followed by his successors. It was otherwise with the more difficult question of the form under which this new executive authority should be exercised and the relation it should hold to the republican constitution. We must be content to remain in ignorance of the precise shape which Cæsar intended ultimately to give to the new system. The theory that he contemplated a revival of the old Roman kingship[7] is supported by little more than the popular gossip of the day, and the form under which he actually wielded his authority can hardly have been regarded by so sagacious a statesman as more than a provisional arrangement. This form was that of the dictatorship; and in favour of the choice it might have been urged that the dictatorship was the office naturally marked out by republican tradition as the one best suited to carry the state safely through a serious crisis, that the powers it conveyed were wide, that it was as dictator that Sulla had reorganized the state, and that a dictatorship had been spoken of as the readiest means of legalizing Pompey's protectorate of the republic in 53–52. The choice nevertheless was a bad one. It was associated with those very Sullan traditions from which Cæsar was most anxious to sever himself; it implied necessarily the suspension for the time of all constitutional government; and, lastly, the dictatorship as held by Cæsar could not even plead that it conformed to the old rules and traditions of the office. There was indeed a precedent in Sulla's case for a dictator "reipublicae constituendae causa," but Cæsar was not only appointed in an unusual manner, but appointed for an unprecedentedly long period,[8] and the "perpetual dictatorship" granted him after his crowning victory at Munda (45) was a contradiction in terms and a repudiation 709) of constitutional government which excited the bitterest animosity.[9] The dictatorship served well enough for the time to give some appearance of legality to Cæsar's autocratic authority, but it was not—even, it is probable, in his own eyes—a satisfactory solution of the problem.

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[1] Livy, *Epit.*, cv.; Dio Cass., xxxix. 31. For Cicero's views, see *Ep. Ad Fam.*, i. 9; *Ad Att.*, iv. 5.

[2] A dictatorship was talked of in Rome; Plut., *Pomp.*, 54; Cic. *Ad Q. Fr.*, iii. 8. Cicero himself anticipated Augustus in his picture of a "princeps civitatis" sketched in a lost book of the *De Republica*, written about this time, which was based upon his hopes of what Pompey might prove to be; *Ad Att.*, viii. 11; August., *De Civ. Dei*, v. 13.

[3] Plut., 56; App., *B. C.*, ii. 24.

[4] For the rights of the question involved in the controversy between Cæsar and the senate, see Mommsen, *Rechtsfrage zw. Cæsar und d. Senat*; Guiraud, *Le Différend entre César et le Sénat* (Paris, 1878).

[5] Cicero severely censures Pompey for abandoning Italy, but strategically the move was justified by the fact that Pompey's strength lay in the East, where his name was a power, and in his control of the sea. Politically, however, it was a blunder, as it enabled Cæsar to pose as the defender of Italy.

[6] See arts. CÆSAR, CICERO, and POMPEY

[7] On this, as on many other points connected with Cæsar, divergence has here been ventured on from the views expressed by Mommsen in his brilliant chapter on Cæsar (*R. G.*, iii. 446 *sq.*). Too much stress must not be laid on the gossip retailed by Suetonius as to Cæsar's early intentions.

[8] Cicero vividly expresses the revulsion of feeling produced by Cæsar's energy, humanity, and moderation on his first appearance in Italy. Compare *Ad Att.*, vii. 11, with *Ad Att.*, viii. 13.

[9] Dio, xli. 18.

[10] App., ii. 48; Dio, xli. 36.

[11] Plut., *Cæs.*, 51; Sueton., 37, "adsignavit agros, sed non continuos, ne quis possessorum expelleretur." *Cf.* App., ii. 94.

[12] For the "lex Julia de pecuniis mutuis," see Sueton., 42; Cæsar, *B. C.*, iii. 1; Dio, xli. 37; App., ii. 48. The "foeneratores" were satisfied; Cic., *Ad Fam.*, viii. 17. But the law displeased anarchists like M. Cœlius Rufus and P. Cornelius Dolabella.

[13] Sueton., 42.

[14] Sueton., 41; Dio, xliii. 21.

[15] Sueton., 40; Dio, xliii. 25.

A second question, hardly less important than the establishment and legalization of a strong central executive authority over the army and the provinces, was that of the position to be assigned to the old constitution, by the side of this new power. So far as Cæsar himself was concerned, the answer was for the time sufficiently clear. The old constitution was not formally abrogated The senate met and deliberated; the assembly passed laws and elected magistrates; there were still consuls, prætors, ædiles, quæstors, and tribunes; and Cæsar himself, like his successors, professed to hold his authority by the will of the people. But senate, assembly, and magistrates were all alike subordinated to the paramount authority of the dictator; and this subordination was, in appearance at least, more direct and complete under the rule of Cæsar than under that of Augustus. Cæsar was by nature as impatient as Augustus was tolerant of established forms; and, dazzled by the splendour of his career of victory and by his ubiquitous energy and versatility, the Roman public, high and low, prostrated themselves before him and heaped honours upon him with a reckless profusion which made the existence of any authority by the side of his own an absurdity.[10] Hence under Cæsar the old constitution was repeatedly disregarded, or suspended in a way which contrasted unfavourably with the more respectful attitude assumed by Augustus. For months together Rome was left without any regular magistrates, and was governed like a subject town by Cæsar's prefects.[11] At another time a tribune was seen exercising authority outside the city bounds and invested with the "imperium" of a prætor.[12] At the elections, candidates appeared before the people backed by a written recommendation from the dictator, which was equivalent to a command.[1] Finally, the senate itself was transformed out of all likeness to its former self by the raising of its numbers to 900, and by the admission of old soldiers, sons of freedmen, and even "semi-barbarous Gauls."[2] But, though Cæsar's high-handed conduct in this respect was not imitated by his immediate successors, yet the main lines of their policy were laid down by him. These were (1) the municipalization of the old republican constitution, and (2) its subordination to the paramount authority of the master of the legions and the provinces. In the first case he only carried further a change already in progress. Of late years the senate had been rapidly losing its hold over the empire at large. Even the ordinary proconsuls were virtually independent potentates, ruling their provinces as they chose, and disposing absolutely of legions which recognized no authority but theirs. The consuls and prætors of each year had since 81 been stationed in Rome, and immersed in purely municipal business; and, lastly, since the enfranchisement of Italy, the comitia, though still recognized as the ultimate source of all authority, had become little more than assemblies of the city populace, and their claim to represent the true Roman people was indignantly questioned, even by republicans like Cicero. The concentration in Cæsar's hands of all authority outside Rome completely and finally severed all real connection between the old institutions of the republic of Rome and the government of the Roman empire. And, though Augustus and Tiberius elevated the senate to a place beside themselves in this government, its share of the work was a subordinate one, and it never again directed the policy of the state; while, from the time of Cæsar onwards, the old magistracies are merely municipal offices, with a steadily diminishing authority, even in the city, and the comitia retain no other prerogative of imperial importance but that of formally confirming the ruler of the empire in the possession of an authority which is already his. But the institutions of the republic not merely became, what they had originally been, the local institutions of the city of Rome; they were also subordinated even within these narrow limits to the paramount authority of the man who held in his hands the army and the provinces. And here Cæsar's policy was closely followed by his successors. Autocratic abroad, at home he was the chief magistrate of the commonwealth; and this position was marked, in his case as in that of those who followed him, by a combination in his person of various powers, and by a general right of precedence which left no limits to his authority but such as he chose to impose upon himself. During the greater part of his reign he was consul as well as dictator.[3] In 48, after his victory at Pharsalia, he was given the "tribunicia potestas" for life,[4] and after his second success at Thapsus the "praefectura morum" for three years.[5] As chief magistrate he convenes and presides in the senate, nominates candidates, conducts elections, carries laws in the assembly, and administers justice in court.[6] Finally, as a reminder that the chief magistrate of Rome was also the autocratic ruler of the empire, he wore even in Rome the laurel wreath and triumphal dress, and carried the sceptre of the victorious imperator.[7]

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[1] Sueton., 42. 43.

[2] Plut., *Cæs.*, 58; Suet., 44; Dio, xliii. 51.

[3] See CALENDAR, vol. iv. pp. 666–7; Mommsen, *R. G.*, iii. 550; and Fischer, *Röm. Zeittafeln*, 292 *sq.*

[4] Plut., 35.

[5] Dio, xliii. 47.

[6] Suet., 40; Dio, xliii. 44. For this use of the title "imperator," see Mommsen, *R. G.*, iii. 466, and note.

[7] See Mommsen, iii. 467, and Ranke, *Weltgeschichte*, ii. 319 *sq.* According to Appian, ii. 110, and Plutarch, *Cæs.*, 64, the title "rex" was only to be used abroad in the East, as likely to strengthen Cæsar's position against the Parthians.

[8] Cæsar's first dictatorship in 49 was simply "comitiorum habendorum causa," and lasted only eleven days. He was appointed dictator again for one year in 48, for ten years in 46, and for life in 45.

[9] Cicero, *Phil.*, i. 2, praises Antony, "quum dictatoris nomen . . . propter perpetuae dictaturae recentem memoriam funditus ex republica sustulisset."

[10] For the long list of these, see Appian, ii. 106; Dio, xliii. 43–45; Plut., 57; Suet., 76. *Cf.* also Mommsen, *R. G.*, iii. 463 *sq.*, Watson, *Cicero's Letters*, App. x.; Zumpt, *Studia Romana*, 199 *sq.* (Berlin, 1859).

[11] Zumpt, *Stud. Rom.*, 241; Suet., 76.

[12] Cic. *Ad Att.*, x. 8a

Nor are we without some clue as to the policy which Cæsar had sketched out for himself in the administration of the empire, the government which he had centralized in his own hands. The much-needed work of rectifying the frontiers he was forced, by his premature death, to leave to other hands, but our authorities agree in attributing to him the design of extending the rule of Rome to its natural geographical limits[8]—to the Euphrates and the Caucasus on the east, to the Danube and the Rhine or possibly the Elbe on the north, and to the ocean on the west. Within the frontiers he anticipated Augustus in lightening the financial burdens of the provincials,[9] and in establishing a stricter control over the provincial governors,[10] while he went beyond him in his desire to consolidate the empire by extending the Roman franchise[11] and admitting provincials to a share in the government.[12] He completed the Romanization of Italy by his enfranchisement of the Transpadane Gauls,[13] and by establishing throughout the peninsula a uniform system of municipal government, which under his successors was gradually extended to the provinces.[14]

Atter ed res tion c repub 44-4

On the eve of his departure for the East, to avenge the death of Crassus and humble the power of Parthia, Cæsar fell a victim to the wounded pride of the republican nobles; and between the day of his death (March 15, 44) and that on which Octavian defeated Antony at Actium (September 710- 2, 31) lies a dreary period of anarchy and bloodshed.[15] 710.

For a moment, in spite of the menacing attitude of 723. Cæsar's self-constituted representative Antony, it seemed to one man at least as if the restoration of republican government was possible. With indefatigable energy Cicero strove to enlist the senate, the people, and above all the provincial governors in support of the old constitution. But, though his eloquence now and again carried all before it in senate house and forum, it was powerless to alter the course of events. By the beginning of 43 civil war 711. had recommenced; in the autumn Antony was already threatening an invasion of Italy at the head of seventeen legions. Towards the end of October Antony and his ally Lepidus coalesced with the young Octavian, who had been recently elected consul at the age of twenty, in spite of senatorial opposition; and the coalition was legalized by the creation of the extraordinary commission for the "reorganization of the commonwealth" known as the "second triumvirate."[16] It was appointed for a period of five years, and was continued in 37 for five years more.[17] 711-7 The rule of the triumvirs was inaugurated in the Sullan 717. fashion, and, in marked contrast to the lenity shown by Cæsar, by a proscription, foremost among the victims of which was Cicero himself.[18] In the next year the defeat of Brutus and Cassius at Philippi, by the combined forces of Octavian and Antony, destroyed the last hopes of the republican party.[19] In 40 a threatened rupture between 714 the two victors was avoided by the treaty concluded at Brundusium. Antony married Octavian's sister Octavia,

The secor trium virat 43-2

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[1] Suet., 41, "Caesar dictator . . . commendo vobis illum et illum, ut vestro suffragio suam dignitatem teneant."

[2] Suet., 41, 76; Dio, xliii. 47.

[3] Watson, *op. cit.*, App. x.; Zumpt, *Stud. Rom.*, *loc. cit.*; Suet., 76, "tertium et quartum consulatum titulo tenus gessit."

[4] Dio, xlii. 20.

[5] Dio, xliii. 14; Suet., 76.

[6] Suet., 43, 'jus laboriosissime ac severissime dixit."

[7] App., ii. 106; Dio. xliii. 43.

[8] Plut., 58, "*συνάψαι τὸν κύκλον τῆς ἡγεμονίας*"; Suet., 44; Dio, xliii. 51.

[9] Plut., 48; App., v. 4.

[10] He limited the term of command to two years in consular and one year in prætorian provinces; Cicero, *Phil.*, i. 8; Dio, xliii. 25.

[11] Suet., 42; Cic. *Ad Att.*, xiv. 12.

[12] Suet., 76.

[13] Dio, xli. 36; Tac., *Ann.*, xi. 24.

[14] Lex Julia municipalis; Wordsworth, *Fragments of Early Latin*, pp. 213, 464; Mommsen, *R. G.*, iii. 524. Lex Rubria; Wordsworth, pp. 212, 463.

[15] For this period see Merivale, *Romans under the Empire*, vol. iii.; Lange, *Röm. Alterth.*, iii. 476 *sq.*; Ranke, *Weltgeschichte*, ii. 336 *sq.*; Watson, *Cicero's Letters*, Introd. to Part v.

[16] The triumvirate was formally constituted in Rome (Nov. 27) by a plebiscitum; App., iv. 7; Dio, xlvi. 50–56, xlvii. 2; Livy, *Epit.*, cxx. "ut IIIviri reipublicae constituendae per quinquennium essent."

[17] Dio, xlviii. 54; App., v. 93. For the date, *cf.* Fischer. *Röm. Zeittafeln*, 352, 353.

[18] Livy, *Epit.*, cxx.; App., iv. 7; and art. CICERO.

[19] Dio, xlvii. 35–49; App., iv. 87–138.

and took command of the eastern half of the empire; Octavian appropriated Italy and the West; while Lepidus was forced to content himself with Africa.[1] For the next twelve years, while Antony was indulging in dreams of founding for himself and Cleopatra an empire in the East, and shocking Roman feeling by his wild excesses and his affectation of oriental magnificence,[2] Octavian was patiently consolidating his power. Of his only two rivals, Lepidus his fellow triumvir was in 36 ejected from Africa and banished to Circeii, while Sextus Pompeius, who had since his defeat at Munda maintained a semi-piratical ascendency in the western Mediterranean, was decisively defeated in the same year, and his death in 35 left Octavian sole master of the West. The inevitable trial of strength between himself and Antony was not long delayed. In 32 Antony inflicted one more outrage upon Roman feeling, and openly challenged the hostility of Octavian by divorcing Octavia in favour of the beautiful and daring Egyptian princess, with whom, as the heiress of the Ptolemies, he aspired to share the empire of the Eastern world. By a decree of the senate Antony was declared deposed from his command, and war was declared
23. against Queen Cleopatra.[3] On September 2, 31, was fought the battle of Actium.[4] Octavian's victory was
24. complete. Antony and Cleopatra committed suicide (30),
25. and the Eastern provinces submitted in 29. Octavian returned to Rome to celebrate his triumph and mark the end of the long-continued anarchy by closing the temple of Janus;[5] at the end of the next year he formally laid
11. down the extraordinary powers he had held since 43, and a regular government was established.

III. *The Empire.*

PERIOD I.: THE PRINCIPATE, 27 B.C.–284 A.D.—(*a*) *The Constitution of the Principate.*—The conqueror of Antony at Actium, the great-nephew and heir of the dictator Cæsar, was now summoned, by the general consent of a world wearied out with twenty years of war and anarchy,[6] to the task of establishing a government which should as far as possible respect the forms and traditions of the republic, without sacrificing that centralization of authority which experience had shown to be necessary for the integrity and stability of the empire. It was a task for which Octavian was admirably fitted. To great administrative capacity and a quiet tenacity of purpose he united deliberate caution and unfailing tact; while his bourgeois birth[7] and genuinely Italian sympathies enabled him to win the confidence of the Roman community to an extent impossible for Cæsar, with his dazzling pre-eminence of patrician descent, his daring disregard of forms, and his cosmopolitan tastes.

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The new system which was formally inaugurated by Octavian in 28–27 B.C.[8] assumed the shape of a restoration of the republic under the leadership of a "princeps."[9] Octavian voluntarily resigned the extraordinary powers which he had held since 43, and, to quote his own words, "handed over the republic to the control of the senate and people of Rome.[10] The old constitutional machinery was once more set in motion; the senate, assembly, and magistrates resumed their functions[11]; and Octavian himself was hailed as the "restorer of the commonwealth and the champion of freedom."[12] It was not so easy to determine what relation he himself, the actual master of the Roman world, should occupy towards this revived republic. His abdication, in any real sense of the word, would have simply thrown everything back into confusion. The interests of peace and order required that he should retain at least the substantial part of his authority;[13] and this object was in fact accomplished, and the rule of the emperors founded, in a manner which has no parallel in history. Any revival of the kingly title was out of the question, and Octavian himself expressly refused the dictatorship.[14] Nor was any new office created or any new official title invented for his benefit. But by senate and people he was invested according to the old constitutional forms with certain powers, as many citizens had been before him, and so took his place among the lawfully appointed magistrates of the republic;—only, to mark his pre-eminent dignity, as the first of them all, the senate decreed that he should take as an additional cognomen that of "Augustus,"[15] while in common parlance he was henceforth styled "princeps," a simple title of courtesy, familiar to republican usage, and conveying no other idea than that of a recognized primacy and precedence over his fellow citizens.[16] The ideal sketched by Cicero in his *De Republica*, of a constitutional president of a free republic, was apparently realised; but it was only in appearance. For in fact the special prerogatives conferred upon Octavian gave him back in substance the autocratic authority he had resigned, and as between the restored republic and its new princeps the balance of power was overwhelmingly on the side of the latter.

Under one form or another Octavian had held the "imperium" since 43, and in 33 he had been formally 711, 721.
acknowledged as "imperator," by the consent of all.[17] For this somewhat irregular authority was substituted in 27 the regular "proconsulare imperium,"[18] the authority under which for nearly two centuries the provinces had been governed and the legions led to war. He received it in the orthodox way, by decree of the senate; and the decree, as was customary, defined the area of his command. The essential difference between the "proconsulare imperium" granted to Octavian and that which had been voted year after year to the ordinary proconsuls, lay in its unprecedentedly wide extent and in its long duration. All the provinces, with the exception of those where no military authority or force was required, were placed under his command, to be governed directly by "legati" appointed by him and responsible only to him.[19] The "unarmed

Imperium proconsulare, 27 = 727.

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[1] Vell., ii. 76; Dio, xlviii. 28; App., v. 65.

[2] For Antony's policy and schemes in the East, see Ranke, *Weltgeschichte*, ii. 381–385; Merivale, *Romans under the Empire*, vol. iii. chap. 27; Lange, *Röm. Alterth.*, iii. 573 *sq.*

[3] Suet., *Octav.*, 17; Dio, l. 1–8; Plutarch, *Anton.*, 53.

[4] Dio, li. 1; Zonaras, 10, 30.

[5] He celebrated his triumph on August 6, 7, 8; Dio, li. 20; Livy, *Epit.*, cxxxiii. For the closing of the temple of Janus, see Livy, i. 19; Vell., ii. 38; Suet., *Oct.*, 22.

[6] Tac., *Ann.*, i. 2, "cunctos dulcedine otii pellexit."

[7] Suet., *Aug.*, i. His grandfather was a citizen of Velitræ; "municipalibus magisteriis contentus."

[8] Mommsen, *Staatsrecht*, ii. 707; *Mon. Ancyranum* (ed. Mommsen, Berlin, 1883), vi. 13–23, pp. 144–153; Merivale, *Romans under the Empire*, chap. xxxi.; Cape's *Early Empire*, chaps. i.–xii.

[9] Tac., *Ann.*, iii. 28, "sexto demum consulatu . . . quae IIIviratu jusserat abolevit, deditque jura quis pace et principe uteremur;" *ibid.*, i. 9, "non regno neque dictatura sed principis nomine constitutam rempublicam."

[10] *Mon. Ancyr.*, vi. 13.

[11] Vell. Pat., ii. 89, "prisca et antiqua reipublicae forma revocata."

[12] Ovid, *Fasti*, i. 589. On a coin of Asia Minor Augustus is styled "libertatis P. R. vindex." Compare, for other evidence, Mommsen, *Staatsr.*, ii. 708, note 1.

[13] Dio Cassius describes Augustus as seriously contemplating abdication (lii. 1; liii. 1–11); *cf.* Suet., *Aug.*, 28.

[14] Suet., 52; *Mon. Ancyr.*, i. 31. [15] *Mon. Ancyr.*, vi. 16, 21; 23.

[16] The explanation of "princeps" as an abbreviated form of "princeps senatus" is quite untenable. For its real significance, see Mommsen, *Staatsrecht*, ii. 733; Pelham, *Journ. of Phil.*, vol. viii. It is not an official title.

[17] *Mon. Ancyr.*, v. 3–6, vi. 13, 14. Augustus adopted "imperator" as a prænomen in 40. Mommsen, *Staatsr.*, ii. 727, note 2.

[18] Dio, liii. 17, 32; Mommsen, *Staatsr.*, 791.

[19] Dio, liii. 12; Suet., 47, "provincias validiores ipse suscepit, ceteras proconsulibus sortito permisit."

provinces were to be assigned by lot in the old way to ex-consuls and ex-prætors, and to be nominally under the control of the senate; but in 23 even their governors were declared to be generally subordinate to Octavian as the holder of a higher authority ("majus imperium)."[1] In addition to this control, direct and indirect, of all the provinces, Octavian received also the sole and supreme command of all the military and naval forces of the empire. He alone henceforth levies, pays, and dismisses soldiers, equips fleets, and orders the movements of both army and navy, and he was granted in addition full authority to wage war and conclude treaties with whom he would.[2] Finally, in 23, if not in 27, he was exempted from the law which required the proconsul to lay down his "imperium" on entering Rome, and was allowed to exercise it within the sacred limits of the pomœrium,[3] a privilege which facilitated the introduction into the city of the prefects, prætorian guard, and summary jurisdiction proper to the proconsul in the province. This "proconsulare imperium" was granted in the first instance for ten years,[4] but was renewed for periods of five, five, and ten years successively, and the fiction of its temporary duration and periodic renewal was maintained under Augustus's successors by the celebration every ten years of the "decennalia."[5] The supreme importance attached to its possession as the mainstay of the imperial power is sufficiently indicated by the fact that the man on whom it is conferred becomes thereby "princeps," and the day on which he receives it ("dies imperii") marks the beginning of his reign.[6]

Tribunicia potestas.

The proconsular imperium not only carried with it the control of the army and the provinces, but in Rome itself it gave its holder a position of precedence. In virtue of it he took his seat between the consuls, was preceded by lictors,[7] and wore the laurel wreath, paludamentum, and sword of the imperator. But as yet Rome could not be governed like a subject provincial city by proconsular authority; and, for the necessary direction and regulation of the constitutional machinery which he had restored, Augustus contented himself[8] with the authority which traditionally invested its holder with a popular leadership, that of the tribunes of the plebs. The "tribunicia
718. potestas" had been granted him for life in 36,[9] and his
731. tenure of it was confirmed in 23.[10] Thenceforward it ranked as a constituent element of the principate, second in importance only to the proconsular authority. With but few exceptions it was conferred for life upon all succeeding emperors, and the years of their reigns are reckoned by the years of their tribunician power. It was conferred, as all special "potestas" had been conferred under the republic, by a decree of the senate and vote of the assembly.[11] It gave its holder all the prerogatives of the tribunate, without the restrictions which hampered the tribunes themselves. Augustus and his successors were unimpeded in its exercise by the presence of colleagues; and both their personal inviolability and their right of interference held good outside the pomœrium. It enabled them, as representing the acknowledged protectors of the plebs, to control in the name of the people the whole administrative machinery, to introduce laws, to convene the senate, to protect the aggrieved, and to interfere with any exercise of authority by other magistrates. In short, it gave to the man who already wielded an authority abroad more absolute than that granted to Pompey by the Gabinian law all and more than all the power possessed by a Gracchus in Rome.

Other powers of the princep

It was on these two powers that Augustus's position as princeps rested. In virtue of these he was chief magistrate of the Roman state, and all other offices and privileges conferred upon him are comparatively of secondary importance. The consulship which he held continuously from
31 up to 23 he never accepted again but on two occa- 723–7
sions, in 5 B.C. and in 2 B.C.,[12] though he was twice invested 749. 75
with "consular authority" for the purpose of taking the
census (8 B.C., 14 A.D.).[13] That he ever received an extra- 746
ordinary "morum legumque regimen," as stated by Suetonius and Dio,[14] is extremely doubtful, and his language in the Ancyran monument implies that for this purpose, as for many others, he found the tribunician authority
sufficient.[15] In 22 B.C. he was invested with the "cura 732.
annonae,"[16] the supervision of the corn supply and the
corn largesses at Rome. On the death of Lepidus in 12 742.
B.C. he succeeded him as "pontifex maximus," and he was also a member of the augural and other priestly colleges.[17] Lastly, at various times, and probably by decree of the senate, he was granted a number of special exemptions and privileges.[18]

Changes in the constitution of the pri cipate

In theory at least, the Roman world was governed according to the "maxims of Augustus"[19] down to the time of Diocletian. Even in the 3d century there is still, in name at least, a republic, of which the emperor is in strictness only the chief magistrate, deriving his authority from the senate and people, and with prerogatives limited and defined by law. The case is quite different when we turn from the theory to the practice. The division of authority between the republic and its chief magistrate became increasingly unequal. Over the provinces the princeps from the first ruled autocratically; and this autocracy reacted upon his position in Rome, so that it became every year more difficult for a ruler so absolute abroad to maintain even the fiction of republican government at home. The republican institutions, with the partial exception of the senate, lose all semblance of authority outside Rome, and even in their altered position as the municipal institutions of the chief city of the empire they retain but little actual power. The real government even of Rome passes gradually into the hands of imperial prefects and commissioners, and the old magistracies become merely decorations which the emperor gives away at his pleasure. And at the same time the rule of the princeps assumes an increasingly personal character, and the whole work of government is silently concentrated in his hands and in those of his own subordinate officials. Closely connected with this change is the different aspect presented by the history of the empire in Rome and Italy on the one hand and in the provinces on the other. Rome and Italy share in the decline of the republic. Political independence and activity die out; their old preeminence and exclusive privileges gradually disappear; and at the same time the weight of the overwhelming power of the princeps, and the abuses of their power by individual "principes," press most heavily upon them. On the other hand, in the provinces and on the frontiers, where the imperial system was most needed, and where from the first it had full play, unfettered by the fictions of republican government, it is seen at its best as developing or protecting an orderly civilization and maintaining the peace of the world.

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[1] Dio, liii. 32.

[2] See the so-called "lex de imperio Vespasiani," *C. I. L.*, vi. 930.

[3] Dio, liii. 17.

[4] Dio, liii. 13.

[5] Dio, liii. 16; lvii. 24; Mommsen, *Staatsr.*, ii. 751, 752.

[6] See the passages from the *Acta Fratrum Arvalium* (ed. Henzen, Berlin, 1874), p. 63. Tiberius received it when associated with Augustus as his colleague; Tac., *Ann.*, i. 3; Suet., *Tib.*, 21.

[7] Dio, liv. 10, connects these privileges with the bestowal of consular power for life, but it is doubtful whether any such power was formally conferred. Mommsen, *Staatsrecht*, ii. 813; *Mon. Ancyr.*, iii. 9.

[8] Tac., *Ann.*, i. 2.

[9] *Mon. Ancyr.*, ii. 21.

[10] Dio, liii. 32. The years of the "tribunicia potestas" are reckoned by Augustus from this year. See Mommsen, *Staatsr.*, ii. 753, 754.

[11] References are found in the *Acta Fratrum Arvalium* to the comitia in which it was conferred; *Acta F. A.*, ed. Henzen, p. 65. It is possible, as Mommsen thinks, that the extant fragmentary law "de imperio Vespasiani" may be a part of the "lex" conferring the "tribunicia potestas"; see his *Staatsr.*, ii. 818. The "tribunicia potestas" was, like the "proconsulare imperium," conferred on the chosen colleague or destined successor; Tac., *Ann.*, i. 2, of Tiberius, "consors tribuniciae potestatis."

[12] Suet., 26.

[13] *Mon. Ancyr.*, ii. 5. 8.

[14] Suet., 27; Dio, liv. 10, 30.

[15] *Mon. Ancyr. Gr.*, iii. 15, and Mommsen's notes, pp. 28-30, 36-38.

[16] *Mon. Ancyr. Lat.*, i. 32, 33.

[17] Mommsen on *Mon. Ancyr. Lat.*, i. 45, p. 32.

[18] Dio, liii. 18. In the "lex de imperio Vespasiani" several such exemptions are mentioned; Mommsen, *Staatsr.*, ii. 711 *sq.*

[19] Suet., *Nero*, 10, "ex Augusti praescripto."

publican institutions. 706, 726.

The decay of the republican institutions had commenced before the revolutionary crisis of 49. It was accelerated by the virtual suspension of all regular government between 49 and 28; and not even the diplomatic deference towards ancient forms which Augustus displayed availed to conceal the unreality of his work of restoration. The comitia. The "comitia" received back from him "their ancient rights,"[1] and during his lifetime they continued to pass laws and to elect magistrates. But after the end of the reign of Tiberius we have only two instances of legislation by the assembly in the ordinary way,[2] and the law-making of the empire is performed either by decrees of the senate or by imperial edicts and constitutions. Their prerogative of electing magistrates was, even under Augustus, robbed of most of its importance by the control which the princeps exercised over their choice by means of his rights of nomination and commendation, rights which effectually secured the election of his own nominees.[3] By Tiberius even this restricted prerogative was still further curtailed. The candidates for all magistracies except the consulship were thenceforward nominated and voted for in the senate-house and by the senators,[4] and only the "renuntiatio," the formal return of the result, and the introduction of the magistrates designate to the people took place in the assembly.[5] And, though the election of consuls was never thus transferred to the senate, the process of voting seems to have been silently abandoned. In the time of the younger Pliny we hear only of the nomination of the candidates and of their formal "renuntiatio" in the Campus Martius.[6] By this empty form the ancient right of the people to confer all magisterial authority was saved, at least in appearance; and it was acknowledged in as purely formal a manner in the case of the princeps himself, who, as long as the principate lasted, continued to receive the "tribunicia potestas" by a vote of the assembly, and was thus held to derive his authority from the people.[7]

The magistracies.

This almost complete effacement of the "comitia" was largely due to the fact that they had ceased to represent anything but the populace of Rome, and the comparatively greater vitality shown by the old magistracies is mainly attributable to the value they continued to possess in the eyes of the Roman upper class. But, though they were eagerly sought,[8] and conferred on their holders considerable social distinction, the magistrates ceased, except in name, to be the popularly chosen executive officers of the Roman state. In the administration of the empire at large they had no share, if we except the subordinate duties still assigned to the quæstor in a province. In Rome, to which their sphere of work was limited, they were overshadowed by the dominant authority of the princeps, while their range of duties was increasingly circumscribed by the gradual transference of administrative authority, even within the city, to the emperor and his subordinate officials. And their dependence on the princeps was confirmed by the control he exercised over their appointment. For all candidates the approval, if not the commendation, of the princeps became the indispensable condition of success, and the princeps on his side treated these ancient offices as pieces of preferment with which to reward his adherents or gratify the ambition of Roman nobles. In all instances, too, the dignity of the office was impaired by the practice, begun by Cæsar and continued by Augustus and his successors, of granting the insignia to men who had not held the actual magistracy itself.[9] Consulship. The change is especially noticeable in the case of the consuls, the chief magistrates of the old commonwealth. The consulship was still the highest post open to the private citizen,[10] and consular rank a necessary qualification for high office in the provinces;[11] but the actual consuls have scarcely any other duties than those of presiding in the senate, conducting its proceedings, and occasionally executing its decrees,[12] while their term of office dwindles from a year to six and finally to two months.[13] In the age of Tacitus and the younger Pliny, the contrast is striking enough between the high estimate set on the dignity of the office and the frankness with which both its limited powers and its dependence on the emperor are acknowledged.[14] Prætorship. Of the other magistrates the prætors continued to exercise their old jurisdiction with little formal change down at least to the latter half of the second century, but only as subordinate to the higher judicial authority of the emperor.[15] Ædileship. The ædiles seem to have retained only such petty police duties as did not pass to one or another of the numerous imperial prefects and commissioners.[16] Tribunate. The tribunate fared still worse, for, by the side of the tribunicia potestas wielded by the princeps, it sank into insignificance, and it is described by the younger Pliny as a "shadow and an empty name."[17] Quæstorship. The quæstorship suffered perhaps less change than any other of the old offices. It still kept its place as the first step on the ladder of promotion, and there was still a quæstor attached to each governor of a senatorial province, to the consuls in Rome, and to the princeps himself as proconsul.[1]

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[1] Suet., *Aug.*, 40, "comitiorum pristinum jus reduxit."

[2] The "plebiscita" of Claudius, Tac., *Ann.*, xi. 13, 14, and the "lex agraria" of Nerva; *Digest*, xlvii. 21, 3; Dio, lxviii. 2; Plin., *Epp.*, vii. 31.

[3] For the nature of these rights, the latter of which was not exercised in the case of the consulship until the time of Vespasian, see Mommsen, *Staatsr.*, ii. 861–869; Tac., *Ann.*, i. 14, 15, 81; Suet., *Aug.*, 56; Dio, lviii. 20.

[4] Tac., *Ann.*, i. 15, "comitia e campo ad patres translata sunt"; compare *Ann.*, xiv. 28. The magistracy directly referred to is the prætorship, but that the change affected the lower magistracies also is certain; see, *e.g.*, Pliny's *Letters*, *passim*, especially iii. 20, vi. 19

[5] Dio, lviii. 20.

[6] Mommsen, *Staatsr.*, ii. 865, 866; Plin., *Paneg.*, 92.

[7] Gaius, i. 5, "cum ipse imperator per legem imperium accipiat." Mommsen is probably right in referring this to the "lex tribunicia."

[8] Plin., *Epp.*, ii. 9, vi. 6. See, generally, Friedlaender, *Sittengeschichte Roms* (Leipsic, 1869), pp. 227 *sq.*

[9] The permission to use the "ornamenta consularia, praetoria," &c., was distinct from the "adlectio inter consulares, praetorios," &c. See Mommsen, *Staatsr.*, ii. 877 *sq.*; Suet., *Jul.*, 76; Claud., v. 24; Tac., *Ann.*, xii. 21, xv. 72; Dio Cass., lx. 8. *Cf.* also Friedlaender, i. 224.

[10] Tac., *Agric.*, 44; Pliny, *Epp.*, ii. 1, "summum fastigium privati hominis."

[11] For a consular senatorial province and for the more important of the imperial legateships.

[12] Plin., *Paneg.*, 48, graphically sums up the consuls' duties.

[13] Mommsen, *Staatsrecht*, ii. 79. Six months was the usual term down to the death of Nero; we have then four or two months; in the 3d century two is the rule. The consuls who entered on office on January 1 were styled "consules ordinarii," and gave their name to the year. Seneca *De Ira*, iii. 31, "a me numerari voluit annum." Lucan, *Phars.*, v. 398, "careat ne nomine tempus, menstruus in fastos distinguet saecula consul." Plin., *Paneg.*, 58. The others were distinguished as "consules suffecti" or "minores"; Dio Cass., xlviii. 35.

[14] Plin., *Paneg.*, 92; Tac., *Hist.*, i. 1; *Agric.*, 44.

[15] Mommsen, *Staatsr.*, ii. 206.

[16] They lost the "cura annonae" and "cura ludorum" as well as other duties, which passed to such officers as the "praefectus vigilum," and the "curatores viarum, cloacarum," &c. There is no mention of the ædileship after the reign of Severus Alexander.

[17] Plin., *Epp.*, i. 23, "inanem umbram et sine honore nomen." There are a few instances of the exercise by the tribunes of their power of interference within the senate; Tac., *Ann.*, i. 77, vi. 47, xvi. 26; Plin., *Epp.*, ix. 13.

The senate alone among republican institutions retained some importance and influence. The virtual abolition of the comitia, and the degradation of the magistracies left the senate to stand alone as the representative of republicanism, and it thus came to be regarded as sharing the government of the empire with the princeps himself. The magistrates elected by the senate are contrasted with the legates, prefects, and procurators appointed by the emperor. It is to the senate, in theory, that the supreme power reverts in the absence of a princeps. It is by decree of the senate that the new princeps immediately receives his powers and privileges,[2] though he is still supposed to derive them ultimately from the people, and is as a rule actually the nominee of the soldiers. After the cessation of all legislation by the comitia, the only law-making authority, other than that of the princeps by his edicts, was that of the senate by its decrees.[3] Its judicial authority was parallel with that of the emperor, and at the close of the 1st century we find the senators claiming, as the emperor's "peers," to be exempt from his jurisdiction.[4] But in spite of the outward dignity and importance of this position, and of the politic deference with which it was frequently treated, the senate became gradually almost as powerless in reality as the comitia and the magistracies. The two great supports of its authority under the republic—its identification with the interests of a powerful aristocracy and the subserviency of the magistrates—both fell away under the empire.

The senators continued indeed to be taken as a rule from the ranks of the wealthy, and a high property qualification was established by Augustus as a condition of membership, but any effect which this may have had in giving independence to the position of a senator was counterbalanced by the facilities it afforded to the emperors for securing their own ascendency by subsidizing those whose property fell short of the required standard, and who thus became simply the paid creatures of their imperial patrons.[5] Admission to the senate was possible only by favour of the emperor, as at once controlling the elections to the magistracies, which still as of old gave entrance to the curia, and as invested with the power of directly creating senators by "adlectio," a power which from the time of Vespasian onwards was freely used.[6] As the result, the composition of the senate rapidly altered. Under Augustus and Tiberius it still contained many representatives of the old republican families, whose prestige, influence, and ancestral traditions were some guarantee for their independence. But this element soon disappeared. The ranks of the old nobility were thinned by natural decay and by the jealous fears of the last three Claudian emperors. Vespasian[7] flooded the senate with new men from the municipal towns of Italy and the Latinized provinces of the West. Trajan and Hadrian, both provincials themselves, carried on the same policy, and by the close of the 2d century even the Greek provinces of the East had their representatives among the senators of Rome. Some, no doubt, of these provincials, who constituted the great majority of the senate in the 3d century, were men of wealth and mark, but many more were of low birth, on some rested the stain of a servile descent, and all owed alike their present position and their chances of further promotion to the emperor.[8] The procedure of the senate was as completely at the mercy of the princeps as its composition. He was himself a senator and the first of senators;[9] he possessed the magisterial prerogatives of convening the senate, of laying business before it, and of carrying senatus consulta;[10] above all, his tribunician power enabled him to interfere at any stage, and to modify or reverse its decisions. The share of the senate in the government was in fact determined by the amount of administrative activity which each princeps saw fit to allow it to exercise, and by the extent to which he chose to use it as an instrument of government. And this share became steadily smaller. The jurisdiction assigned it by Augustus and Tiberius was in the 3d century limited to the hearing of such cases as the emperor thought fit to send for trial, and these became steadily fewer in number. Its control of the state treasury, as distinct from the imperial fiscus, and of the so-called senatorial provinces passed in fact to the emperor and his officials, and was only occasionally revived by the special favour of emperors who, like Marcus Aurelius,[11] were sincerely attached to old traditions, or, like Severus Alexander and Tacitus, hoped by close alliance with the senate to escape from the evils of a military despotism.[12] Even in Rome and Italy its control of the administration was gradually transferred to the prefect of the city, and after the reign of Hadrian to imperial officers (juridici) charged with the civil administration.[13] The part still played by its decrees in the modification of Roman law has been dealt with elsewhere (see p. 704 *supra*), but it is clear that these decrees did little else than register the expressed wishes of the emperor and his personal advisers.

Altered position of the princeps: centralization of authority in his hands.

The growing impotence of all other authority than that of the princeps inevitably altered the character of the principate. Even under Augustus, Tiberius, and the Claudian emperors, there is a silent and steady concentration of all authority in the hands of the princeps; not only the army and the provinces, but even Rome and Italy, are in reality governed by him, though still with a lingering respect for the traditional prerogatives of the senate and the senatorial magistrates; in the reigns of Caligula, Claudius, and Nero the politic disguise under which Augustus and Tiberius had endeavoured to conceal the extent of their power was thrown contemptuously aside. In the administration of justice and in finance, as well as in military and foreign affairs, the authority of the princeps is paramount; and his own personal subordinates—legates, prefects, procurators, and even his freedmen[14]—divide between them the real work of government. This increase of power was accompanied by a corresponding elevation of the princeps himself above the level of all other citizens. The comparatively modest household and simple life of Augustus were replaced by a more than regal splendour, and under Nero we find all the outward accessories of monarchy present, the palace, the palace guards, the crowds of courtiers, and a court ceremonial. In direct opposition to the republican theory of the principate, the members of the princeps's family share in the dignities of his position. The males bear the cognomen of Cæsar, and are invested, as youths, with high office; their names and even those of the females are included in the yearly prayers for the safety of the princeps[1]; their birthdays are kept as festivals; the prætorian guards take the oath to them as well as to the princeps himself. Finally, the growing practice of Cæsar worship invested the chief magistrate of the Roman commonwealth with the divine attributes ascribed to Eastern monarchs.[2] The death of Nero was followed, it is true, by a partial reaction. Not only Galba and the Flavian emperors but Trajan, Hadrian, and the Antonines at once affected a certain simplicity in their personal habits, and discountenanced the excessive servility and adulation encouraged by Caligula and Nero. But this reaction served only to bring into clearer relief the continued advance made towards the establishment of an autocratic and military rule. Caligula, Claudius, and Nero were all first saluted as imperatores by the soldiery and then invested with their powers by the senate,[3] but this reversal of the constitutional order was rendered less noticeable by the fact that the choice was still made in Rome, and that it fell in each case on one whose birth already marked him out as the natural successor to the purple. The salutation of Galba by the legions in Spain marks the opening of a new epoch.[4] Thenceforward, if the legions do not actually select the princeps, it is their acceptance of him which is the one essential condition of his tenure of power, and it is on their support that he relies. Vitellius and Vespasian were chosen by the legions of Germany and Syria, as Galba had been by those of Spain. Domitian emphasized the military character of his rule by entering the senate in the triumphal dress;[5] and under the great soldier Trajan, whose adoption by Nerva was a frank confession of the necessities of the case, the military title "imperator" was already superseding the older and more constitutional "princeps."

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[1] Mommsen, *Staatsrecht*, ii. 532. Pliny was himself "quaestor Caesaris," *Epp.*, vii. 16.

[2] Mommsen, *Staatsrecht*, ii. 818; Tac., *Ann.*, xii. 69, *Hist.*, i. 47. In the 3d century the honours, titles, and powers were conferred *en bloc* by a single decree; *Vit. Sev. Alex.*, 1.

[3] Gaius, i. 4; Ulpian, *Dig.*, i. 3, 9.

[4] Under Domitian; Dio Cass., lxvii. 2. Even Septimius Severus pledged himself "non inconsulto senatu occidere senatorem"; *Vita Severi*, 7.

[5] Suet., *Nero*, 10; *Vesp.*, 17.

[6] Mommsen, *Staatsrecht*, ii. 879 *sq.* The power was derived from the censorial authority. Domitian was censor for life; Suet, *Dom.*, 8. After Nerva it was exercised as falling within the general authority vested in the princeps; Dio, liii. 17.

[7] Suet., *Vesp.*, 90; Tac., *Ann.*, iii. 55.

[8] See on this point Friedlaender, *Sittengeschichte Roms*, i. 197 *sq*

[9] *Mon. Ancyr. Gr.*, iv. 3, πρῶτον ἀξιώματος τόπον.

[10] Lex de imp. Vesp., *C. I. L.*, vi. 930: "Senatum habere, relationem facere, remittere; Scta. per relationem discessionemque facere."

[11] Dio Cass., lxxi. 10.

[12] *Vit. Sev. Alex.*, 3; *Vit. Tac.*, 12, 18.

[13] *Vit. Hadr.*, 22. "Juridici" were appointed by Marcus Aurelius, *Vit. Ant.*, 11; Marquardt, i. 72, 73.

[14] For the position of the imperial freedmen under Claudius, see Friedlaender, i. 63 *sq.*; Tac., *Ann.*, xii. 60, xiv. 39, *Hist.*, ii. 57, 95.

Increasingly military character of the principate.

Severance of the connexion with Rome.

Closely connected with the increasingly military character of the emperor's position was the gradual severance of the old ties which connected the emperor, as chief magistrate, with Rome, as the traditional seat and centre of political power. Galba, Vitellius, and Vespasian were already *de facto* emperors when they entered Rome from their distant provinces to claim the legal confirmation by the senate. Trajan and Hadrian were both provincials by birth; the former did not enter Rome for a full year after his accession, and Hadrian courteously apologized to the senate for taking up the imperium in Syria before his acceptance by that body.[6] The connexion between the emperors and Rome was further weakened by the increasing frequency and length of their absences from the city. Life in Rome was no doubt irksome to men trained in camps, as Trajan had been, and the state of affairs was such as imperatively to require the emperor's presence in the provinces and on the frontiers. The distant campaigns of Trajan and Marcus Aurelius, and the unwearying travels of Hadrian, were necessary for the safety and good government of the empire, but they involved the removal from Rome of the real seat of government. The emperors from Vespasian to Aurelius were, with the exception of Domitian, ready enough to respect constitutional forms, at least in their personal intercourse with the senate, and Aurelius seems sincerely to have wished to share with the senate the overwhelming responsibilities which pressed upon him. But the improved organization of the administrative system which the times demanded was too urgent a need to be set aside out of respect for the niceties of an obsolete constitutional government; and this period is marked by the development and extension of a purely imperial system of government, the control of which was centralized in the hands of the emperor alone. The main credit of this achievement is due to Hadrian,[7] and its immediate effect was undoubtedly to increase the effectiveness of the administration; but it accelerated the decay of local independence and energy, and thus diminished the strength of the empire. The century which separates the death of Marcus Aurelius from the accession of Diocletian (180–284) completed the destruction of the old Augustan system. Now and again, as in the case of Pertinax, of Severus Alexander, of Maximus and Balbinus, and of Tacitus, the senate succeeded in claiming for itself the selection of an emperor, but with the single exception of Severus Alexander their nominees were not more successful than Nerva in securing the necessary attachment of the legions; as a rule the emperors of the 3d century were more than ever the nominees of the soldiery, often men of obscure origin from the frontier provinces.[8] The worst of them treated the senate with contempt and contumely, and the best of them excluded it from all share in the government. Septimius Severus, a native of Africa, set the precedent of abstaining from seeking a formal confirmation of his authority from the senate;[9] he assumed the title of proconsul even in Rome, administered justice no longer openly in the forum but within the walls of the palace, and finally established the prefect of the prætorian guard as the officer next in power to the emperor himself. It is, moreover, on his inscriptions that the emperor is first officially styled "dominus." From the accession of Decius (249), the first of a series of able emperors sprung from the Danubian provinces, the autocratic and military character of the imperial system rapidly develops. The old distinctions between imperial and senatorial provinces, between the state treasury and the privy purse of the emperor, finally disappear. Senators are almost entirely excluded alike from the military and civil services. Under Aurelian (270–275), an able soldier and a vigorous administrator, the breach with the old traditions became complete. He anticipated Diocletian in the completely autocratic methods of his government and in the Oriental pomp and splendour with which he surrounded himself.

The emperors of the 3d century.

Septimius Severus.

The "Illyrian" emperors.

(*b*) *General History of the Empire.*—From the development of the principate of Augustus into the avowed despotism which it was the great work of Diocletian to organize and consolidate we pass to the general fortunes of the empire during this period. On the accession of Augustus, there could be little doubt as to the nature of the work that was necessary, if peace and prosperity were to be secured for the Roman world. He was called upon to justify his position by rectifying the frontiers and strengthening the frontier defences, by reforming the system of provincial government, and by reorganizing the finance; and his success in dealing with these three difficult problems is sufficiently proved by the prosperous condition of the empire for a century and a half after his death.[1] To secure the peace which the distracted Roman world desired, it was imperatively necessary to establish on all sides of the empire really defensible frontiers; and this became possible now that for the first time the direction of the foreign policy of the state and of its military forces was concentrated in the hands of a single magistrate. To the south and west the generals of the republic, and Cæsar himself, had extended the authority of Rome to the natural boundaries formed by the African deserts and the Atlantic Ocean, and in these two directions Augustus's task was in the main confined to the organization of a settled Roman government within these limits. In Africa the client state of Egypt was formed into a separate province, and the kingdom of Numidia (25 B.C.) was incorporated with the old province of Africa. In Spain the hill-tribes of the north-west were finally subdued, and a third province, Lusitania, established.[2] Until the commencement of Cæsar's campaigns (58 B.C.) Roman rule in Gaul had been confined to the single southern province of Gallia Narbonensis (121–118 B.C.). Cæsar subdued the rest of the country, but the fierce struggles of the Civil War and his early death obliged him to leave to his nephew the task of organizing the conquered territory. Augustus (27 B.C.) established in addition to the "old province" the three new ones of Aquitania, Lugdunensis, and Belgica.[3] Towards the north the republic had left the civilized countries bordering on the Mediterranean with only a very imperfect defence against the threatening mass of barbarian tribes above them. The result[4] of Augustus's policy was to establish a protecting line of provinces running from the Euxine to the North Sea, and covering the peaceful districts to the south,—Mœsia (6 A.D.), Pannonia (9 A.D.), Noricum (15 B.C.), Rætia (15 B.C.), and Gallia Belgica. Roman rule was thus carried up to the natural frontier lines of the Rhine and the Danube. Here, after the defeat of Varus (9 A.D.) and the abandonment of a forward policy beyond the Rhine, Augustus fixed the limits of the empire northward; his successor Tiberius recalled Germanicus, as soon as the disaster in the Silva Teutoburgensis had been avenged; and after the peace with Maroboduus, the chief of the Marcomanni on the upper Danube, in the next year (17 A.D.), the defensive policy recommended by Augustus was adopted along the whole of the northern frontier. The line of the great rivers was held by an imposing mass of troops. Along the Rhine lay the armies of Upper and Lower Germany, consisting of four legions each; eight more guarded the Danube and the frontiers of Pannonia and Mœsia. The command of the troops was entrusted to imperial legates, whose posts became the most coveted prizes in the imperial service, and were not unfrequently stepping-stones to the imperial purple itself. At frequent intervals along the frontier were the military colonies, the permanent camps, and the smaller intervening "castella." Flotillas of galleys cruised up and down the rivers, and Roman roads opened communication both along the frontiers and with the seat of government in Italy.

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[1] *Acta Fr. Arval.* (ed. Henzen) 33, 98, 99.

[2] For Cæsar worship, see Mommsen, *Staatsrecht*, ii. 716 *sq.*; Boissier, *La Religion Romaine*, i. 122–208; Marquardt, *Röm. Staatsverw.*, iii. 443–454; Preller, *Röm. Mythologie*, 770 *sq.*

[3] Tac., *Ann.*, xii. 69, of Nero, "sententiam militum secuta patrum consulta."

[4] *Tac.*, *Hist.*, i, 4

[5] Dio, lxvii. 4.

[6] Dio, lxix. 2.

[7] See, for a short account, Capes, *Age of the Antonines*, chap. ix., *cf.* Schiller, *Gesch. d. Kaiserzeit*, i. (2) 617 *sq.*

[8] *E.g.*, Maximinus, "de vico Thraciae, barbaro patre ac matre," *Vit. Max.*, 1.

[9] *Vita Severi*, 7. For the importance of the reign of Severus see Schiller, i. (2) 725, Gibbon, vol. i. 253 *sq.*

The frontiers.

The North.

In the East Rome had other work to do than that of erecting a barrier against a surging tide of barbarism, for here she was confronted with a well-organized and powerful state whose claims to empire were second only to her own. The conquests of Pompey (66–62 B.C.) had brought Rome face to face with Parthia on the banks of the Euphrates, the limits of Roman authority being marked by the eastern frontiers of the client states of Pontus, Cappadocia, and Commagene, and of the newly formed province of Syria. In 54 the rash advance of Crassus beyond the Euphrates provoked the first serious collision between Rome and Parthia, and the victory at Carrhæ encouraged among the Parthians the idea of an invasion of Syria and Asia Minor, while it awakened in Rome a genuine fear of the formidable power which had so suddenly arisen in the East. Cæsar was at the moment of his death preparing to avenge the death of Crassus by an invasion of Parthia, and Antony's schemes of founding an Eastern empire which should rival that of Alexander included the conquest of the kingdom beyond the Euphrates. But on the Euphrates, as on the Rhine and the Danube, Augustus adhered to the policy which he recommended to his successors of "keeping the empire within its bounds"; and the Parthians, weakened by internal feuds and dynastic quarrels, were in no mood for vigorous action. Roman pride was satisfied by the restoration of the standards taken at Carrhæ. Four legions guarded the line of the Euphrates, and, beyond the frontiers of Pontus and Cappadocia, Armenia was established as a "friendly and independent ally."[5]

Next in importance to the rectification and defence of the frontiers was the reformation of the administration, and the restoration of prosperity to the distracted and exhausted provinces. The most serious defect of the republican system had been the absence of any effective central control over the Roman officials outside Italy. This was now supplied by the general proconsular authority vested in the emperor. The provinces were for the first time treated as departments of a single state, while their governors, from being independent and virtually irresponsible rulers, became the subordinate officials of a higher authority.[6] Over the "legati" and "procuratores" of the imperial provinces the control of the emperor was as complete as that of the republican proconsul over his staff in his own province. They were appointed by him, held office at his good pleasure, and were directly responsible to him for their conduct. The proconsuls of the senatorial provinces were in law magistrates equally with the princeps, though inferior to him in rank; it was the senate that they were as of old responsible; they were still selected by lot from among the senators of consular and prætorian rank. But the distinction did not seriously interfere with the paramount authority of the emperor. The provinces left nominally to the senate were the more peaceful and settled districts in the heart of the empire, where only the routine work of civil administration was needed, and where the local municipal governments were as yet comparatively vigorous. The senatorial proconsuls themselves were indirectly nominated by the emperor through his control of the prætorship and consulship. They wielded no military and only a strictly subordinate financial authority, and, though Augustus and Tiberius, at any rate, encouraged the fiction of the responsibility of the senatorial governors to the senate, it was in reality to the emperor that they looked for direction and advice, and to him that they were held accountable. Moreover, in the case of all governors this accountability became under the empire a reality. Prosecutions for extortion ("de pecuniis repetundis"), which were now transferred to the hearing of the senate, are tolerably frequent during the first century of the empire; but a more effective check on maladministration lay in the appeal to Cæsar from the decisions of any

Administrative reforms in the provinces.

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[1] Marquardt, *Röm. Staatsverw.*, i. 292, 566.

[2] Marquardt, i. 101; Mommsen, *R. G.*, v. 58 *sq.*

[3] Marquardt, i. 112; Mommsen, *R. G.*, v. 76.

[4] See especially Mommsen, *R. G.*, v. caps. 4 and 6.

[5] Mommsen, *R. G.*, v. cap. 9. Armenia, however, long continued to be a debateable ground between Rome and Parthia,—passing alternately under the influence of one or the other.

[6] For the provincial reforms of Augustus, see Marquardt, *Staatsverw.*, i. 402-422; Madvig, *Verf. d. R. Reichs*, ii. 7; Merivale, iv. cap. 32.

Financial reforms.

Liberal policy towards the provinces.

Italy and the provinces under the empire.

governor, which was open to every provincial, and in the right of petition. Under the Antonines, not the least laborious of the duties which devolved upon the emperor and his ministers was the daily one of hearing and deciding the innumerable cases sent up from the provinces. On the other hand, the growing frequency of imperial mandates and rescripts (see above, p. 705), dealing both with questions of general policy and with points of law, attests the close attention paid by all the better emperors to the government of the provinces and the increasing dependence of the governor on imperial guidance. Within the province Augustus curtailed the powers of legate and proconsul alike. In both cases there was a division of authority. By the side of the imperial legate was placed, as the highest financial authority, an imperial procurator, while the proconsul, in addition to the loss of all military control, was checked by the presence of the imperial officer, also styled procurator, to whom the care of the fiscal revenues was entrusted; finally, both legate and proconsul were deprived of that right of requisitioning supplies which, in spite of a long series of restrictive laws, had been the most powerful instrument of oppression in the hands of republican governors. The financial reforms of Augustus[1] are marked by the same desire to establish an equitable, orderly, and economical system, and by the same centralization of authority in the emperor's hands. The institution of an imperial census, or valuation of all land throughout the empire, and the assessment upon this basis of a uniform land tax, in place of the heterogeneous and irregular payments made under the republic, were the work of Augustus, though the system was developed and perfected by the emperors of the 2d century and by Diocletian. The land tax itself was directly collected, either by imperial officials or by local authorities responsible to them, and the old wasteful plan of selling the privilege of collection to publicani was henceforward applied only to such indirect taxes as the customs duties. The rate of the land tax was fixed by the emperor, and with him rested the power of remission even in senatorial provinces.[2] The effect of these reforms is clearly visible in the improved financial condition of the empire. Under the republic the treasury had been nearly always in difficulties, and the provinces exhausted and impoverished. Under the emperors, at least throughout the 1st century, in spite of a largely increased expenditure on the army, on public works, on shows and largesses, and on the machinery of government itself, the better emperors, such as Tiberius and Vespasian, were able to accumulate large sums, while the provinces show but few signs of distress. A reformed administration and an improved system of taxation were not the only boons for which the empire at large had to thank Augustus. While the republic had almost entirely neglected to develop the internal resources of the provinces, Augustus set the example of a liberal expenditure on public works, in the construction of harbours, roads, and bridges, the reclamation of waste lands, and the erection of public buildings.[3] The crippling restrictions which the republic had placed on freedom of intercourse and trade, even between the separate districts of a single province, disappeared under the empire, and the institution of the provincial councils, as centres of provincial unity, is one among many instances of the more liberal policy pursued by the emperors.[4] In the eyes of the republican statesmen the provinces were merely the estates of the Roman people, but from the reign of Augustus dates the gradual disappearance of the old pre-eminence of Rome and Italy. It was from the provinces that the legions were increasingly recruited; provincials rose to high rank as soldiers, statesmen, and men of letters;[5] the growing Roman civilization of the Western provinces and the thriving commerce of the populous cities of the East contrasted significantly with the degenerate cosmopolitanism of Rome, and with the dwindling population and decaying industry of Italy; while even into Rome and Italy the methods of administration formerly distinctive of the provinces found their way. From Augustus himself, jealous as he was of the traditions and privileges of the ruling Roman people, date the rule of an imperial prefect in the city of Rome, the division of Italy into regiones in the provincial fashion, and the permanent quartering there of armed troops.[6]

Marcus Aurelius, 180 A.D.

Conquest of Britain;

of Dacia.

The frontiers on the north.

For a century and a half the policy initiated by Augustus secured the peace and prosperity of the empire; of the emperors who ruled during that period the majority were able and vigorous administrators, and even the follies and excesses of Gaius, Claudius, and Nero did little harm beyond the limits of Rome and Italy. The firm rule of Vespasian repaired the damages inflicted by the wars of the rival emperors after Nero's death, and the abilities of Trajan, Hadrian, and the Antonines, if they failed to revive the flagging energies of the empire, at least secured tranquillity and good government. But few additions of importance were made to the territories of Rome. In Britain the work begun by Cæsar was taken up by Claudius, under whom the southern part of the island was constituted a province; the northern districts were subdued by Agricola (78–84 A.D.), and the limits of the province northward were finally fixed by the Wall of Hadrian (see BRITANNIA). The conquest of Dacia by Trajan (107) was provoked by the threatening attitude of the barbarian tribes on the lower Danube, and, though it remained part of the empire down to 256, its exposed position as lying beyond the Danube frontier rendered it always a source of weakness rather than strength.[7] To Trajan's reign also belongs the annexation of Arabia Petræa. Otherwise on the frontiers there was little change. In the north the revolt of Civilis (69–70 A.D.) owed its temporary success mainly to the confusion created by the rivalries of Otho, Vitellius, and Vespasian.[8] The connexion of the Rhine with the Danube frontier by a continuous wall, a work gradually carried out under the Flavian and Antonine emperors, was a strategical necessity, and involved no general advance of the Roman lines.[9] On the Rhine itself the peaceful state of affairs is sufficiently proved by the reduction of the force stationed there from eight legions to four; and it was only on the Danube that there was any pressure severe enough to strain the strength of the Roman defence. The presence of Trajan himself was required to quell the Dacians under their able king Decebalus, and, though his campaigns were followed by sixty years of peace, a force of ten legions was considered necessary to guard the Danubian frontier. Far more serious was the irruption of the Marcomanni and other tribes in the reign of Marcus Aurelius (162–175.).[10] The tide of barbaric invasion which then swept across the upper Danube and over the provinces of Rhætia, Noricum, and Pannonia, till it touched the Alps and the soil of Italy, was indeed driven back after fourteen years of war, but it first revealed to the Roman world the strength of the forces which were gathering unnoticed in the distant regions beyond the limits of the "Roman peace." In the East Rome and Parthia still faced each other upon the banks of the Euphrates, and contended, now by arms now by diplomacy, for supremacy in the debateable land of Armenia. Trajan's momentary acquisitions were abandoned by Hadrian, and on this side of the empire the first changes of importance on the frontier belong to the reign of Septimius Severus.[1] Within the frontiers the levelling and unifying process commenced by Augustus had steadily proceeded. A tolerably uniform provincial system covered the whole area of the empire. The client states had one by one been reconstituted as provinces, and even the government of Italy had been in many respects assimilated to the provincial type. The municipal system had spread widely; the period from Vespasian to Aurelius witnessed the elevation to municipal rank of an immense number of communities, not only in the old provinces of the West, in Africa, Spain, and Gaul, but in the newer provinces of the North, and along the line of the northern frontier; and everywhere under the influence of the central imperial authority there was an increasing uniformity in the form of the local constitutions, framed and granted as they all were by imperial edict.[2]

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[1] Marquardt, ii. 198 *sq.*, esp. p. 200, note 4, where the literature is given.

[2] Tac., *Ann.*, ii. 47.

[3] Suet., *Aug.*, 18, 47

[4] Marquardt, i. 365.

[5] Jung, *Romanische Landschaften* (Innsbruck, 1881); Budinszky, *Die Ausbreitung d. Lateinischen Sprache* (Berlin, 1881).

[6] Marquardt, i. 67; Suet., *Aug.*, 32.

[7] Mommsen, *R. G.*, v. 205–208.

[8] Tac., *Hist.*, iv.; Mommsen, *R. G.*, v. 116–131.

[9] For the "limes imperii," see Mommsen, v. 140–146; Cohausen, *Der Röm. Grenzwall* (Wiesbaden, 1884); Herzog, *Die Vermessung d. Röm. Grenzwalls* (Stuttgart, 1880).

[10] Mommsen, v. 209; *Vita Marci*, 12 *sq.*

of the Roman franchise;

Throughout the empire again the extension of the Roman franchise was preparing the way for the final act by which Caracalla assimilated the legal status of all free-born inhabitants of the empire,[3] and in the west and north this was preceded and accompanied by the complete Romanizing of the people in language and civilization.

of Roman law and civilization.

Moreover, the empire, that was thus becoming one in its administrative system, its laws, and its civilization, had as yet continued to enjoy peace and order. The burdens of military service fell on the frontier provinces, and only the echoes of the border wars reached the Mediterranean territories. Yet, in spite of the internal tranquillity and the good government which have made the age of the Antonines famous, we can detect signs of weakness.

Symptoms of decline.

Though the evils of excessive centralization were hardly felt while the central authority was wielded by vigorous rulers, yet even under Trajan, Hadrian, and the Antonines we notice a failure of strength in the empire as a whole, and a corresponding increase of pressure on the imperial government itself. The reforms of Augustus had given free play to powers still fresh and vigorous. The ceaseless labours of Hadrian were directed mainly to the careful husbanding of such strength as still remained, or to attempts at reviving it by the sheer force of imperial authority. Among the symptoms of incipient decline which not the most heroic efforts of the government could entirely remove were the growing depopulation especially of the central districts of the empire, the constant financial difficulties, the deterioration in character of the local governments in the provincial communities,[4] and the increasing reluctance exhibited by all classes to undertake the now onerous burden of municipal office. Lastly, the irruption of the Marcomanni, and the revolt of Avidius Cassius (174–175) in the Eastern provinces, anticipated the two most serious of the dangers which ultimately proved fatal to the empire.

Marcus Aurelius died in 180, and his death was followed by a century of war and disorder, during which nothing but the stern rule of soldier emperors, such as Septimius Severus, Decius, Claudius, Aurelian, and Probus saved the empire from dissolution. The want of any legal security for the orderly transmission of the imperial power had been partially supplied during the 2d century by the practice of adoption.

Inter dissen sions

But throughout the 3d century the Roman world witnessed a series of desperate conflicts between rival generals put forward by their respective legions as claimants for the imperial purple. Between the death of Severus in 211 and the accession of Diocletian in 284, no fewer than twenty-three emperors sat in the seat of Augustus, and of these all but three died violent deaths at the hands of a mutinous soldiery or by the orders of a successful rival. Of the remaining three, Decius fell in battle against the Goths, Valerian died a prisoner in the far East, and Claudius was among the victims of the chronic pestilence which added to the miseries of the time. The "tyrants," as the unsuccessful pretenders to the imperial purple were styled, reappear with almost unfailing regularity in each reign. The claims of Septimius Severus himself, the first and ablest of the soldier emperors, were disputed by Clodius Albinus in the West, and by Pescennius Niger in the East, and at the bloody battle of Lugdunum and the sack of Byzantium rival Roman forces, for the first time since the accession of Vespasian, exhausted each other in civil war.[5] In 237–238 six emperors perished in the course of a few months.

Reign Gallie 260–2

It was, however, during the reign of Gallienus (260–268) that the evil reached its height. The central authority was paralysed; the barbarians were pouring in from the North; the Parthians were threatening to overrun the Eastern provinces; and the legions on the frontiers were left to repel the enemies of Rome as best they could. A hundred ties bound them closely to the districts in which they were stationed; their permanent camps had grown into towns, they had families and farms; the unarmed provincials looked to them as their natural protectors, and were attached to them by bonds of intermarriage and by long intercourse. Now that they found themselves left to repel by their own efforts the invaders from without, they reasonably enough claimed the right to ignore the central authority which was powerless to aid them, and to choose for themselves "imperatores" whom they knew and trusted.

Tyrant in Gau

The first of these provincial empires was that established by Postumus in Gaul (259–272), and long maintained by his successors Victorinus and Tetricus.[6] Their authority was acknowledged, not only in Gaul and by the troops on the Rhine, but by the legions of Britain and Spain; and under Postumus at any rate (259–269) the existence of the Gallic empire was justified by the repulse of the barbarians and by the restoration of peace and security to the provinces of Gaul. On the Danube, in Greece, and in Asia Minor none of the "pretenders" enjoyed more than a passing success.

Odæna thus a Zenobi at Palmyra.

It was otherwise in the far East, where the Syrian Odænathus, prince of Palmyra,[7] though officially only the governor of the East (dux Orientis) under Gallienus, drove the Persians out of Asia Minor and Syria, recovered Mesopotamia, and ruled Syria, Arabia, Armenia, Cappadocia, and Cilicia with all the independence of a sovereign. Odænathus was murdered in 266. His young son Vaballathus succeeded him in his titles, but the real power was vested in his widow Zenobia, under whom not only the greater part of Asia Minor but even the province of Egypt was forcibly added to the dominions governed in the name of Gallienus by the Palmyrene prince.

Gallienus was murdered at Milan in 268, and the remaining sixteen years of this period were marked by the restoration of unity to the distracted empire. Palmyra was destroyed and Zenobia led a prisoner to Rome by

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[1] Mommsen, v. 409.

[2] Marquardt, i. 464 *sq.*; *cf.* esp., the "leges Salpensanae et Malacitanae"; *C. I. L.*, ii. 1963, 4; Bruns, *Fontes Juris Romani*, 130 (Berlin, 1879).

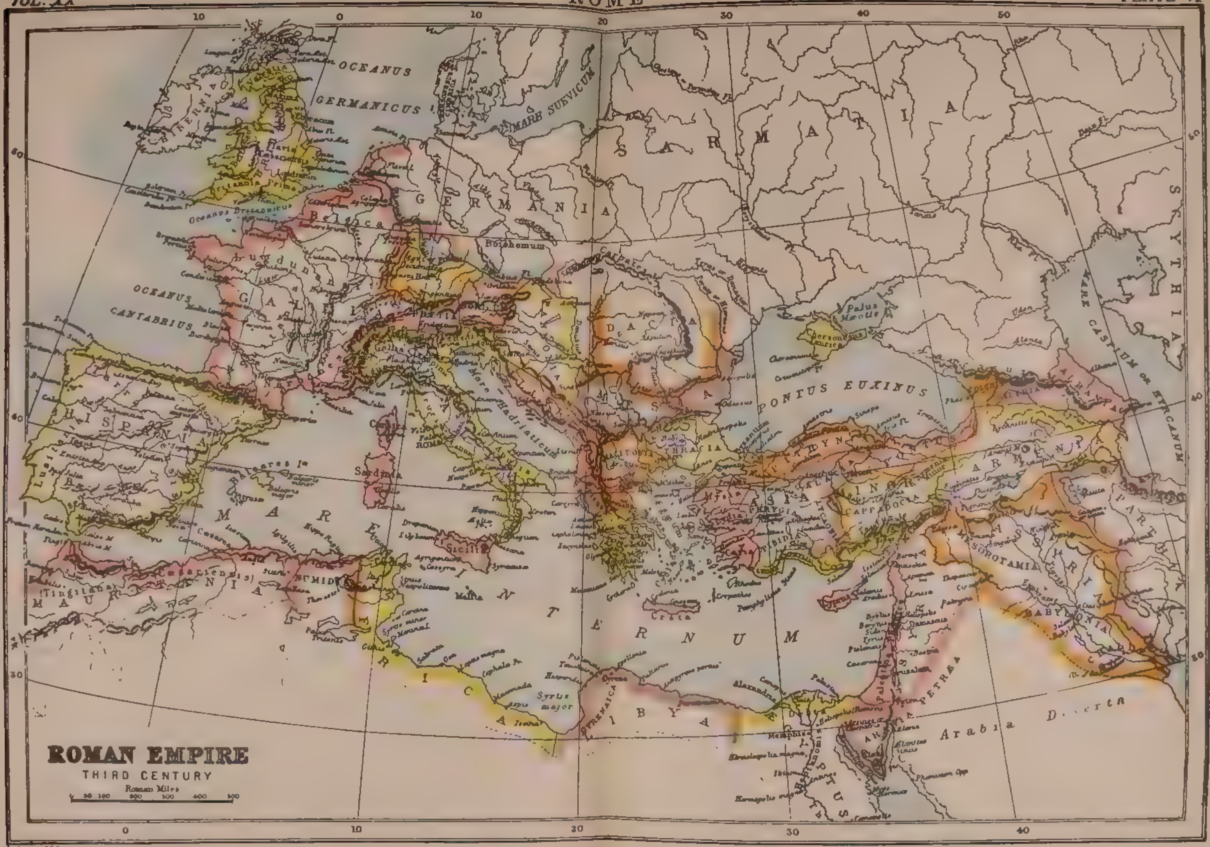
[3] Dio, lxxvii. 9 (211–217 A.D.).

[4] Pliny, *Epp. ad Trajanum.* For the "curatores" and "correctores" appointed in the 2d century, see Marquardt, i. 457 and notes.

[5] Gibbon, i. chap. v.; Schiller, *Gesch. d. Kaiserzeit*, i. (2) 660.

[6] Gibbon, i. chap. x.; Mommsen, v. 149; Schiller, i. (2) 827.

[7] Gibbon, i. chap. x.; Mommsen, v. 433; *cf.* PALMYRA.



ROMAN EMPIRE

THIRD CENTURY

Aurelian in 273; in the next year the Gallic empire came to an end by the surrender of Tetricus, and the successors of Aurelian—Tacitus, Probus, and Carus (275–282)—were at least rulers over the whole extent of the empire.

arbaric va- ions.

While rival generals were contending for the imperial purple, the very existence of the empire which they aspired to rule was imperilled by foreign invasion. As early as 236 a new enemy, the Alemanni, had crossed the Rhine, but had been driven back by the valour of Maximinus (238), and in the same year the Goths first appeared on the banks of the Danube. It was, however, during the period of internal dissension and civil war from the reign of Philip (244–249) to the accession of Claudius (268) that the barbarians saw and used their opportunity. From across the Rhine bands of Alemanni and Franks swept over Gaul and Spain, and even descended upon the coasts of Africa, until their raids were checked by the Gallic emperor Postumus (253–259). Far more destructive were the raids of the Goths.[1] Towards the close of the reign of Philip (247) they crossed the Danube, and overran Mœsia, Thrace, and Macedonia. In 251 they defeated and slew the emperor Decius; and, though his successor Gallus purchased a temporary peace by lavish gifts, the province of Dacia was finally lost to Rome. The Gothic raids by sea which began under Valerian (253–260) were even more destructive. Their fleets issuing from the ports of the Black Sea ravaged the seaboard of Asia Minor, and returned laden with the spoils of the maritime towns. In the reign of Gallienus (260–268) a fleet of five hundred sail appeared off the coasts of Greece itself; Athens, Corinth, Argos, and Sparta were sacked, and Epirus laid waste. On the death of Gallienus (268) the Goths once more marched southward, but in the new emperor Claudius they were confronted at last by an able and resolute opponent. They were decisively defeated and driven back across the Danube (269). Claudius died of the plague in the next year, but by his successor Aurelian Roman authority was established in Mœsia and Pannonia, and the Danube frontier was put once more in a state of efficient defence. Five years later (276) Probus repulsed a raid of the Franks and Alemanni, and restored peace on the Rhine. But the rule of Rome now stopped short, as in the reign of Tiberius, at the line of the two great rivers; all that had been acquired beyond since the time of Vespasian was abandoned, and on the further banks of the Rhine and Danube stood, in the place of friendly or subject tribes, a threatening array of hostile peoples.

he assani- e in arthia.

At the close of the 2d century the growing weakness of Parthia seemed to promise an immunity from danger on the Eastern frontier. But with the revolution which placed the Sassanidæ upon the throne the whole situation was changed.[2] The new dynasty was in blood and religion Persian; it claimed descent from Cyrus and Darius, and aspired to recover from Western hands the dominions which had once been theirs. In 230 Artaxares (Ardashir) had formally demanded from Severus Alexander the restitution of the provinces of Asia, had invaded Mesopotamia, now a Roman province, and even advanced into Syria. Twenty years later his successor Sapor again crossed the Euphrates; in 260, ten years after Decius's defeat by the Goths, the emperor Valerian was conquered and taken prisoner by the Persians, who poured triumphantly into Syria and captured Antioch. But here for the time their successes ended. Three years later Odænathus of Palmyra drove them back, and held the East securely in the name of Rome. On the fall of Zenobia (273) they gained possession for a time of Armenia and Mesopotamia, but were driven out by the emperor Carus (282), and the frontier line as fixed by Septimius Severus was restored.

Although any serious loss of territory had been avoided, the storms of the 3d century had told with fatal effect upon the general condition of the empire. The "Roman peace" had vanished; not only the frontier territories, but the central districts of Greece, Asia Minor, and even Italy itself, had suffered from the ravages of war, and the fortification of Rome by Aurelian was a significant testimony to the altered condition of affairs. War, plague, and famine had thinned the population and crippled the resources of the provinces. On all sides land was running waste, cities and towns were decaying, and commerce was paralysed. Only with the greatest difficulty were sufficient funds squeezed from the exhausted tax-payers to meet the increasing cost of the defence of the frontiers. The old established culture and civilization of the Mediterranean world rapidly declined, and the mixture of barbaric rudeness with Oriental pomp and luxury which marked the court, even of the better emperors, such as Aurelian, was typical of the general deterioration, which was accelerated by the growing practice of settling barbarians on lands within the empire, and of admitting them freely to service in the Roman army.

The reforms of Diocletian and Constantine.

PERIOD II.: 284–476 A.D.—(*a*) *From the Accession of Diocletian to the Death of Theodosius* (284–395 A.D.).—The work begun by Aurelian and Probus, that of fortifying the empire alike against internal sedition and foreign invasion, was completed by Diocletian and Constantine the Great, whose system of government, novel as it appears at first sight, was in reality the natural and inevitable outcome of the history of the previous century.[3] Its object was twofold, to give increased stability to the imperial authority itself, and to organize an efficient administrative machinery throughout the empire.

Augusti and Caesares.

In the second year of his reign Diocletian associated Maximian with himself as colleague, and six years later (292) the hands of the two "Augusti" were further strengthened by the proclamation of Constantius and Galerius as "Caesares." Precedents for such an arrangement might have been quoted from the earlier history of the empire;[4] and the considerations in favour of it at the time were strong. It divided the overwhelming burdens and responsibilities of government, without sacrificing the unity of the empire; for, although to each of the Augusti and Cæsars a separate sphere was assigned, the Cæsars were subordinate to the higher authority of the Augusti, and over all his three colleagues Diocletian claimed to exercise a paramount control. It at least reduced the too familiar risk of a disputed succession by establishing in the two Cæsars the natural successors to the higher position of Augusti, and finally it satisfied the jealous pride of the rival armies of the empire by giving them what they had so constantly claimed, imperatores of their own. The distribution of power between Diocletian and his colleagues followed those lines of division which the feuds of the previous century had only too clearly marked out. The armies of the Rhine, the Danube, and of Syria fell to the lot respectively of Constantius, Galerius, and Diocletian, the central districts of Italy and Africa to Maximian.[5] A second point in the new system was the complete and final emancipation of the imperial authority from all constitutional limitation and control. The last lingering traces of its republican origin disappear. The emperors from Diocletian onwards are autocrats in theory as well as in practice. The divided powers, the parallel jurisdictions, the defined prerogatives of the Augustan system have all vanished. There is but one legal authority throughout the empire, that of the emperor himself; and that authority is absolute. This avowed despotism Diocletian, following in the steps of Aurelian, hedged round with all the pomp and majesty of Oriental monarchy. The final adoption of the title "dominus," so often rejected by earlier emperors, the diadem on the head, the robes of silk and gold, the replacement of the republican salutation of a fellow citizen by the adoring prostration even of the highest in rank before their lord and master, were all significant marks of the new regime.[1] In the hands of this absolute ruler was placed the entire control of an elaborate administrative machinery. Most of the old local and national distinctions, privileges, and liberties which had once flourished within the empire had already disappeared under the levelling influence of imperial rule, and the levelling process was now completed. Roman citizenship had, since the edict of Caracalla, ceased to be the privilege of a minority. Diocletian finally reduced Italy and Rome to the level of the provinces: the provincial land-tax and provincial government were introduced into Italy,[2] while Rome ceased to be even in name the seat of imperial authority.[3] Throughout the whole area of the empire a uniform system of administration was established, the control of which was centred in the imperial palace, and in the confidential ministers who stood nearest the emperor's person.[4] Between the civil and military departments the separation was complete. At the head of the former, at least under the completed organization of Constantine, were the four prefects,[5] next below them the "vicarii," who had charge of the "dioceses," below these again the governors of the separate provinces ("praesides," "correctores," "consulares"),[6] under each of whom was a host of minor officials. Parallel with this civil hierarchy of prefects, vicars, præsides, and smaller "officiales" was the series of military officers, from the "magistri militum," the "duces," and "comites" downwards. But the leading features of both are the same. In both there is the utmost possible subordination and division of authority. The subdivision of provinces, begun by the emperors of the 2d century, was systematically carried out by Diocletian, and either by Diocletian or by Constantine the legion was reduced to one-fifth of its former strength.[7] Each official, civil or military, was placed directly under the orders of a superior, and thus a continuous chain of authority connected the emperor with the meanest official in his service. Finally, the various grades in these two imperial services were carefully marked by the appropriation to each of distinctive titles, the highest being that of "illustris," which was confined to the prefects and to the military magistri and comites, and to the chief ministers.[8]

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[1] Gibbon, i. chap. x.; Mommsen, v. 216.

[2] Gibbon, i. chap. viii.; Mommsen, v. 411; *cf.* PERSIA.

[3] See Gibbon, vol. iii., chap. xvii.; Marquardt, *Staatsverw.*, i. pp. 81, 336, 337, ii. 217 *sq.*; Madvig, *Verf. d. Röm. Reichs*, i. 585; Böcking, *Notitia Dignitatum*, Bonn, 1853; Hodgkin, *Italy and her Invaders*, i. 202 *sq.*; Preuss, *Diocletian*, Leipsic, 1869.

[4] Mommsen, *Staatsrecht*, ii. 1065 *sq.* Verus was associated with Marcus Aurelius as Augustus; Severus gave the title to his two sons. The bestowal of the title "Cæsar" on the destined successor dates from Hadrian. Mommsen, *op. cit.*, 1044.

[5] The division was as follows:—(1) Diocletian—Thrace, Egypt, Syria, Asia Minor; (2) Maximian—Italy and Africa; (3) Galerius—Illyricum and the Danube; (4) Constantius—Britain, Gaul, Spain. See Gibbon, ii. 68; Aurelius Victor, c. 39.

Levelling policy of Diocletian.

Degradation of Italy and Rome.

The new administrative system.

Effects of these reforms.

There can be little doubt that on the whole these reforms prolonged the existence of the empire, by creating a machinery which enabled the stronger emperors to utilize effectively all its available resources, and which even to some extent made good the deficiencies of weaker rulers. But in many points they failed to attain their object. Diocletian's division of the imperial authority among colleagues, subject to the general control of the senior Augustus, was effectually discredited by the twenty years of almost constant conflict which followed his own abdication (305–323). Constantine's partition of the empire among his three sons was not more successful in ensuring tranquillity, and in the final division of the East and West between Valens and Valentinian (364) the essential principle of Diocletian's scheme, the maintenance of a single central authority, was abandoned. The "tyrants," the curse of the 3d century, were far from unknown in the 4th, and their comparative paucity was due rather to the hold which the house of Constantine obtained upon the allegiance of their subjects than to the system of Diocletian. This system, moreover, while it failed altogether to remove some of the existing evils, aggravated others. The already overburdened financial resources of the empire were strained still further by the increased expenditure necessitated by the substitution of four imperial courts for one, and by the multiplication in every direction of paid officials. The gigantic bureaucracy of the 4th century proved, in spite of its undoubted services, an intolerable weight upon the energies of the empire.[9]

Constantine the Great.

Recognition of Christianity.

Constantinople.

Diocletian and Maximian formally abdicated their high office in 305. Eighteen years later Constantine, the sole survivor of six rival emperors, united the whole empire under his own rule. His reign of fourteen years was marked by two events of first-rate importance,—the recognition of Christianity as the religion of the empire,[10] and the building of the new capital at Byzantium. The alliance which Constantine inaugurated between the Christian church and the imperial government, while it enlisted on the side of the state one of the most powerful of the new forces with which it had to reckon, imposed a check, which was in time to become a powerful one, on the imperial authority. The establishment of the new "City of Constantine" as a second Rome, with a second senate, a prefect of the city, regiones, and even largesses, did more than proclaim once again the deposition of Rome from her old imperial position. It paved the way for the final separation of East and West by providing the former for the first time with a suitable seat of government on the Bosphorus. The death of Constantine in 337 was followed, as the abdication of Diocletian had been, by the outbreak of quarrels among rival Cæsars. Of the three sons of Constantine who in 337 divided the empire between them, Constantine the eldest fell in civil war against his brother Constans; Constans himself was, ten years afterwards, defeated and slain by Magnentius; and the latter in his turn was in 353 vanquished by Constantine's only surviving son Constantius. Thus for the second time the whole empire was united under the rule of a member of the house of Constantine. But in 355 Constantius reluctantly granted the title of Cæsar to his cousin Julian and placed him in charge of Gaul, where the momentary elevation of a tyrant, Silvanus, and still more the inroads of Franks and Alemanni, had excited alarm. But Julian's successes during the next five years were such as to arouse the jealous fears of Constantius. In order to weaken his suspected rival the legions under Julian in Gaul were suddenly ordered to march eastward against the Persians (360). They refused, and when the order was repeated replied by proclaiming Julian himself emperor and Augustus. Julian, with probably sincere reluctance, accepted the position, but the death of Constantius in 361 saved the empire from the threatened civil war. The chief importance of the career of Julian, both as Cæsar in Gaul from 355 to 361 and during his brief tenure of sole power (361–363), lies, so far as the general history of the empire is concerned, in his able defence of the Rhine frontier and in his Persian campaign; for his attempted restoration of pagan and in especial of Hellenic worships had no more permanent effect than the war which he courageously waged against the multitudinous abuses which had grown up in the luxurious court of Constantius.[1] But his vigorous administration in Gaul undoubtedly checked the barbarian advance across the Rhine, and postponed the loss of the Western provinces, while, on the contrary, his campaign in Persia, brilliantly successful at first, resulted in his own death, and in the immediate surrender by his successor Jovian of the territories beyond the Tigris won by Diocletian seventy years before. Julian died on June 26, 363, his successor Jovian on February 17, 364; and on the 26th of February Valentinian was acknowledged as emperor by the army at Nicæa. In obedience to the expressed wish of the soldiers that he should associate a colleague with himself, he conferred the title of Augustus upon his brother Valens, and the long-impending division of the empire was at last effected,—Valentinian became emperor of the West, Valens of the East. From 364 till his death in 375 the vigour and ability of Valentinian kept his own frontier of the Rhine tolerably intact, and prevented any serious disasters on the Danube. But his death, which deprived the weaker Valens of a trusted counsellor and ally, was followed by a crisis on the Danube, more serious than any which had occurred there since the defeat of Decius. In 376 the Goths, hard pressed by their new foes from the eastward, the Huns, sought and obtained the protection of the Roman empire. They were transported across the Danube and settled in Mœsia, but, indignant at the treatment they received, they rose in arms against their protectors. In 378 at Hadrianople Valens was defeated and killed; the victorious Goths spread with fire and sword over Illyricum, and advanced eastward to the very walls of Constantinople. Once more, however, the danger passed away. The skill and tact of Theodosius, who had been proclaimed emperor of the East by Gratian, conciliated the Goths; they were granted an allowance, and in large numbers entered the service of the Roman emperor. The remaining years of Theodosius's reign (382–395) were mainly engrossed by the duty which now devolved upon the emperor of the East of upholding the increasingly feeble authority of his colleague in the West against the attacks of pretenders. Maximus, the murderer of Gratian (383), was at first recognized by Theodosius as Cæsar, and left in undisturbed command of Gaul, Spain, and Britain; but, when in 386 he proceeded to oust Valentinian II. from Italy and Africa, Theodosius marched westward, crushed him, and installed Valentinian as emperor of the West. In the very next year, however, the murder of Valentinian (392) by Arbogast, a Frank, was followed by the appearance of a fresh tyrant in the person of Eugenius, a domestic officer and nominee of Arbogast himself. Once more Theodosius marched westward, and near Aquileia decisively defeated his opponents. But his victory was quickly followed by his own illness and death (395), and the fortunes of East and West passed into the care of his two sons Arcadius and Honorius.

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[1] Aurel. Victor, 39; Eutrop., ix. 26.

[2] Marquardt, *Staatsverw.*, i. 80-83, where a list is given of the seventeen so-called "provinciae" into which Italy, together with Sicily, Sardinia, and Corsica, was divided. Each had its own governor; the governors were subject to the two vicarii (vic. urbis, vic. Italiæ), and they in turn to the prefect of Italy, whose prefecture, however, included as well Africa and Western Illyricum.

[3] The seats of government for Diocletian and his three colleagues were Milan, Treves, Sirmium, Nicomedia.

[4] For these last, see Gibbon, ii. chap. xvii. p. 325; *cf.* also *Notitia Dignitatum* and Bocking's notes.

[5] "Praefecti praetorio." The four prefectures were Oriens, Illyricum, Italia, Gallia, to which must be added the prefectures of Rome and Constantinople.

[6] There were 12 dioceses and 116 provinces; *cf.* in addition to the authorities mentioned above, Bethmann-Hollweg, *Civil-Prozess*, iii.; Walter, *Gesch. d. Röm. Rechts*, i. pp. 425 *sq.* (Bonn, 1845).

[7] For this and other changes in the military organization, see Madvig, ii. 572; Marquardt, ii. 584 *sq.*

[8] The grades were as follows: illustres, spectabiles, clarissimi, perfectissimi, egregii. For the other insignia, see Madvig, ii. 590, and the *Notitia Dignitatum*.

[9] The passion for moulding everything after a uniform official pattern extended beyond the departments of civil and military administration to the professions and to society. Walter, *op. cit.*, i. 456; Marquardt, ii. 230 *sq.*

[10] Gibbon, ii. chaps. xv. xvi.; Ranke, *Weltgesch.*, iii. 525.

vian, 3-364.

alen-
ian I.,
4-375.

ivision
the
npire,
4.

alens,
4-378.

evolt of
e Goths.

neo-
sius I.,
8-395.

(*b*) *From the Death of Theodosius to the Extinction of the Western Empire* (395–476).—Through more than a century from the accession of Diocletian the Roman empire had succeeded in holding at bay the swarming hordes of barbarians. But, though no province had yet been lost, as Dacia had been lost in the century before, and though the frontier lines of the Rhine and the Danube were still guarded by Roman forts and troops, there were signs in plenty that a catastrophe was at hand.

Distress
of the
provinces
in the 4th
century.

From all the writers who deal with the 4th century comes the same tale of declining strength and energy. From Lactantius to Zosimus we have one long series of laments over the depression and misery of the provinces. To meet the increased expenditure necessary to maintain the legions, to pay the hosts of officials, and to keep up the luxurious splendour of the imperial courts, not only were the taxes raised in amount, but the most oppressive and inquisitorial methods were adopted in order to secure for the imperial treasury every penny that could be wrung from the wretched taxpayer. The results are seen in such pictures as that which the panegyrist Eumenius[2] draws of the state of Gaul (306–312) under Constantine, in the accounts of the same province under Julian fifty years later, in those given by Zosimus early in the 5th century, and in the stringent regulations of the Theodosian code, dealing with the assessment and collection of the taxes. Among the graver symptoms of economic ruin were the decrease of population, which seriously diminished not only the number of taxpayers, but the supply of soldiers for the legions;[3] the spread of infanticide; the increase of waste lands whose owners and cultivators had fled to escape the tax collector; the declining prosperity of the towns; and the constantly recurring riots and insurrections, both among starving peasants, as in Gaul,[4] and in populous cities like Antioch.[5] The distress was aggravated by the civil wars, by the rapacity of tyrants, such as Maxentius and Maximus, but above all by the raids of the barbarians, who seized every opportunity afforded by the dissensions or incapacity of the emperors to cross the frontiers and harry the lands of the provincials. Constantine (306–312), Julian (356–360), and Valentinian I. (364–375) had each to give a temporary breathing space to Gaul by repelling the Franks and Alemanni. Britain was harassed by Picts and Scots from the north (367–370), while the Saxon pirates swept the Northern seas and the coasts both of Britain and Gaul. On the Danube the Quadi, Sarmatæ, and above all the Goths, poured at intervals into the provinces of Pannonia and Mœsia, and penetrated to Macedon and Thrace. In the East, in addition to the constant border feud with Persia, we hear of ravages by the Isaurian mountaineers. and by a new enemy, the Saracens.[6]

Even more ominous of coming danger was the extent

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[1] In especial against the overweening influence of the eunuchs, an influence at once greater and more pernicious than even that of the imperial freedmen in the days of Claudius.

[2] Eumenius, *Paneg. Vet.*, vii. For Julian's administration in Gaul see Ammianus, xv.–xvii.; Julian's own oration to the Athenian senate and people, *Juliani Opera* (ed. Hertlein, Leipsic, 1875) pp. 346 *sq.*; Zosimus, ii. 38. *Cf.* Gibbon, ii. 333, 412; Jung, *Roman. Landschaften*, 264, 265; Hodgkin, i. 600 *sq.*

[3] Gibbon, ii. 323.

[4] For the Bagaudæ, see Gibbon, ii. 69, and Jung, *op. cit.*, 264, where the authorities are given.

[5] In 387; Hodgkin, i. 178.

[6] Amm. Marcel., xiv. 4.

Barbarians within the empire.

to which the European half of the empire was becoming barbarized. The policy which had been inaugurated by Augustus himself of settling barbarians within the frontiers had been taken up on a larger scale and in a more systematic way by the Illyrian emperors of the 3d century, and was continued by their successors in the 4th. In Gaul, in the provinces south of the Danube, even in Macedon and Italy, large barbarian settlements had been made—Theodosius in particular distinguishing himself by his liberality in this respect. Nor did the barbarians admitted during the 4th century merely swell the class of half-servile coloni. On the contrary, they not only constituted to an increasing extent the strength of the imperial forces, but won their way in ever-growing numbers to posts of dignity and importance in the imperial service. Under Constantine the palace was crowded with Franks.[1] Julian led Gothic troops against Persia, and the army with which Theodosius defeated the tyrant Maximus (388) contained large numbers of Huns and Alans, as well as of Goths. The names of Arbogast, Stilicho, and Rufinus are sufficient proof of the place held by barbarians near the emperor's person and in the control of the provinces and legions of Rome; and the relations of Arbogast to his nominee for the purple, Eugenius, were an anticipation of those which existed between Ricimer and the emperors of the latter half of the 5th century.

Barbaric invasions.

It was by barbarians already settled within the empire that the first of the series of attacks which finally separated the Western provinces from the empire and set up a barbaric ruler in Italy were made,[2] and it was in men of barbarian birth that Rome found her ablest and most successful defenders, and the emperors both of East and West their most capable and powerful ministers.

Alaric and the Visigoths.

The Visigoths whom Alaric led into Italy had been settled south of the Danube as the allies of the empire since the accession of Theodosius. The greater part of them were Christians at least in name, and Alaric himself had stood high in the favour of Theodosius. The causes which set them in motion are tolerably clear. Like the Germans of the days of Cæsar, they wanted land for their own, and to this land-hunger was evidently added in Alaric's own case the ambition of raising himself to the heights which had been reached before him by the Vandal Stilicho at Ravenna and the Goth Rufinus at Constantinople. The jealousy which existed between the rulers of the Western and Eastern empires furthered his plans. In the name of Arcadius, the emperor of the East, or at least with the connivance of Arcadius's minister Rufinus, he occupied the province of Illyricum, and from thence ravaged Greece, which according to the existing division of provinces belonged to the Western empire. Thence in 396 he retreated before Stilicho to Illyricum, with the command of which he was now formally invested by Arcadius, and which gave him the best possible starting point for an attack on Italy.[3] In 400 he led his people, with their wives and families, their waggons and treasure, to seek lands for themselves south of the Alps. But in this first invasion he penetrated no farther than the plains of Lombardy, and after the desperate battle of Pollentia (402)[4] he slowly withdrew from Italy, his retreat being hastened by the promises of gold freely made to him by the imperial government. Not until the autumn of 408 did Alaric again cross the Alps. Stilicho was dead; the barbarian troops in Honorius's service had been provoked into joining Alaric by the insane anti-Teutonic policy of Honorius and his ministers, and Alaric marched unopposed to Rome. This time, however, the payment of a heavy ransom saved the city. Several months of negotiation followed between Alaric and the court of Ravenna. Alaric's demands were moderate, but Honorius would grant neither lands for his people nor the honourable post in the imperial service which he asked for himself. Once more Alaric sat down before Rome, and this time the panic-stricken citizens discovered a fresh mode of escape. Attalus, a Greek, the prefect of the city, was declared Augustus, and Alaric accepted the post of commander-in-chief. But the incapacity of Attalus was too much for the patience of his barbarian minister and patron, and after a few months' reign Alaric formally deposed him and renewed his offers to Honorius. Again, however, they were declined, and Alaric marched to the siege and sack of Rome (410).[5] His death followed hard on his capture of Rome.

The Visigoths in Gaul.

Two years later (412) his successor Ataulf led the Visigoths to find in Gaul the lands which Alaric had sought in Italy. It is characteristic of the anarchical condition of the West that Ataulf and his Goths should have fought for Honorius in Gaul against the tyrants,[6] and in Spain against the Vandals, Suevi, and Alani; and it was with the consent of Honorius that in 419 Wallia, who had followed Ataulf as king of the Visigoths, finally settled with his people in south-western Gaul and founded the Visigothic monarchy.[7]

Vandals, Suevi, and Alani in Spain.

It was about the same period that the accomplished fact of the division of Spain between the three barbarian tribes of Vandals, Suevi, and Alani was in a similar manner recognized and approved by the paramount authority of the emperor of the West.[8] These peoples had crossed the Rhine at the time when Alaric was making his first attempt on Italy. A portion of the host led by Radagaisus[9] actually invaded Italy, but were cut to pieces by Stilicho near Florence (405); the rest pressed on through Gaul, crossed the Pyrenees, and entered the as yet untouched province of Spain.

Death of Honorius, 423.

Honorius died in 423. His authority had survived the dangers to which it had been exposed alike from the rivalry of tyrants and barbaric invasion, and with the single exception of Britain[10] no province had yet formally broken loose from the empire. But over a great part of the West this authority was now little more than nominal; throughout the major part of Gaul and in Spain the barbarians had settled, and barbarian states were growing up which still recognized the paramount supremacy of the emperor, but were in all essentials independent of his control. The question for the future was whether this relationship between the declining imperial authority and the vigorous young states which had planted the seeds of a fresh life in the provinces would be maintained.

The long reign of Valentinian III. (423–455) is marked

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[1] Amm., xv. 5.

[2] Accounts of the leading ancient authorities for the period 395–476 will be found prefixed to the several chapters in Hodgkin's *Italy and her Invaders*, vols. i. ii. (Oxford, 1880), especially vol. i. pp. 234, 277. Among standard modern authorities are Gibbon, vol. iv.; Tillemont, *Histoire des Empereurs*, vol. v.; Milman, *Latin Christianity*, vol. i.; Thierry, *Trois Ministres des fils de Theodose* (Paris, 1865), and *Histoire d'Attila*; Ranke, *Weltgeschichte*, vol. iv.,—compare especially his criticisms (iv. (2) 249 *sq.*) on Eusebius, Zosimus, Procopius, Jordanes, and Gregory of Tours. For the barbarian migrations see Wietersheim, *Gesch. d. Volkerwanderung*.

[3] Hodgkin, *op. cit.*, i. 275.

[4] According to others, 403; Hodgkin, i. 310.

[5] For the treatment of Rome by Alaric, see Hodgkin, i. 370, with Gibbon, iv. 101, and Ranke, *Weltgesch.*, iv. 246. Allowance must be made for the exaggerations of the ecclesiastical writers.

[6] For these "tyrants" see an article by Prof. Freeman in the first number of the new *English Historical Review* (Jan. 1886), pp. 53–86.

[7] The capital of the new state was Tolosa (Toulouse).

[8] Jung, *Die Romanische Landschaften*, 73 *sq.*

[9] For the connexion between his movement and those of Alaric and of the Vandals, see Hodgkin, i. 282, 304; Gibbon, iv. 46.

[10] The Roman troops were withdrawn from Britain by Constantine in 409; Jung, 305.

Vandal conquest of Africa.

by two events of first-rate importance,—the conquest of Africa by the Vandals[1] and the invasion of Gaul and Italy by Attila. The Vandal settlement in Africa was closely akin in its origin and results to those of the Visigoths and of the Vandals themselves in Gaul and Spain. Here as there the occasion was given by the jealous quarrels of powerful imperial ministers. The feud between Boniface, count of Africa, and Aetius, the "master-general" or "count of Italy," opened the way to Africa for the Vandal king Gaiseric (Genseric), as that between Stilicho and Rufinus had before set Alaric in motion westward, and as the quarrel between the tyrant Constantine and the ministers of Honorius had paved the way for the Vandals, Sueves, and Alans into Spain. In this case too, as in the others, the hunger for more land and treasure was the impelling motive with the barbarian invader, and in Africa, as in Gaul and Spain, the invaders' acquisitions were confirmed by the imperial authority which they still professed to recognize. It was in 429 that Gaiseric, king of the Vandals, crossed with his warriors, their families and goods, to the province of Africa, a province hitherto almost as untouched as Spain by the ravages of war. Thanks to the quarrels of Boniface and Aetius their task was an easy one. The defenceless province was easily and quickly overrun. In 435[2] a formal treaty secured them in the possession of a large portion of the rich lands which were the granary of Rome, in exchange for a payment probably of corn and oil. Carthage was taken in 439, and by 440 the Vandal kingdom was firmly established.

Attila and the Huns.

Battle of Châlons.

Eleven years later (451) Attila invaded Gaul, but this Hunnish movement was in a variety of ways different from those of the Visigoths and Vandals. Nearly a century had passed since the Huns first appeared in Europe, and drove the Goths to seek shelter within the Roman lines. Attila was now the ruler of a great empire in central and northern Europe,[3] and, in addition to his own Huns, the German tribes along the Rhine and Danube and far away to the north owned him as king. He confronted the Roman power as an equal; and, in marked contrast to the Gothic and Vandal chieftains, he treated with the emperors of East and West as an independent sovereign. His advance on Gaul and Italy threatened, not the establishment of yet one more barbaric chieftain on Roman soil, but the subjugation of the civilized and Christian West to the rule of a heathen and semi-barbarous conqueror. But Rome now reaped the advantages of the policy which Honorius had perhaps involuntarily followed. The Visigoths in Gaul, Christian and already half Romanized, rallied to the aid of the empire against a common foe. Attila, defeated at Châlons[4] by Aetius, withdrew into Pannonia (451). In the next year he overran Lombardy, but penetrated no farther south, and in 453 he died. With the murder of Valentinian III. (453) the western branch of the house of Theodosius came to an end, and the next twenty years witnessed the accession and deposition of nine emperors. The three months' rule of Maximus is memorable only for the invasion of Italy and the sack of Rome by the Vandals under Gaiseric. From 456-472 the actual ruler of Italy was Ricimer, the Sueve. Of the four emperors whom he placed on the throne, Majorian (457-461) alone played any imperial part outside Italy.[5] Ricimer died in 472, and two years later a Pannonian, Orestes, aspired to fill the place which Ricimer had occupied. Julius Nepos was deposed, and Orestes filled the vacancy by proclaiming as Augustus his own son Romulus. But Orestes's tenure of power was brief. The barbarian mercenaries in Italy determined to secure for themselves a position there such as that which their kinsfolk had won in Gaul and Spain and Africa. Their demand for a third of the lands of Italy was refused by Orestes,[6] and they instantly rose in revolt. On the defeat and death of Orestes they proclaimed their leader, Odoacer the Rugian,[7] king of Italy. Romulus Augustulus laid down his imperial dignity, and the court at Constantinople was informed that there was no longer an emperor of the West.[8]

The installation of a barbarian king in Italy was the natural climax of the changes which had been taking place in the West throughout the 5th century. In Spain, Gaul, and Africa barbarian chieftains were already established as kings. In Italy, for the last twenty years, the real power had been wielded by a barbarian officer. Odoacer, when he decided to dispense with the nominal authority of an emperor of the West, placed Italy on the same level of independence with the neighbouring provinces. But the old ties with Rome were not severed. The new king of Italy formally recognized the supremacy of the one Roman emperor at Constantinople, and was invested in return with the rank of "patrician," which had been held before him by Aetius and Ricimer. In Italy too, as in Spain and Gaul, the laws, the administrative system, and the language remained Roman.[9] But the emancipation of Italy and the Western provinces from direct imperial control, which is signalized by Odoacer's accession, has rightly been regarded as marking the opening of a new epoch. It made possible in the West the development of a Romano-German civilization; it facilitated the growth of new and distinct states and nationalities; it gave a new impulse to the influence of the Christian church, and laid the foundations of the power of the bishops of Rome.

Chronological Table of the Roman Emperors.

B.C.	
27	Augustus
A.D.	
14.	Tiberius.
37.	Caligula.
41.	Claudius.
54.	Nero.
68, 69.	Galba. Otho. Vitellius.
69.	Vespasian.
79.	Titus.
81.	Domitian.
96.	Nerva.
98.	Trajan.
117.	Hadrian.
138.	Antoninus Pius.
161.	Marcus Aurelius.
180.	Commodus.
A.D.	
193.	Pertinax. Didius Julianus. Septimius Severus.
211.	Caracalla.
217.	Macrinus.
218.	Elagabalus.
221.	Severus Alexander.
235.	Maximinus.
238.	The two Gordiani. Maximus and Balbinus. Gordian III.
244.	Philip.
249.	Decius.
	Gallus and Æmilianus.
253.	Valerian.
A.D.	
260.	Gallienus.
268.	Claudius.
270.	Aurelian.
275.	Tacitus.
276.	Probus.
282.	Carus.
283.	Carinus and Numerian.
284.	Diocletian (Maximian associated with him, 286).
305.	Constantius and Galerius, Augusti.
323.	Constantine I.
353.	Constantius II.
361.	Julian.
363.	Jovian.

Division of the Empire.

A.D.	West.	A.D.	East.
364.	Valentinian I.	364.	Valens.
375.	Gratian and Valentinian II.	379.	Theodosius I.
383.	Valentinian II.		
392.	Theodosius I.		
395.	Honorius.	395.	Arcadius.
423.	Valentinian III.	408.	Theodosius II
455.	Maximus.	450.	Marcian.
455.	Avitus.	457.	Leo I.
457.	Majorian.	474.	Leo II.
461.	Severus.		
467.	Anthemius.		
472.	Olybrius.		
473.	Glycerius.		
474.	Julius Nepos.		
475.	Romulus Augustulus.		

(H. F. P.)

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[1] Hodgkin, ii. 233-290; Gibbon, iv. 176-188, 256; Jung, 183. The leading ancient authority is Procopius. See Ranke, iv. (2) 285; Papencordt, *Gesch. d. Vandal. Herrschaft in Africa*.

[2] Prosper, 659; Ranke, iv. (1) 282.

[3] The principal ancient authorities are Priscus (Müller, *Fragm. Hist. Gr.*, iv. 69); Jordanes (ed. Mommsen, 1882); Sidonius Apollinaris (ed. Barret, Paris, 1878).

[4] For the decisive battle of Châlons, see Gibbon, iv. 234 *sq.*; Hodgkin, ii. 138, note A, 161, where the topography is discussed.

[5] Majorian was the last Roman emperor who appeared in person in Spain and Gaul.

[6] Hodgkin, i. 531.

[7] The nationality of Odoacer is a disputed point. Hodgkin, i. 528: Ranke, iv. (1) 372.

[8] Gibbon, iv. 298. The authority for the embassy to Zeno is Malchus (Müller, *Fragm. Hist. Gr.*, iv. 119).

[9] Gibbon, iv. 302; Jung, 66 *sq.*; Bryce, *Holy Roman Empire*, 24-33. See also ROMAN LAW.

SECTION II.—HISTORY OF THE ROMAN REPUBLIC IN THE MIDDLE AGES.

The history of the Roman republic during the Middle Ages has yet to be written, and only by the discovery of new documents can the difficulties of the task be completely overcome. Although very different in its origin, the Roman republic gradually assumed the same form as the other Italian communes, and with almost identical institutions. But, owing to the special local conditions amid which it arose, it maintained a distinct physiognomy and character. The deserted Campagna surrounding the city checked any notable increase of trade or industry, and prevented the establishment of the guilds on the solid footing that elsewhere made them the basis and support of the commune. There was also the continual and oppressive influence of the empire, and, above all, the presence of the papacy, which often appeared to absorb the entire vitality of the city. At such moments the commune seemed annihilated, but it speedily revived and reasserted itself. Consequently there are many apparent gaps in its history, and we have often extreme difficulty in discovering the invisible links connecting the visible fragments.

Even the aristocracy of Rome had a special stamp. In the other republics, excepting Venice, it was feudal, of German origin, and in perpetual conflict with the popular and commercial elements which sought its destruction. The history of municipal freedom lay in this struggle. But the infiltration of Teutonic and feudal elements broke up the ancient aristocracy of Rome, and left it at the mercy of the people. Then the popes, by the bestowal of lucrative posts, rich benefices, and vast estates, and, above all, by raising many nobles to the purple, introduced new blood into the Roman aristocracy, and endued it with increasing strength and vitality. Always divided, always turbulent, this irrepressible body was a continual source of discord and civil war, of permanent confusion and turmoil. Amidst all these difficulties the commune struggled on, but never succeeded in long preserving a regular course or administration. What with continual warfare, attacks on the Capitol, and consequent slaughter, pillage, and incendiarism, it is no wonder that so few original documents are left to illustrate the history of the Roman republic. Nor have chroniclers and historians done much to supply this want, since, in treating of Roman affairs, their attention is mainly devoted to the pope and the emperor. Nevertheless we will attempt to connect in due order all the facts gleaned from former writers and published records.

The removal of the seat of the empire to Constantinople effected a radical change in the political situation of Rome; nor was this change neutralized by the formation of the weak Western empire soon to be shattered by the Germanic invasions. But we still find Roman laws and institutions; and no sign is yet manifest of the rise of a mediæval municipality. The earliest germ of one is seen during the barbarian invasions. Of these we need only enumerate the four most important,—those of the Goths, Byzantines, Lombards, and Franks. The Gothic rule merely superposed upon the Roman social order a Teutonic stratum, that never penetrated beneath its surface. The Goths always remained a conquering army; according to the German custom, they took possession of one third of the vanquished territory, but, while forbidding the Romans to bear arms, left their local administration intact. The senate, the *curiae*, the principal magistrates, both provincial and municipal, the prefect of the city, and the Roman judges enforcing the enactments of the Roman law were all preserved. Already, under the empire, the civil power had been separated from the military, and this separation was maintained. Hence there was no visible change in the constitution of the state. Only, now there were conquered and conquerors. All real and effective power was on the side of brute force, and the Goths alone bore arms. In every province they had their *comites*, or heads of the army, who had judicial power over their countrymen, especially in criminal cases. Here then was a combination of civil and military jurisdiction altogether contrary to the Roman idea. Nor can it be denied that the comites, as chiefs of the armed force, necessarily exerted a direct or indirect influence on the civil and administrative power of the provinces, and especially upon the collection of the imposts. The civil arm, being virtually subordinate to the military, suffered unavoidable change. Notwithstanding the praise lavished on Theodoric, the kingdom founded by him in Italy had no solid basis. It was composed of two nations differing in race and traditions and even in religion, since the Goths were Arians and the Romans Catholics. The latter were sunk in degeneracy and corruption; their institutions were old and decrepit. It was necessary to infuse new life into the worn-out body. This was difficult, perhaps impossible; and at any rate Theodoric never attempted the task. Little wonder then if the Gothic kingdom succumbed to the Byzantine hordes from Constantinople.

The Byzantine rule.

The wars of Belisarius and Narses against the Goths lasted twenty years (535–555 A.D.), caused terrible slaughter and devastation in Italy, and finally subjected her to Constantinople. In place of a Gothic king she was now ruled by a Greek patrician, afterwards entitled the exarch, who had his seat of government at Ravenna as lieutenant of the empire. In the chief provincial cities the ruling counts were replaced by dukes, subordinate to the exarch; and the smaller towns were governed by military tribunes. Instead of dukes, we sometimes find *magistri militum*, apparently of higher rank. The *praefectus praetorio* of Italy, likewise a dependant of the exarch, was at the head of the civil administration. The pragmatic sanction (554), promulgating the Justinian code, again separated the civil from the military power, which was no longer allowed to intervene in the settlement of private disputes, and, by conferring on the bishops the superintendence of and authority over the provincial and municipal government, soon led to the increase of the power of the church, which had already considerable influence.

The new organization outwardly resembled that of the Goths: one army had been replaced by another, the counts by dukes; there was an exarch instead of a king; the civil and military jurisdictions were more exactly defined. But the army was not, like that of the Goths, a conquering nation in arms; it was a Græco-Roman army, and did not hold a third of the territory which was now probably added to the possessions of the state. The soldiery took its pay from Constantinople, whence all instructions and appointments of superior officers likewise proceeded. In Rome we find a *magister militum* at the head of the troops. The Roman senate still existed, but was reduced to a shadow. Theodoric had left it intact until he suspected it of hostile designs and dealings with the Byzantines, but then began to persecute it, as was proved by the wretched fate of Boetius and Symmachus. Nevertheless the senate survived, added the functions of a *curia* or municipal council to those of a governmental assembly, and took part in the election of the pope—already one of the chief affairs of Rome. So many senators, however, were slaughtered during the Byzantine war that it was commonly believed to be extinct. The pragmatic sanction, conferring on senate and pope the superintendence of weights and measures in Italy, is a convincing proof to the contrary, although, in the general chaos, now that

Rome was a mere provincial city, constantly exposed to attack, we may imagine to what the senate was reduced.

All Roman institutions were altered and decayed; but their original features were still to be traced, and no heterogeneous element had been introduced into them. The first dawn of a completely new epoch can only be dated from the invasion of the Lombards (568–572). Their conquest of a large portion of Italy was accompanied by the harshest oppression. They abolished all ancient laws and institutions, and not only seized a third of the lands, but reduced the inhabitants to almost utter slavery. But, in the unsubdued parts of the country—namely, in Ravenna, Rome, and the maritime cities—a very different state of things prevailed. The necessity for self-defence and the distance of the empire, now too worn out to render any assistance, compelled the inhabitants to depend solely on their own strength. Thus, certain maritime cities, such as Naples, Amalfi, Pisa, and Venice, soon attained to a greater or less degree of liberty and independence.

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A special state of things now arose in Rome. We behold the rapid growth of the papal power and the continual increase of its moral and political influence. This had already begun under Leo I., and been further promoted by the pragmatic sanction. Not only the superintendence but often the nomination of public functionaries and judges was now in the hands of the popes. And the accession to St Peter's chair of a man of real genius in the person of Gregory I., surnamed the Great, marked the commencement of a new era. By force of individual character, as well as by historic necessity, this pope became the most potent personage in Rome. Power fell naturally into his hands; he was the true representative of the city, the born defender of church and state. His ecclesiastical authority, already great throughout Italy, was specially great in the Roman diocese and in southern Italy. The continual offerings of the faithful had previously endowed the church with enormous possessions in the province of Rome, in Sicily, Sardinia, and other parts. The administration of all this property soon assumed the shape of a small government council in Rome. This protected and succoured the oppressed, settled disputes, nominated judges, and controlled the ecclesiastical authorities. The use made by the pope of his revenues greatly contributed to the increase of his moral and political authority. When the city was besieged by the Lombards, and the emperor left his army unpaid, Gregory supplied the required funds and thus made resistance possible. And, when the defence could be no longer maintained, he alone, by the weight of his personal influence and the payment of large sums, induced the Lombards to raise the siege. He negotiated in person with Agilulph, and was recognized by him as the true representative of the city. Thus Rome, after being five times taken and sacked by the barbarians, was, on this occasion, saved by its bishop. The exarch, although unable to give any help, protested against the assumption of so much authority by the pope; but Gregory was no usurper, and his attitude was the natural result of events. "For twenty-seven years"—so wrote this pontiff to the imperial government of Constantinople—"we lived in terror of the Longobards, nor can I say what sums we had to pay them. There is an imperial treasurer with the army at Ravenna; but here it is I who am treasurer. Likewise I have to provide for the clergy, the poor, and the people, and even to succour the distress of other churches."

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It was at this moment that the new Roman commune began to take shape and acquire increasing vigour owing to its distance from the seat of the empire and its resistance to the Lombard besiegers. Its special character was now to be traced in the preponderance of the military over the civil power. A Roman element had penetrated into the army, which was already possessed of considerable political importance. The prefect of Rome loses authority and seems almost a nullity compared with the magister militum. Hardly anything is heard of the senate. "Quia enim Senatus deest, populus interiit," exclaims Gregory in a moment of despair. The popes now make common cause with the people against the Lombards on the one hand and the emperor on the other. But they avoid an absolute rupture with the empire, lest they should have to face the Lombard power without any prospect of help. Later, when the growing strength of the commune becomes menacing, they remain faithful to the empire in order not to be at the mercy of the people. It was a permanent feature of their policy never to allow the complete independence of the city until they should be its sole and absolute masters. But that time was still in the future. Meanwhile pope and people joined in the defence of their common interests.

This alliance was cemented by the religious disputes of the East and the West. First came the Monothelite controversy regarding the twofold nature of Christ. In order to compel obedience to his edict, the emperor commanded the exarch to take energetic measures, and, provided he could secure the favour of the Roman army, to actually seize the person of Pope Martin I. (649–654). A long and violent struggle ensued, in which the people of Rome and of other Italian cities sided so vigorously with the popes that John VI. (701–705) had to interpose in order to release the exarch from captivity and prevent a definitive rupture with the empire. Later (710–711) Ravenna revolted against the emperor, organized its armed population under twelve flags, and almost all the cities of the exarchate joined in a resistance that was the first step towards the independence of the Italian communes. A still fiercer religious quarrel then broke out concerning images. Pope Gregory II. (715–731) opposed the celebrated edict of the iconoclastic emperor Leo the Isaurian. Venice and the Pentapolis took up arms in favour of the pope, and elected dukes of their own without applying to the emperor. Again public disorder rose to such a pitch that the pope was obliged to check it lest it should go too far.

The duchy of Rome

In the midst of these warlike tumults a new constitution, almost a new state, was being set up in Rome. During the conflict with Philippicus, the Monothelite and heretical emperor who ascended the throne in 711, the *Liber Pontificalis* makes the first mention of the duchy of Rome (*ducatus Romanae urbis*), and we find the people struggling to elect a duke of their own. In the early days of the Byzantine rule the territory appertaining to the city was no greater than under the Roman empire. But, partly through the weakness of the government of Constantinople, and above all through the decomposition of the Italian provinces under the Lombards, who destroyed all unity of government in the peninsula, this dukedom was widely extended, and its limits were always changing in accordance with the course of events. It was watered by the Tiber, and stretched into Tuscia to the right, starting from the mouth of the Marta, by Tolfa and Bleda, and reaching as far as Orte. Viterbo was a frontier city of the Lombards. On the left the duchy extended into Latium as far as the Garigliano. It spread very little to the north-east and was badly defended on that side, inasmuch as the duchy of Spoleto reached to within fourteen miles of the Salara gate. On the other side, towards Umbria, the river Nera was its boundary line.

The constitution of the city now begins to show the results of the conditions amid which it took shape. The separation of the civil from the military power has entirely disappeared. This is proved by the fact that, after the year 600, there is no further mention of the prefect. His office still survived, but with a gradual change of functions, until, in the 8th century, he once more appears as president of a criminal tribunal. The constitution of the duchy and of the new republic formed during the wars with the Lombards and the exarch was substantially of an aristocratico-military nature. At its head was the duke, first elected by the emperor, then by the pope and the people, and, as his strength and influence grew with those of the commune, he gradually became the most respected and powerful personage in Rome. The duke inhabited the palace of the Cæsars on the Palatine Hill, and had both the civil and the military power in his hands; he was at the head of the army, which, being composed of the best citizens and highest nobility of Rome, was a truly national force. This army was styled the *felicissimus* or *florens exercitus Romanus* or also the *militia Romana*. Its members never lost their citizen stamp; on the contrary they formed the true body of the citizens. We find mention of other *duces* in Rome, but these were probably other leaders or superior officers of the army. Counts and tribunes are found in the subject cities bound to furnish aid to the capital. In fact during the pontificate of Sergius II. (844), when the duchy was threatened by a Saracenic invasion, they were requested to send troops to defend the coast, and as many soldiers as possible to the city.

The different classes of society in Rome.

At that time the inhabitants of Rome were divided into four principal classes—clergy, nobles, soldiers, and simple citizens. The nobles were divided into two categories, first the genuine *optimates*, *i.e.*, members of old and wealthy families with large estates, and filling high, and often hereditary, offices in the state, the church, and the army. These were styled *proceres* and *primates*. The second category comprised landed proprietors, of moderate means but exalted position, mentioned as *nobiles* by Gregory I., and constituting in fact a numerous petty nobility and the bulk of the army. Next followed the citizens, *i.e.*, the commercial class, merchants, and craftsmen, who, having as yet no fixed organization and but little influence, were simply designated as *honesti cives*. These, however, were quite distinct from the plebeians, *plebs*, *vulgus populi*, *viri humiles*, who in their turn ranked above bondsmen and slaves. The honesti cives did not usually form part of the army, and were only enrolled in it in seasons of emergency. Nevertheless the army was not only national, but became increasingly democratic, so that in the 10th century it included every class of inhabitants except churchmen and slaves. At that period we sometimes find the whole people designated as the *exercitus*, those actually under arms being distinguished as the *militia exercitus Romani*. This again was divided into bands or "numbers," *i.e.*, regiments, and also, in a manner peculiar to Rome, into *scholae militum*. These scholae were associations derived from antiquity, gaining strength and becoming more general in the Middle Ages as the central power of the state declined. There were scholae of notaries, of church singers, and of nearly every leading employment; there were scholae of foreigners of diverse nationalities, of Franks, Lombards, Greeks, Saxons, &c. Even the trades and crafts began to form scholae. These were at first very feeble institutions, and only later gained importance and became guilds. As early as the 8th century there were scholae militum in the army, which was thus doubly divided. But we have no precise definition of their functions. They were *de facto* corporations with separate property, churches, and magistrates of their own. The latter were always optimates, and guarded the interests of the army. But the real chiefs of the bands or *numeri* were the duces or tribunes, and under the Franks the latter became comites. These chiefs were styled *magnifici consules*, *optimates de militia*, often too *judices de militia*, since, as was the custom of the Middle Ages, they wielded political and judicial as well as military authority. The title of consul was now generally given to superior officers, whether civil or military. The importance of the scholae militum began to decline in the 10th century; towards the middle of the 12th they disappeared altogether, and, according to Papencordt, were last mentioned in 1145. It is probable that the scholae militum signified local divisions of the army, corresponding with the city wards, which were twelve in number during the 10th and 11th centuries, then increased to thirteen, and occasionally to fourteen. It is certain that from the beginning the army was distributed under twelve flags; after the scholae had disappeared, we find it classified in districts, which were subdivided into companies. The division of cities into quarters, *sestieri* or *rioni*, corresponding with that of the army, and also with that of the municipal government, was the common practice of Florence, Siena, and almost all the Italian communes. But, while usually losing importance as the guilds acquired power, in Rome the insignificance of the guilds added to the strength of the *regioni* or *rioni*, which not only became part of the army but finally grasped the reins of government. This was a special characteristic of the political constitution of the Roman commune.

The senate in the Middle Ages

We now come to a question of weightier import for all desiring to form a clear idea of the Roman government at that period. What had become of the senate? It had undoubtedly lost its original character now that the empire was extinct. But, after much learned discussion, historical authorities are still divided upon the subject. Certain Italian writers of the 18th century—Vendettini, for example—asserted with scanty critical insight that the Roman senate did not disappear in the Middle Ages. The same opinion backed by much learned research was maintained by the great German historian Savigny. And Leo, while denying the persistence of the curia in Lombard Italy, adhered to Savigny's views as regarded Rome. Papencordt did the same, but held the Roman senate to be no more than a curia. This judgment was vigorously contested, first by Hegel and Giesebrecht, then by Gregorovius. These writers believe that after the middle of the 6th century the senate had a merely nominal existence. According to Gregorovius its last appearance was in the year 579. After that date it is mentioned in no documents, and the chroniclers are either equally silent or merely allude to its decay and extinction. In the 8th century, however, the terms *senator*, *senatores*, *senatus* again reappear. We find letters addressed to Pippin, beginning thus: *Omnis senatus atque universi populi generalitas.* When Leo III. returned from Germany he was met by *tam proceres clericorum cum omnibus clericis, quamque optimates et senatus, cunctaque militia* (see Anastasius, in Muratori, vol. iii. 198 *c*). But it has been noted that the senate was never found to act as a political assembly; on occasions when it might have been mentioned in that capacity we hear nothing of it, and only meet with it in ceremonials and purely formal functions. Hence the conclusion that the term senator was used in the sense of noble, senatus of nobility, and no longer referred to an institution but only to a class of the citizens. Even when we find that Otho III. (who sought to revive all the ancient institutions of Rome) addressed an edict to the "Consuls and Senate of Rome," and read that the laws of St Stephen were issued *senatus decreto*, the learned Giesebrecht merely remarks that no important changes in the Roman constitution are to be attributed to the consuls and senate introduced by Otho III Thus for the next glimpse of the senate we must pass to the 12th century, when it was not only reformed, as some writers believe, but entirely reconstituted.

But in this case a serious difficulty remains to be disposed of. Gregorovius firmly asserts that the nobles acquired great power between the 7th and 10th centuries, not only filling the highest military, judicial, and ecclesiastical offices, "but also directing the municipal government, presumably with the prefect at their head." He further adds:—"Notwithstanding the disappearance of the senate, it is difficult to suppose that the city was without governing magistrates, or without a council." Thus, after the 7th century, the optimates at the head of the army were also at the head of the citizens, and "formed a communal council in the same manner in which it was afterwards formed by the *banderesi*."[1] Now, if the nobles were called senatores, and the nobility senatus, and if this body of nobles met in council to administer the affairs of the republic, there is no matter for dispute, inasmuch as all are agreed that the original senate must have had a different character from the senate of the Middle Ages. And, since the absence of all mention of a prefect after the 7th century is not accepted as a proof of his non-existence, and we find him reappear under another form in the 8th century, so the silence as to the senate after the year 579, the fresh mention of it in the 8th century, and its reappearance in the 12th as a firmly reconstituted body reasonably lead to the inference that, during that time, the ancient senate had been gradually transformed into the new council. Its meetings must have been held very irregularly, and probably only in emergencies when important affairs had to be discussed, previously to bringing them before the parliament or general assembly of the people. Historians are better agreed as to the significance of the term *consul*. At first this was simply a title of honour bestowed on superior magistrates, and retained that meaning from the 7th to the 11th century, but was then—as in other Italian cities—only given to the chief officer of the state.

During this period the Roman constitution was very simple. The duke, commanding the army, and the prefect, presiding over the criminal court, were the chiefs of the republic; the armed nobility constituted the forces, filled all superior offices, and occasionally met in a council called the senate, though it had no resemblance to the senate of older times. In moments of emergency a general parliament of the people was convoked. This constitution differed little from that of the other Italian communes, where, in the same way, we find all the leading citizens under arms, a parliament, a council, and one or more chiefs at the head of the government.

But Rome had an element that was lacking elsewhere. We have already noted that in the provinces, the administrators of church lands were important personages, and exercised during the Middle Ages, when there was no exact division of power, both judicial and political functions. It was very natural that the heads of this vast administration resident in Rome should have a still higher standing, and in fact, from the 6th century, their power increased to such an extent that in the times of the Franks they already formed a species of papal cabinet with a share and sometimes a predominance in the affairs of the republic. There were seven principal administrators, but two of them held the chief power,—the *primicerius notariorum* and the *secundicerius*, *i.e.*, the first and under secretaries of state. When, on the constitution of the new empire, these ministers were declared to be palatine or imperial as well as papal officials, the primicerius and the secundicerius were also in waiting on the emperor, who sat in council with them, when in Rome. Next came the *arcarius*, or treasurer; the *sacellarius*, or cashier; the *protoscriniarius*, who was at the head of the papal chancery; the *primus defensor*, who was the advocate of the church, and administered its possessions. Seventh and last came the *nomenclator*, or *adminiculator*, who pleaded the cause of widows, orphans, and paupers. There were also some other officials, such as the *vestiarius*, the *vicedominus* or steward, the *cubicularius* or majordomo, but these were of inferior importance. They were ecclesiastics, but not bound to be in priest's orders. The first seven were those specially known as *proceres clericorum* and oftener still as *judices de clero*, since they speedily assumed judicial functions and ranked among the chief judges of Rome. But as ecclesiastics they did not give decisions in criminal cases. Thus Rome had two tribunals, that of the *judices de clero*, or *ordinarii*, presided over by the pope, and that of the *judices de militia*, leaders of the army, dukes and tribunes, also bearing the generic title of consuls. First appointed by the exarch and then frequently by the pope, these decided both civil and criminal cases. In the latter they were sole judges under the presidency of the prefect.

The pope and the papal power.

The pope was thus at the head of a large administrative body with judicial and civil powers that were continually on the increase, and, in addition to his moral authority over Christendom, was possessed of enormous revenues. So in course of time he considered himself the real representative of the Roman republic. Gregory II. (715–731) accepted in the name of the republic the submission of other cities, and protested against the conquest by the Lombards of those already belonging to Rome. He seemed indeed to regard the territory of the duchy as the patrimony of the church. The duke was always at the head of the army, and, officially, was always held to be an imperial magistrate. But the empire was now powerless in Italy. Meanwhile the advance of the Lombards was becoming more and more threatening; they seized Ravenna in 751, thus putting an end to the exarchate, and next marched towards Rome, which had only its own forces and the aid of neighbouring cities to rely upon. To avoid being crushed by the brute force of a foreign nation unfit to rule, and only capable of oppression and pillage, it was necessary to make an energetic stand.

The popes appeal to the Franks for aid.

Accordingly the reigning pope, Stephen II. (752–757), appealed to Pippin, king of the Franks, and concluded with that monarch an alliance destined to inaugurate a new epoch of the world's history. The pope consecrated Pippin king of the Franks, and named him *patricius Romanorum*. This title, as introduced by Constantine, had no longer the ancient meaning, but now became a sign of lofty social rank. When, however, it was afterwards conferred on barbarian chieftains such as Odoacer and Theodoric, and then on the representative of the Byzantine empire in Italy, it acquired the meaning of a definite dignity or office. In fact the title was now given to Pippin as defender of the church, for the pope styled him at the same time *patricius Romanorum* and *defensor* or *protector ecclesiae*. And the king pledged himself not only to defend the church but also to wrest the exarchate and the Pentapolis from the Lombards and give them to Rome, or rather to the pope, which came to the same thing. This was considered as a restitution made to the head of the church, who was also the representative of the republic and the empire. And, to preserve the character of a restitution, the famous "donation of Constantine" was invented during this period (752–

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[1] Gregorovius, *Geschichte*, vol. ii. p. 427–8 and note (2d ed.).

777). Pippin brought his army to the rescue (754–755) and fulfilled his promise. The pope accepted the donation in the name of St Peter, and as the visible head of the church. Thus in 755 central Italy broke its connexion with the empire and became independent; thus was inaugurated the temporal power of the papacy, the cause of so much subsequent warfare and revolution in Rome.

Its first consequences were speedily seen. In 767 the death of Paul I. was followed by a fierce revolt of the nobles under Duke Toto (Theodoro) of Nepi, who by violent means raised his brother Constantine to the chair of St Peter, although Constantine was a layman and had first to be ordained. For more than a year the new pontiff was a pliable tool in the hands of Toto and of the nobles. But the genuine papal faction, headed by a few judices de clero, asked the aid of the Lombards and made a formidable resistance. Their adversaries were defeated, tortured, and put to death. Toto was treacherously slain during a fight. The pope was blinded and left half dead on the highway. Fresh and no less violent riots ensued, owing to the public dread lest the new pope, Stephen IV. (768–772), elected by favour of the Lombards, should give them the city in return. But Stephen went over to the Franks, whom he had previously deserted, and his successor, Hadrian I. (772–795), likewise adhered to their cause, called the city to arms to resist king Desiderius and his Lombard hordes, and besought the assistance of Charlemagne. This monarch accordingly made a descent into Italy in 773, and not only gained an easy victory over Desiderius, but destroyed the Lombard kingdom and seized the iron crown. Entering Rome for the first time in 774, he confirmed and augmented the donation of Pippin by the addition of the dukedom of Spoleto. He returned several times to Italy and Rome, making new conquests and fresh concessions to Adrian I., until the death of the latter in 795.

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The position of Rome and of the pope is now substantially changed. Duke, prefect, militia, and the people exist as heretofore, but are all subordinate to the head of the church, who, by the donations of Pippin and Charlemagne, has been converted into a powerful temporal sovereign. Henceforth all connexion with Byzantium is broken off, but Rome is still the mainspring of the empire, the Roman duchy its sole surviving fragment in Italy, and the pope stands before the world as representative of both. And, although it is difficult to determine how this came about, the pope is now regarded and regards himself as master of Rome. In the year 772 he entrusts the *vestiarius* with judicial powers over the laity, ecclesiastics, freemen, and slaves *nostrae Romanae reipublicae*. He writes to Charlemagne that he has issued orders for the burning of the Greek ships employed in the slave trade, "in our city of Civita Vecchia" (Centumcellæ), and he always speaks of Rome and the Romans as "our city," "our republic," "our people." The donations of Pippin and Charlemagne are restitutions made to Saint Peter, the holy church, and the republic at the same time. It is true that Charlemagne held the supreme power, had an immensely increased authority, and actively fulfilled his duties as patricius. But his power was only occasionally exercised in Rome; it was the result of services rendered to the church, and of the church's continual need of his help; it was, as it were, the power of a mighty and indispensable ally. The pope, however, was most tenacious of his own authority in Rome, made vigorous protest whenever rebels fled to Charlemagne or appealed to that monarch's arbitration, and contested the supremacy of the imperial officials in Rome. Yet the pope was no absolute sovereign, nor, in the modern sense of the term, did any then exist. He asserted supremacy over many lands which continually rebelled against him, and which, for want of an army of his own, he was unable to reduce to obedience without others' help. Neither did the republic acknowledge him as its head. It profited by the growing power of the pope, could not exist without him, respected his moral authority, but considered that he usurped undue power in Rome. This was specially the feeling of the nobles, who had hitherto held the chief authority in the republic, and, being still the leaders of the army, were by no means willing to relinquish it. The Roman nobles were very different from other aristocratic bodies elsewhere. They were not, as they pretended, descendants of the Camilli and the Scipios, but neither were they a feudal aristocracy, inasmuch as the Teutonic element had as yet made small way among them. They were a mixture of different elements, national and foreign, formed by the special conditions of Rome. Their power was chiefly derived from the high offices and large grants of money and land conferred on them by the popes; but, as no dynasty existed, they could not be dynastic. Every pope aggrandized his own kindred and friends, and these were the natural and often open adversaries of the next pontiff and his favourites. Thus the Roman nobility was powerful, divided, restless, and turbulent; it was continually plotting against the pope, threatening not only his power, but even his life; it continually appealed to the people for assistance, stirred the militia to revolt, and rendered government an impossibility. Hence, notwithstanding his immense moral authority, the pope was the effective head neither of the aristocracy, the army, nor of the as yet unorganized lower classes. The lord of vast but often insubordinate territories, the recognized master of a capital city torn by internecine feud and plots against himself, he needed the support of an effective force for his own preservation and the maintenance of the authority proffered him from all quarters. Hence the necessity of creating an empire of the West, after having snapped every link with that of the East. Thus the history of Rome is still, as in the past, a history of continual strife between pope, emperor, and republic; and the city, while imbibing strength from all three, keeps them in perpetual tumult and confusion.

Leo III. (796–816) further strengthened the ties between Charlemagne and the church by sending the former a letter with the keys of the shrine of St Peter and the banner of Rome. Charlemagne had already joined to his office of patrician the function of high justice. The new symbols now sent constituted him *miles* of Rome and general of the church. The pope urged him to despatch an envoy to receive the oath of fealty, thus placing himself, the representative of the republic, in the subordinate position of one of the bishops who had received the immunities of counts. And all these arrangements took place without the slightest reference to the senate, the army, or the people. Much resentment was felt, especially by the nobles, and a revolution ensued headed by the primicerius Paschalis and the secundicerius Campulus, and backed by all who wished to liberate the city from the papal rule. During a solemn procession the pope was attacked and barbarously maltreated by his assailants, who tried to tear out his eyes and tongue (799). He was thrown into prison, escaped, and overtook Charlemagne at Paderborn, and returned guarded by ten of the monarch's envoys, who condemned to death the leaders of the revolt, reserving, however, to their sovereign the right of final judgment. Charlemagne arrived in December 800, and as high justice assembled a tribunal of the clergy, nobles, citizens, and Franks; he pronounced Leo to be innocent, and confirmed the capital sentence passed on the rebels. But through the intercession of the pope, who dreaded the wrath of the nobles, this was presently commuted into perpetual exile. And finally on Christmas day, in St. Peter's, before an assemblage of Roman and Frankish lords, the clergy and the people, the pontiff placed the imperial crown on Charlemagne's head and all proclaimed him emperor.

Thus the new emperor was elected by the Romans and consecrated by the pope. But he was their real master and supreme judge. The pope existed only by his will, since he alone supplied the means for the maintenance of the temporal power, and already pretended to the right of controlling the papal elections. Yet Charlemagne was not sovereign of Rome; he possessed scarcely any regalia there, and was not in command of the army; he mainly represented a principle, but this principle was the law which is the basis of the state. The pope still nominated the Roman judges, but the emperor or his *missi* presided over them, together with those of the pope, and his decision was appealed to in last resort. During the Carolingian times no mention is found of the prefect, and it would seem that his office was filled by the imperial *missus*, or legate, the judices de clero, and judices de militia. The power of the pope was now entangled with that of the republic on the one hand and that of the empire on the other. The consequent confusion of sacred and secular functions naturally led to infinite complications and disputes.

The death of Charlemagne in 814 was the signal for a fresh conspiracy of the nobles against the pope, who, discovering their design, instantly put the ringleaders to death, and was severely blamed by Louis for this violation of the imperial prerogative. While the matter was under discussion the nobles broke out in fiercer tumults, both in Rome and the Campagna. At last, in 824, the emperor Lothair came to re-establish order in Rome, and proclaimed a new and noteworthy constitution, to which Pope Eugenius II. (824–27) gave his oath of adherence. By this the partnership of pope and emperor in the temporal rule of Rome and the states of the church was again confirmed. The more direct power appertained to the pope; the supreme authority, presidence of the tribunals, and final judgment on appeal to the emperor. The new constitution also established the right of contending parties to select either the Roman or the Teutonic code for the settlement of their disputes. During the Carolingian period it is not surprising that the commune should have been, as it were, absorbed by the church and the empire. In fact it is scarcely mentioned in history throughout that time. And when, no longer sustained by the genius of its founder, the Frankish empire began to show signs of dissolution, the popes, finding their power thereby strengthened, began to assume many of the imperial attributes. Soon, however, as a natural consequence of the loss of the main support of the papacy, the nobles regained vigour and were once more masters of the city. Teutonic and feudal elements had now largely penetrated into their organization. The system of granting lands, and even churches and convents, as benefices according to feudal forms, became more and more general. It was vain for the popes to offer opposition, and they ended by yielding to the current. The fall of the Frankish empire left all Italy a prey to anarchy, and torn by the faction fights of Berengar of Friuli and Guido of Spoleto, the rival claimants to the crowns of Italy and the empire. The Saracens were advancing from the south, the Huns from the north; the popes had lost all power; and in the midst of this frightful chaos a way was opened for the rise of the republics. Anarchy was at its climax in Rome, but the laity began to overpower the clergy to such an extent that the judices de militia prevailed over the judices de clero. For a long time no imperial missi or legates had been seen, and the papacy was incredibly lowered. The election of the popes had positively fallen into the hands of certain beautiful women notorious for their evil life and depravity. The aristocracy alone gained strength; now freed from the domination of the emperor, it continually wrested fresh privileges from the impotent pontiffs, and became organized as the ruling force of the republic. Gregorovius, notwithstanding his denial of the continuation of the senate after the 6th century, is obliged to acknowledge that it appeared to have returned to life in the power of this new baronage. And, although this body was now permeated with the feudal principle, it did not discard its ancient traditions. The nobles claimed to be the main source of the empire; they wished to regain the dignity and office of patricius, and to make it, if possible, hereditary in their families. Nothing is known of their system of organization, but it seems that they elected a chief bearing the title of *consul*, *senator princeps Romanorum*, who was officially recognized by the pope, as a patricius presided over the tribunals, and was the head of the commune.

Theophylact was one of the first to assume this dignity. His wife Theodora, known as the *senatrix*, was one of the women then dominating Rome by force of their charms and licentiousness. She was supposed to be the concubine of Pope John X. (914–928), whose election was due to her influence. Her daughter Marozia, in all things her worthy rival, was married to Alberic, a foreign mercenary of uncertain birth who rose to a position of great influence, and, although an alien, played a leading part in the affairs of the city. He helped to increase the power of Theophylact, who seemingly shared the rule of the city with the pope. In the bloody war that had to be waged against the Saracens of southern Italy, and at the defeat of the latter on the Garigliano (916), Theophylact and Alberic were the Roman leaders, and distinguished themselves by their valour. They disappeared from the scene after this victory, but Marozia retained her power, and bore a son Alberic, who was destined to greater deeds. The pope found himself caught in this woman's toils, and struggled to escape, but Marozia, gaining fresh influence by her marriage with Hugo, margrave of Tuscany, imprisoned the pontiff himself in Castle St Angelo (928). This fortress was the property of Marozia and the basis of her strength. The unfortunate John died within its walls. Raised to the chair by Theodora, he was deposed and killed by her daughter. The authority of the latter reached its culminating point in 931, when she succeeded in placing her son John XI. on the papal throne. On the death of her second husband she espoused Hugo of Provence, the same who in 928 had seized the iron crown at Pavia, and now aspired to the empire. Dissolute, ambitious, and despotic, he came to Rome in 932, and, leaving his army outside the walls, entered Castle St Angelo with his knights, instantly began to play the tyrant, and gave a blow to Alberic his stepson, who detested him as a foreign intruder. This blow proved the cause of a memorable revolution; for Alberic rushed from the castle and harangued the people, crying that the time was come to shake off the tyrannous yoke of a woman and of barbarians who were once the slaves of Rome. Then, putting himself at the head of the populace, he closed the city gates to prevent Hugo's troops from coming to the rescue, and attacked the castle. The king fled; Marozia was imprisoned, Alberic proclaimed lord of the Romans, and the pope confined to the Lateran in the custody of his own brother. Rome was again an independent state, a republic of nobles. Rid of the temporal dominion of emperor and pope, and having expelled the foreigners with great energy and courage, it chose Alberic for its chief with the title of *princeps atque omnium Romanorum senator*. The tendency of the Roman republic to elect a supreme authority, first manifested in the case of Theophylact, was repeated in those of Alberic, Brancaleone. Crescenzio, Cola di Rienzo, and others. One of the many causes of this tendency may be traced to the conception of the new empire of which Rome was the original and enduring fountainhead. As Rome had once transferred the empire from Byzantium to the Franks, so Rome was surely entitled to reclaim it. The imperial authority was represented by the office of patrician, now virtually assumed by Alberic. That he gave the name of Octavian to his son is an additional proof of this fact. In the Eternal City the mediæval political idea has always the aspect of a resurrection or transformation of classic antiquity. This is another characteristic of the history of the Roman commune.

Alberic's strength was due to his connexion with the nobility, to his father's valiant service against the Saracens at the battle of Garigliano, and to the militia under his command, on which everything depended amid the internal and external dangers now threatening the new state. As yet no genuine municipal constitution was possible in Rome, where neither the people nor the wealthy burghers engaged in industry and commerce had any fixed organization. All was in the hands of the nobles, and Alberic, as their chief, frequently convened them in council, although obliged to use pressure to keep them united and avoid falling a prey to their disputes. Hence the whole power was concentrated in his grasp; he was at the head of the tribunals as well as of the army. The judices de clero and judices de militia still existed, but no longer met in the Lateran or the Vatican, under the presidency of emperor and pope or their missi. Alberic himself was their president; and, a still more significant fact, their sittings were often held in his private dwelling. There is no longer any mention of prefect or patricius. The papal coinage was inscribed with Alberic's name instead of the emperor's. His chief attention was given to the militia, which was still arranged in scholae, and it is highly probable that he was the author of the new division of the city into twelve *regions*, with a corresponding classification of the army in as many regiments under twelve flags and twelve *banderesi*, one for every region. The organization of the scholae could not have been very dissimilar, but doubtless Alberic had some important motive for altering the old method of classification. By means of the armed regions he included the people in the forces. It is certain that after his time we find the army much changed and far more democratic. It was only natural that so excellent a statesman should seek the aid of the popular element as a defence against the arrogance of the nobles, and it was requisite to reinforce the army in order to be prepared for the attacks threatened from abroad. This change effected, Alberic felt prepared for the worst, and began to rule with energy, moderation, and justice. His contemporaries award him high praise, and he seems to have been exempt from the vices of his mother and grandmother.

In 933 Hugo made his first attack upon the city, and was repulsed. A second attempt in 936 proved still more unfortunate, for his army was decimated by a pestilence. Thoroughly disheartened, he not only made peace, but gave his daughter in marriage to Alberic, thus satisfying the latter's desire to ally himself with a royal house. But this union led to no conciliation with Hugo. For Alberic, finding his power increased, marched at the head of his troops to consolidate his rule in the Campagna and the Sabine land. On the death of his brother, Pope John XI., in 936, he controlled the election of several successive popes, quelled a conspiracy formed against him by the clergy and certain nobles instigated by Hugo, and brilliantly repulsed, in 941, another attack by that potentate. At last, however, this inveterate foe withdrew from Rome, being summoned to the north by the victories of his rival Berengarius. But Alberic, after procuring the election of various popes who were docile instruments of his will, experienced a check when Agapetus II. (946–955), a man of firmness and resource, was raised to the papal throne. The fortunes of Berengarius were now in the ascendant. In 950 he had seized the iron crown, and ruled in the Pentapolis and the exarchate. This being singularly painful to the pope, he proceeded to make alliance with all those enemies of Berengarius preferring a distant emperor to a neighbouring and effective sovereign, with the Roman nobles who were discontented with Alberic, and with all who foresaw danger, even to Rome, from the extended power of Berengarius. And Agapetus recurred to the old papal policy, by making appeal to Otho I., whose rule in Germany was distinguished by a prestige almost comparable with that of Charlemagne.

Otho immediately responded to the appeal and descended into Italy; but his envoys were indignantly repulsed by Alberic, and, being prudent as well as firm, he decided to wait a more opportune moment for the accomplishment of his designs. Meanwhile Alberic died in 954, and the curtain fell on the first great drama of the Roman republic. He had reigned for twenty-two years with justice, energy, and prudence; he had repelled foreign invaders, maintained order and authority. He seems, however, to have realized that the aspect of affairs was about to change, that the work he had accomplished would be exposed to new dangers. These dangers, in fact, had already begun with the accession of an enterprising pope to the Holy See. The name of Octavian given by Alberic to his son leads to the inference that he meant to make his power hereditary. But, suddenly, he began to educate this son for the priesthood, and, assembling the nobles in St Peter's shortly before his death, he made them swear to elect Octavian as pope on the decease of Agapetus II. They kept their word, for in this way they freed themselves from a ruler. Possibly Alberic trusted that both offices might be united, and that his son would be head of the state as well as the church. But the nobles knew this to be a delusion, especially in the case of a nature such as Octavian's. The lad was sixteen years old when his father died, received princely honours until the death of Agapetus, and was then elected pope with the name of John XII. He had inherited the ungoverned passions of his grandmother Marozia and great-grandmother Theodora, but without their intelligence and cunning. His palace was the scene of the most scandalous licence, while his public acts were those of a baby tyrant. He conferred a bishopric on a child of ten, consecrated a deacon in a stable, invoked Venus and Jupiter in his games, and drank to the devil's health. He desired to be both pope and prince, but utterly failed to be either. Before long, realizing the impossibility of holding in check Berengarius, who still ruled over the exarchate, he sought in 960 the aid of Otho I., and promised him the imperial crown. Thus the new ruler was summoned by the son of the man by whom he had been repulsed. Otho vowed to defend the church, to restore her territories, to refrain from usurping the power of the pope or the republic, and was crowned on the 2d February 962 with unheard-of pomp and display.

Accordingly, after being extinct for thirty-seven years, the empire was revived under different but no less difficult conditions. The politico-religious unity founded by Charlemagne had been dissolved, partly on account of the heterogeneous elements of which it was composed, and partly because other nations were in course of formation

Now too the feudal system was converting the officers of the empire into independent princes, and the new spirit of communal liberty was giving freedom to the cities. Otho once more united the empire and the church, Italy and Germany, in order to combat these new foes. But the difficulties of the enterprise at once came to light. John XII., finding a master in the protector he had invoked, now joined the discontented nobles who were conspiring with Berengarius against the emperor. But the latter hastened to Rome in November 963, assembled the clergy, nobles, and heads of the people, and made them take an oath never again to elect a pope without his consent and that of his son. He also convoked a synod presided over by himself in St Peter's, which judged, condemned, and deposed Pope John and elected Leo VIII. (963–965), a Roman noble, in his stead. All this was done at the direct bidding of the emperor, who thus deprived the Romans of their most valued privilege, the right of choosing their own pope. But the people had now risen to considerable importance, and, for the first time, we find it officially represented in the synod by the plebeian Pietro, surnamed Imperiola, together with the leaders of the militia, which had also become a popular institution since Alberic's reign. It was no longer easy to keep the lower orders in subjection, and by their junction with the malcontent nobles they formed a very respectable force. On the 3d January 964 they sounded the battle-peal and attacked the Vatican, where the emperor was lodged. The German knights repulsed them with much slaughter, and this bloodshed proved the beginning of an endless feud. Otho departed in February, and John XII., as the chosen pope of the Romans, returned with an army of followers and compelled the defenceless Leo VIII. to seek safety in flight. Soon afterwards Leo was deposed and excommunicated by a new synod, and many of his adherents were cruelly murdered. But on the 14th May 964 John suddenly expired; the Romans, amid violent struggles and tumults, resumed their rights, elected Benedict V. and procured his consecration in spite of the emperor's veto. Otho now appeared at the head of an army, committed fresh slaughter, besieged the city, reduced it by famine, and, after holding a council which deposed Benedict and sent him a prisoner to Hamburg, restored Leo VIII. to the papal throne.

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But, although the emperor thus disposed of the papacy at his will, his arbitrary exercise of power roused a long and obstinate resistance, which had no slight effect upon the history of the commune. Leo VIII. died in 965, and the imperial party elected John XIII. (965–972). Upon this the nobles of the national party joined the people, and there was a general revolt. The nobles were led by Pietro, prefect of Rome. As we have noted, this office seemed to be extinct during the Carolingian rule, but we again meet with it in 955, after an interval of a century and a half. The leaders of the people were twelve *decarconi*, a term of unknown derivation, but probably indicating chiefs of the twelve regions (*dodecarchi*, *dodecarconi*, *decarconi*). The new pope was seized and confined, first in Castle St Angelo, then in a fortress in the Campagna. But the emperor quickly marched an army against Rome, and this sufficed to produce a reaction which recalled the pope (November 966), sent the prefect into exile, and put several of the rebellious nobles to death. And shortly after the emperor sacked the city. Many Romans were exiled, some tortured, others, including the twelve *decarconi*, killed. John XIII. died in 972 and Otho in 973.

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All these events clearly prove how great a change had now taken place in the conditions of Rome. The people (*plebs*) had made its appearance upon the stage; the army had become democratic; the twelve regions were regularly organized under leaders. Opposed to them stood the nobles, headed by the prefect, also a noble, precisely as in Florence the nobles and the podestà were later opposed to the guilds and the people. So far, it is true, nobles and people had made common cause in Rome; but this harmony was soon to be interrupted. The feudal spirit had made its way among the Roman aristocrats, had split them into two parties and diminished their strength. It was now destined to spread, and, as it was always vigorously detested and opposed by the people elsewhere in Italy, so the same consequence was inevitable in Rome. Another notable change, and a subject of unending controversy, had also occurred in the administration of justice. So far there were the judices de clero, also known as ordinary or palatine judges, and the judices de militia, also styled consules or duces. These judges generally formed a court of seven, three being de clero, four de militia, or *vice versa*, under the presidency of the papal or imperial missi. In criminal cases the judices de militia had the prefect or the imperial missus for their president. But there was a third order of judges called *pedanei, a consulibus creati*. It seems clear that the duces, being *distributi per judicatus*, found themselves isolated in the provinces, and to obtain assistance nominated these pedanei, who were legal experts. In Rome, with its courts of law, they were less needed, but possibly in those sections of the city where cases of minor importance were submitted to a single magistrate reference was made to the pedanei. But many changes were made under the Franks, and when the edict of Lothair (824) granted free choice of either the Roman or Germanic law, and the duces were replaced by *comites* and *gastaldiones*, chiefly of German origin, the use of legal experts became increasingly necessary. And the custom of employing them was the more easily diffused by being already common among the Franks, whose *scabini* were legal experts acting as judges, though not qualified to pass sentence. Thus the pedanei multiplied, came to resemble the scabini, and were designated *judices dativi* (*a magistratu dati*) or simply *dativi*. These were to be found in the exarchate in 838, but not in Rome until 961, when the judices de militia had ceased to exist. The great progress of the German legal procedure may then have contributed to the formation of the new office.

Meanwhile Pope John XIII. had been succeeded by Benedict VI. (973–974) and Otho I. by his son Otho II., a youth of eighteen married to the Byzantine princess Theophano. Thereupon the Romans, who had supported the election of another pope, and were in no awe of the new emperor, rose to arms under the command of Crescenzio, a rich and powerful noble. They not only seized Benedict VI. by force, but strangled him in Castle St Angelo. The national and imperial parties then elected several popes who were either exiled or persecuted, and one of them was said to be murdered. In 985 John XV. was elected (985–996). During this turmoil, the national party, composed of nobles and people, led by Giovanni Crescenzio, son of the other Crescenzio mentioned above, had taken complete possession of the government. This Crescenzio assumed the title of patrician, and sought to imitate Alberic, although far his inferior in capacity. Fortunately for him the reigning pope was a detested tyrant, and the emperor a child entirely guided by his mother. But the new emperor Otho III. was backed by a powerful party, and on coming to Rome in 996 was able, although only aged fifteen, to quell the rebellion, oust Crescenzio from public life, and elect as successor to John XV. his own cousin, Pope Gregory V. (996–999). But this first German pope surrounded himself with compatriots, and by raising them to lofty posts even in the tribunals excited a revolt that drove him from the throne (29th September 996). Crescenzio, being master of Castle St Angelo, resumed the title of patrician or consul of the Romans, expelled the German judges, reconstituted the government, prepared his troops for defence, and created a new pope. But the following year Otho III. came to Rome, and his party opened the gates to him. Although deserted by nearly all his adherents, Crescenzio held the castle valiantly against its besiegers. At last, on the 29th April 998, he was forced to make terms, and the imperialists, violating their pledges, first put him to torture and then hurled him from the battlements. Gregory V. dying shortly after these events, Sylvester II., another German, was raised to the papacy (999–1003).

Thus Otho III. was enabled to establish his mastery of Rome. But, as the son of a Greek mother, trained amid Greek influences, his fantastic and contradictory nature seemed only to grasp the void. He wished to reconstitute a Romano-Byzantine empire with Rome for his capital. His discourse always turned on the ancient republic, on consuls and senate, on the might and grandeur of the Roman people; and his edicts were addressed to the senate and the people. The senate is now constantly mentioned, and its heads bear the title of consuls. The emperor also gave renewed honour to the title of patrician, surrounded himself with officials bearing Greek and Roman designations, and raised the prestige of the prefect, who, having now almost the functions of an imperial vicar, bore the eagle and the sword as his insignia. Nevertheless Otho III. was thoroughly German, and during his reign all Germanic institutions made progress in Rome. This was particularly the case with feudalism, and Sylvester II. was the first pope to treat it with favour. Many families of real feudal barons now arose. The Crescenzii held sway in the Sabine hills, and Præneste and Tusculum were great centres of feudalism in the 11th century. The system of feudal benefices was recognized by the church, which made grants of lands, cities, and provinces in the feudal manner. The bishops, like feudal barons, became actual counts. And, in consequence of these changes, when the emperor, as head of the feudal system, seeks to impose his will upon the church (which has also become feudal) and control the papal elections, he is met by the great question of the investitures, a question destined to disturb the whole world. Meanwhile the Roman barons were growing more and more powerful, and were neither submissive nor faithful to the emperor. On the contrary they resented his attitude as master of Rome, and, when he subjected Tivoli to the Holy See, attacked both him and the pope with so much vigour as to put both to flight (16th February 1001). Thereupon Rome again became a republic, headed by Gregory of Tusculum, a man of a powerful family claiming descent from Alberic.

By the emperor's death in January 1002 the race of the Othos became extinct, the papacy began to decline, as at the end of the Carolingian period, and the nobles, divided into an imperial and a national party, were again predominant. They reserved to themselves the office of patrician, and, electing popes from their own ranks, obtained enlarged privileges and power. At the time when Ardoin, marquis of Ivrea, profiting by the extinction of the Othos and the anarchy of Germany, was stirring Italy in the vain hope of constituting a national kingdom, the Roman republic was being consolidated under another Giovanni Crescenzio, of the national faction. He was now elected patrician; one of his kinsmen was invested with the office of prefect, and the new pope John XVIII. (1003–9) was one of his creatures. Although the power of Henry of Bavaria was then gaining ascendency in Germany, and giving strength to the imperialist nobles, Crescenzio still remained supreme ruler of the city and the Campagna. Surrounded by his judges, the senators, and his kinsman the prefect, he continued to dispense justice in his own palace until his death in 1012, after ten years' rule. And, Pope Sergius IV. having died the same year, the counts of Tusculum compassed the election of Benedict VIII. (1012–24), one of their own kin. This pope expelled the Crescenzii, changed the prefect, and reserved the title of patrician for Henry II., whom he consecrated emperor on the 14th February 1014. A second Alberic, bearing the title of "eminentissimus consul et dux," was now at the head of the republic and dispensed *placita* in the palace of his great ancestor, from whom the counts of Tusculum were also descended.

The new emperor endeavoured to re-establish order in Rome, and strengthen his own authority together with that of the pope. But the nobles had in all things the upper hand. They were regularly organized under leaders, held meetings, asserted their right to nominate both pope and emperor, and in fact often succeeded in so doing. Even Henry II. himself was obliged to secure their votes before his coronation. The terms senate and senator now recur still more frequently in history. Nevertheless, Benedict VIII. succeeded in placing his own brother, Romano, at the head of the republic with the title of "consul, dux, and senator," thus making him leader of the nobles, who met at his bidding, and chief of the militia and the tribunals. The prefect still retained his authority, and the emperor was by right supreme judge. But, a violent revolt breaking out, the emperor only stayed to suppress it and then went to Germany in disgust. The pope, aided by his brother, conducted the government with energy; he awed the party of Crescenzio, and waged war against the Saracens in the south. But he died in 1024, and in the same year Henry II. was succeeded by Conrad II. There was now beheld a repetition of the same strange event that had followed the death of Alberic, and with no less fatal consequences. Benedict's brother Romano, head of the republic, and still retaining office, was, although a layman, elected pope. He took the name of John XIX. (1024–33), and in 1027 conferred the imperial crown on Conrad the Salic, who, abolishing the Lothairian edict of 824, decreed that throughout Rome and its territory justice should be henceforth administered solely by the Justinian code. Thus, notwithstanding the spread of feudalism and Germanic procedure, the Roman law triumphed through the irresistible force of the national character, which was already manifested in many other ways.

Meanwhile John XIX. was succeeded by his nephew, Benedict IX. (1033–45), a lad of twelve, who placed his own brother at the head of the republic. Thus church and state assumed the aspect of hereditary possessions in the powerful house of the counts of Tusculum. But the vices and excesses of Benedict were so monstrous that the papacy sank to the lowest depth of corruption; there followed a series of tumults and reactionary attempts, and so many conflicting elections that in 1045 three popes were struggling for the tiara in the midst of scandal and anarchy. The streets and neighbourhood of Rome swarmed with thieves and assassins; pilgrims were plundered; citizens trembled for their lives; and a hundred petty barons threatened the rival popes, who were obliged to defend themselves by force. This state of things lasted until Henry III. came to re-establish order. He appointed a synod to depose the three popes, and then, with the consent of the wearied and anarchy-stricken Romans, assuming the right of election, proposed a German, Clement II., who was consecrated at Christmas 1046. Henry III. was then crowned, and also took the title of patrician. Thus the emperor was lord over church and state. This, however, stirred both people and pope against him, and led to the terrible contest of the investitures, although for the moment the Romans, being exhausted by past calamities, seemed not only resigned but contented.

In fact, the idea of reform and independence was already germinating in the church and was soon to become tenacious and irresistible. Hildebrand was the prompter and hero of this idea. He sought to abolish the simony and concubinage of the priesthood, to give the papal elections into the hands of the higher ecclesiastics, and to emancipate the church from all dependence on the empire. Henry III. procured the election of four German popes in succession, and Hildebrand was always at hand to inspire their actions and dominate them by his strength of intellect and still greater strength of will. But the fourth German pope, Victor II., died in 1057, and Henry III. had been succeeded in 1056 by the young Henry IV. under the regency of a weak woman, the empress Agnes. Hildebrand seized this favourable moment for trying his strength and procured the election of Stephen IX. (1057-58), a candidate he had long had in view. Stephen, however, died in 1058; the nobles instantly rose in rebellion; and Gregory of Tusculum, who had assumed the patriciate, caused an incapable cousin to be named pope (Benedict X.). Upon this Hildebrand postponed his design of maintaining the papacy by the help of Italian potentates and had recourse to the empress. In a synod held at Siena with her consent Benedict was deposed and Nicholas II. (1059-61) elected in his stead. This pope entered Rome escorted by the troops of Godfrey of Tuscany, and, when also assured of help from Naples, assembled a council of one hundred and thirteen bishops (1059), who condemned the deposed pontiff and renewed the prohibition of simony and concubinage among the priesthood. Finally Nicholas instituted the college of cardinals, entrusting it with the election of the pope, who was in future to be chosen from its ranks. The assent of the clergy and people was left purely formal. The decree also contained the proviso—"saving the honour and reverence due to the emperor": but this too was an empty expression.

The new decree was a master-stroke of Hildebrand's genius, for by means of it he placed the papal election in the hands of a genuine ecclesiastical senate and gave a monarchical form to the church. Backed by the Normans who were in Rome, and whose commander, Richard of Capua, did not scruple to strike off the heads of many recalcitrant nobles, Hildebrand and the pope could now pursue their work of reform. Nevertheless the nobles again revolted on the death of Nicholas II. in 1061, and declared their purpose of restoring to Henry IV. the patriciate and right of election; but Hildebrand, by speedily convoking the cardinals, procured the election of Alexander II. (1061-73). This pope, although friendly to the empire, did not await the imperial sanction, but, protected by the Romans, at once entered the Lateran and put some other riotous nobles to death. The German bishops, however, elected Honorius II., who had the support of the barons. Thus the city was split into two camps and a deadly civil war ensued, terminating, despite the vigorous resistance of the nobility, in the defeat of Honorius II. But the nobles persevered in the contest and were the real masters of Rome. By conferring the patriciate on the emperor, as their feudal chief, they hoped to organize themselves under the prefect, who now, with greatly increased authority, presided over both the civil and criminal courts in the absence of the pope's representative. In a general assembly the Romans elected their prefect, whose investiture was granted by the emperor, while the pope elected another. Thus disorder was brought to a climax.

Gregory VII.

Alexander died on the 21st April 1073, and thereupon Hildebrand was at last raised to the chair as pope Gregory VII. (1073-85). He reconfirmed his predecessors' decrees, dismissed all simoniacal and non-celibate priests, and then in a second council (1075) forbade the clergy to receive investiture at the hands of laymen. No bishop nor abbot was again to accept ring or crozier from king or emperor. Now, as ecclesiastical dignities included the possession of extensive benefices, privileges, and feudal rights, this decree gave rise to tremendous dispute and to fierce contest between the empire and the church. The nobles took a very decided part in the struggle. With Cenci, their former prefect, at their head, they rose in revolt, assailed the pope on Christmas day 1075, and threw him into prison. But their fear of the popular wrath compelled his speedy release; and he then decreed the excommunication and deposition of the emperor who had declared him deposed. That monarch afterwards made submission to Gregory at Canossa (1077), but, again turning against him, was again excommunicated. And in 1081 he returned to Italy bringing the antipope Clement III., and besieged Rome for forty days. Assembling the nobles in his camp, he there arranged a new government of the city with prefect and senate, palatine judges, and other magistrates, exactly similar to the existing government within the walls. He then took his departure, returned several times in vain, but at last forced his way into the city (March 1084), and compelled Gregory VII. to seek refuge in Castle St Angelo. The emperor was then master of Rome, established the government he had previously arranged, and, calling a parliament of nobles and bishops, procured the deposition of Gregory and the consecration of Clement III., by whom he was crowned in 1084. He then attacked and seized the Capitol, and assaulted the castle in order to capture the pope. But Robert Guiscard brought his army to the rescue. Emperor and anti-pope fled; the city was taken, the pope liberated, and Rome reduced to ruin by fire and pillage. Upon this Gregory VII., broken with grief, went away with the Normans, and died at Salerno on the 25th May 1085. He had separated the church from the people and the empire by a struggle that, as Gregorovius says, disturbed the deep sleep of the Middle Ages

Paschal II. and the nobles.

Pope Paschal II. (1099-1118) found himself entirely at the mercy of the tyrannous nobles who were alike masters of Rome, of its government, and its spiritual lord. As they were divided among themselves, all the pope could do was to side with one party in order to overcome the other. With the help of his own nephew Gualfredo, the prefect Pietro Pierleone, and the Frangipani, he was able to keep down the Corsi, and hold the Colonna in check. Being compelled to repair to Benevento in 1108, he left Gualfredo to command the militia, Tolomeo of Tusculum to guard the Campagna, and the consuls Pierleone and Leone Frangipani, together with the prefect, in charge of the government. The consulship was no longer a mere title of honour. The consuls seem to have been elected, as at Ravenna, in imitation of those of the Lombard cities, and were at the head of the nobles and senate. The expressions "praefectus et consules," "de senatoribus et consulibus," are now of frequent occurrence. We have no precise knowledge of the political organization of the city at this moment; but it was an aristocratic government, similar to that originally formed in Florence, as Villani tells us, with a senate and consuls. The nobles were so completely the masters that the pope, in spite of having trusted them with the government, could only return to Rome with the aid of the Normans. Being now absorbed in the great investiture question, he had recourse to a daring plan. He proposed to Henry V. that the bishops should resign all property derived from the crown and depend solely on tithes and donations, while the empire should resign the right of investiture. Henry seemed disposed to accept the suggestion, but, suddenly changing his mind, took the pope prisoner and forced him to yield the right of investiture and to give him the crown (1111). But the following year the party of reform annulled in council this concession, which the pope declared to have been extorted by force. By the death of Countess Matilda in 1115 and the bequest of her vast possessions to the Holy See, the pope's dominions were greatly enlarged, but his authority as a ruler was nowise increased. Deeds of violence still continued in Rome; and then followed the death of the prefect Pietro. The nobles of the imperial party, joined with the people, wished to elect Pietro's son, also nephew to Tolomeo of Tusculum, who then held the position of a potent imperial margrave, had territories stretching from the Sabine mountains to the sea, was the dictator of Tusculum, master of Latium, and consul of the Romans. The pope opposed this election to the best of his strength; but the nobles carried the day, and their new prefect received investiture from the emperor. Upon this the pope again quitted Rome, and on his return, two years later, was compelled to shut himself up in Castle St Angelo, where he died in 1118.

The popes were now the sport of the nobles whom they had aggrandized by continual concessions for the sake of peace. And peace seemed at hand when Innocent II. (1130–43), after triumphing over two antipopes, came to terms with Roger I., recognized him as king of Sicily, and gained his friendship and protection. But now still graver tumults took place. In consequence of the division of the nobles neither party could overcome its foes without the aid of the people, which thus became increasingly powerful. Throughout Upper and Central Italy the cities were being organized as free and independent communes on a democratic basis. Their example was soon followed in the ancient duchy of Rome and almost in the immediate neighbourhood of the city. Even Tivoli was converted into a republic. This excited the deepest jealousy in the Romans, and they became furious when this little city, profiting by its strong position in the Teverone valley, not only sought to annex Roman territory, but dared to offer successful resistance to the descendants of the conquerors of the world. In 1141 Tivoli openly rebelled against the mother city, and the pope sent the Romans to subdue it. They were not only repulsed; but ignominiously pursued to their own gates. Afterwards, returning to the assault in greater numbers, they conquered the hostile town. Its defenders surrendered to the pope, and he immediately concluded a treaty of peace without consulting either the people or the republic. The soldiery, still flushed with victory, were furious at this slight. They demanded not only the submission of Tivoli to the Roman people, but also permission to demolish its walls and dwellings and expel its population. Innocent II. refused consent to these excesses, and a memorable revolution ensued by which the temporal power of the papacy was entirely overthrown.

In 1143 the rebellious people rushed to the Capitol, proclaimed the republic, reconstituted the senate, to the almost entire exclusion of the nobles, declared the abolition of the temporal power, issued coin inscribed to the senate, the people, and St Peter, and began to reckon time from the day of the restoration of liberty. Arnold of Brescia was not, as has been incorrectly stated, the author of this revolution, for he had not yet arrived in Rome. It was the outcome of an historic necessity—above all of the renewed vigour of the people and its detestation of the feudal aristocracy. This body, besides being divided into an imperial and a national party, had almost excluded from the government the powerful baronage of the Campagna and the provinces. Also, as we have before noted, the Roman aristocracy was by no means an exclusive caste. Between the great aristocrats and the people there stood a middle or new nobility, which made common cause with the people, whose chief strength now lay in the army. This, divided into twelve and then into thirteen or fourteen regions, assembled under its banners all arm-bearing citizens. Thus the *exercitus* was also the real *populus Romanus*, now bent on the destruction of the temporal power. This purpose, originating in the struggle of the investitures, was the logical and inevitable result of the proposals of Paschal II., which, despite their rejection, found a loud echo in Italy. Lucius II. (1144–45) tried to withstand the revolution by seeking Norman aid and throwing himself into the arms of the feudal party, but this only precipitated the course of events. The people, after having excluded nearly all aristocrats from the senate, now placed at its head the noble Giordano dei Pierleoni, who had joined the revolutionary party. They named him patrician, but without prejudice to the authority of the empire, still held by them in respect, and also conferred on him the judicial powers appertaining to the aristocratic and imperial office of prefect. The pope was requested to resign the temporal power, the regalia, and every other possession, and content himself with the tithes and offerings of the faithful according to the scheme of Paschal II. He indignantly refused, marched at the head of the nobles against the Capitol, but was violently repulsed, and received a blow on the head from a stone, which is supposed to have occasioned his speedy death on the 15th February 1145. Eugenius III. was then elected (1145–53), but soon had to fly to Viterbo in quest of armed assistance, in consequence of the senate's resolve to forcibly prevent his consecration until he recognized the new state of things in the Eternal City.

Arnol Bresci

It was at this moment that Arnold of Brescia arrived in Rome. His ideas, already well known in Italy, had inspired and promoted the Roman revolution, and he now came to determine its method and direction. Born at Brescia in the beginning of the 12th century, Arnold had studied in France under the celebrated Abelard, who had instructed him in theology and philosophy, inspired him with a great love for antiquity, and stimulated his natural independence of mind. On returning to his native land he assumed the monkish habit, and proved the force and fervour of his character by taking part in all struggles for liberty. And, together with political reform, he preached his favourite doctrine of the necessary renunciation by the clergy of all temporal wealth. Expounded with singular eloquence, these doctrines had a stirring effect on men's minds, spread throughout the cities of northern Italy, and were echoed on all sides. It seems undoubted that they penetrated to Rome and helped to promote the revolution, so that Arnold was already present in spirit before he arrived there in person. It is known that at the Lateran council of 1139 Innocent II. had declared these doctrines to be inimical to the church and enjoined silence on their author. And, as at that time the party hostile to liberty was triumphant in Brescia, Arnold left his native place, crossed the Alps, and returned to France, where other struggles awaited him. He professed no anti-Catholic dogmas,—only maintaining that when the pope and the prelacy deviated from the gospel rule of poverty they should not be obeyed, but fearlessly opposed. In France, finding his master, Abelard, exposed to the persecutions of St Bernard, he assumed his defence with so much ardour that St Bernard directed the thunders of his eloquence against the disciple as well as the master, saying of the former, "He neither eats nor drinks, suffers hunger, and, being leagued with the devil, only thirsts for the blood of souls." In 1142 we find Arnold a wanderer in Switzerland, and then, suddenly reappearing in Italy, he arrived in Rome.

Three different elements entered into his nature and inspired his eloquence—an exalted and mystic temperament, a great and candid admiration for classic antiquity added to an equal admiration for republican freedom independent of the church and the empire, and a profound conviction, derived from the Vaudois and Paterine doctrines, that the church could only be purified by the renunciation of temporal wealth. Finding Rome already revolutionized in accordance with his own ideas, he immediately began to preach there. His mystic exhortations against the riches of the church had an inflammatory effect, while his classical reminiscences aroused the enthusiasm of the Romans, and his suggestion that they should imitate the republican institutions of Upper Italy met the necessities of the time that had created the revolution. He urged the reconstitution of the ancient senate and senatorial order, which indeed was already partially accomplished, and of the ancient equestrian order, and the reconstruction and fortification of the Capitol. His proposed senate was a body somewhat resembling the communal councils of Upper Italy, his equestrian order a mounted force composed of the lesser nobility, since at Rome, as elsewhere, the lower classes had neither time nor means to form part of it. All his suggestions were accepted; the citizens laboured strenuously on the fortification of the Capitol. The pope soon beheld the revolution spread beyond the walls, and several cities of the state proclaimed their independence. The barons of the Campagna profited by the opportunity to act as independent sovereigns. Thus the whole domain of the church was threatened with dissolution. The pope marched towards Rome with his newly gathered army, but hoped to come to terms. The Romans in fact recognized his authority, and he in his turn recognized the republic. The office of patrician was abolished, and seems to have been replaced by that of gonfalonier, and the prefect, answering to the podestà of the other republics, was revived. The senators received investiture from the pope, who returned to Rome at Christmas 1145.

The republic now seems to have been fully constituted. The senate was drawn from the lower classes and the petty nobility, and this was the special characteristic of the new revolution. In 1144 there were fifty-six senators, probably four to each of the fourteen regions, but the number often varied. By the few existing documents of the period we notice that the senators were divided into *senatores consiliarii* and ordinary senators. The former constituted a smaller council, which, like the *credenza* or lesser council found in other cities, consulted with the head or heads of the republic on the more urgent and secret affairs of the state. And, conjointly with the rest of the senators, it formed the greater council. Thus classic traditions were identified with new republican usages, and the commonwealth of Rome resembled those in other parts of Italy. But, of course, every republic had special local customs of its own. So the Roman senate had judicial as well as political attributes, and there was a *curia senatus* composed of senators and legal experts.

As was easily to be foreseen, the agreement with the pope was of short duration. The revolution could not be checked; the Romans desired independence, and their spiritual lord fled to France, whence, in 1147, he proclaimed a new crusade, while the Romans were employed in demolishing Tivoli, banishing its inhabitants, and waging war on other cities. Giordano Pierleone was gonfalonier and head of the republic, and Arnold, supported by the popular favour and the enthusiasm of the lower clergy, was preaching with even greater fervour than before. But the pope now re-entered Italy, proclaimed Arnold a schismatic, and then advancing to Tusculum assembled an army in order to attack Rome. In this emergency the Romans applied to Conrad III., the first emperor of the house of Hohenstaufen; and their urgent letters are clearly expressive of Arnold's theories and his medley of ancient and modern, sacred and profane, ideas. "Rome," so they said, "is the fountain of the empire confided to you by the Almighty, and we seek to restore to Rome the power possessed by her under Constantine and Justinian. For this end we conquered and destroyed the strongholds of the barons who, together with the pope and the Normans, sought to resist us. These are now attacking us on all sides. Haste to Rome, the capital of the world, thus to establish thy imperial sway over the Italian and German lands."

After long hesitation the king of the Romans at last replied to these appeals, stating that he would come "to re-establish order, reward the faithful, and punish the rebellious." These words promised ill. In fact Conrad had already arranged terms with the pope; but his life came to an end on the 15th February 1152.

He was succeeded by Frederick I. surnamed Barbarossa, who took no notice of the numerous letters urging him to come and receive the empire from the Roman people, which alone had the right of conferring it. In accordance with his design of subduing all the independent cities, he made an agreement with the pope, in which he vowed to give no truce to the Romans, but subject them to their spiritual lord, whose temporal power should be restored. The pope, on his side, promised to crown him emperor. Thereupon the people again rose to arms, and Arnold broke off all negotiations with Eugenius III. The senate was reorganized, formed of one hundred members, and, according to the old Roman precedent, had two consuls, one for internal and the other for external affairs. Frederick was a daring statesman, a valiant soldier in command of a powerful army, and was no friend of half measures. Accordingly the nobles ventured on reaction. Finally, to increase the gravity of the situation, an English pope, Hadrian IV., was elected (1154–59), who was also a man of strong and resolute temper. In fact, even before being able to take possession of the Lateran, he requested the Romans to banish Arnold, who, with greater eloquence than ever, was directing his thunders against the papacy. These utterances increased the wrath of Hadrian, who, encouraged by the knowledge that Frederick and his host were already in Italy, at last launched an interdict against Rome. It was the first time that a pope had ventured to curse the Eternal City. The interdict put a summary stop to the religious life of the inhabitants. Men's minds were seized with a sudden terror, and a fierce tumult broke out. Thereupon the senators, whose opposition to the pope was less courageous than that of the fallen magnates, prostrated themselves at his feet and implored pardon. But Hadrian demanded the expulsion of Arnold before consenting to raise the interdict. Arnold was therefore obliged to leave Rome. After having for nine years preached successfully in favour of liberty, after having been the moving spirit of the new revolution, the new constitution, he was now abandoned by all, and forced to wander from castle to castle, in the hope of reaching some independent city capable of shielding him from the fierce enmity of the pope. Meanwhile Frederick I. had achieved his first victories in Lombardy, and, leaving ruined cities and bloodshed in his track, was rapidly advancing towards central Italy. The pope sent three cardinals to him, with a request for the capture and consignment of Arnold, who had taken refuge in the castle of the Visconti of Campagnatico. Frederick without delay caused one of the Visconti to be seized and kept prisoner until Arnold was given up, and then consigned the latter to the papal legates. The pope in his turn gave the reformer into the hands of the prefect, Pietro di Vico, who immediately hanged his prisoner, burnt his body at the stake, and cast his ashes into the Tiber. The execution took place in June 1155. The exact date and place of it are unknown; we only know that Arnold met his fate with great serenity and firmness.

The republic still remains.

But the Romans who had so basely deserted their champion would not give up their republic. Their envoys went to meet Frederick near Sutri, and made an address in the usual fantastic style on the privileges of the Roman people and its sole right to confer the imperial crown. But Frederick indignantly cut short their harangue, and they had to depart full of rage. He then continued his march, and, entering Rome on the 18th June 1155, was forthwith crowned in St Peter's by the pope. Thereupon the Romans rushed to arms, and made a furious attack on the Leonine city and the imperial camp. A desperate battle went on throughout the day; and the knights proved that the equestrian order instituted at Arnold's suggestion was no empty sham. About a thousand Romans perished by the sword or by drowning, but their fellow-citizens made such determined preparations to continue the struggle that Frederick, on the 19th June, hastily retreated or rather fled, and was escorted as far as Tivoli by the pope and the cardinals. After all, the temporal power of the papacy was not restored, and the republic still survived in the form bestowed on it by Arnold of Brescia. Its existence was in truth favourable rather than injurious to Frederick, whose aim was to rule over Rome and treat the bishops as his vassals. He had not yet discerned that his best policy would have been to use the republic as a lever against the pope. The latter, with keener acumen, while remaining faithful to the feudal party in Rome, made alliance with the communes of Lombardy and encouraged them in their resistance to the emperor. Hadrian IV. died in 1159, and the national party elected Alexander III. (1159–1181), who energetically opposed the pretensions of Frederick, but, having to struggle with three antipopes successively raised against him by the imperial party, was repeatedly driven into exile. During these schisms the senate quietly carried on the government, administered justice, and made war on some neighbouring cities and barons. An army comprising many nobles of the national party marched against Tusculum, but found it defended by several valiant officers and a strong band of German soldiery, who, on the 29th May 1167, inflicted on the Romans so severe a defeat that it is styled by Gregorovius the Cannæ of the Middle Ages. Shortly afterwards the emperor arrived in Rome with his antipope Paschal III., and Alexander had to fly before him to Benevento. Then, at last, Frederick came to terms with the republic, recognized the senate, which accepted investiture at his hands, re-established the prefecture as an imperial office, and bestowed it on Giovanni, son of Pietro di Vico. He then hastily departed, without having advanced outside the Leonine city.

Meanwhile Pope Alexander continued the crafty policy of Hadrian and with better success, for the Lombard cities had now formed a league and inflicted a signal defeat on the emperor at Legnano on the 29th May 1176. One of the results of this battle was the conclusion of an agreement between the pope and the emperor, the latter resigning his pretensions on Rome and yielding all that he had denied to Hadrian. And by the treaty of Venice (1st August 1177) the antipope was forsaken, Alexander III. recognized and hailed as the legitimate pontiff, and the prefect of Rome again nominated by the pope, to whom the emperor restored the temporal power, acknowledging him the independent sovereign of Rome and of the ecclesiastical state from Acquapendente to Ceprano. Frederick's troops accompanied the pope to Rome, where the republic was forced to make submission to him. But, proudly conscious as it still was of its strength, its surrender wore the aspect of a voluntary concession, and its terms began with these words—"Totius populi Romani consilio et deliberatione statutum est," &c. The senators, elected yearly in September, had to swear fealty to the pope, and a certain proportion of nobles was included in their number. On his return to Rome, Alexander received a solemn welcome from all, but he had neither extinguished nor really subdued the republic. On the contrary, men's minds were more and more inflamed by the example of freedom displayed in the north of Italy. He died on the 30th August 1181. The fact that between 1181 and 1187 there were three popes always living in exile proves that the republic was by no means crushed. During the same period another blow was inflicted on the papacy by the marriage of Henry VI., son and successor to Frederick I., with Constance, sole heiress of the Norman line in Naples. For thus the kingdom was joined to the empire and the popes were more than ever in the latter's power. On the 20th December 1187 Clement III. (1187–91), being raised to the pontificate, made a solemn agreement with the Government of the Capitol before coming to Rome. And this peace or *concordia* had the air of a treaty between potentates of equal importance. Rome confronted the pope from the same standpoint from which the Lombard cities had confronted the emperor after Legnano. This treaty, the basis of the new constitution, was confirmed on the last day of May 1188 (Anno XLIV. of the senate). It begins with these words:—"Concordia inter Dominum Papam Clementem III. et senatores populumque Romanum super regalibus et aliis dignitatibus urbis." The pope was recognized as supreme lord, and invested the senators with their dignity. He resumed the privilege of coinage, but allowed one-third of the issue to be made by the senate. Almost all the old pontifical rights and prerogatives were restored to him. The pope might employ the Roman militia for the defence of his patrimony, but was to furnish its pay. The rights of the church over Tivoli and Tusculum were confirmed; but the republic reserved to itself the right of making war on those cities, and declared its resolve to dismantle and destroy the walls and castle of Tusculum. In this undertaking the pope was to co-operate with the Romans, even should the unhappy city make surrender to him alone.

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From all this it is clear that the church had been made independent of the empire, and that the republic, despite its numerous concessions, was by no means subject to the church. The pope, in fact, had obtained liberty of election, and Frederick I., by resigning the investiture of the prefect, had virtually renounced his claim to imperial power in Rome. The republic had no patrician nor any other imperial magistrate, and preserved its independence even as regarded the pope, who merely granted investiture to magistrates freely chosen by the people, and had no legislative nor administrative power in the city. His temporal dominion was limited to his great possessions, to his regalia, to a supreme authority that was very indefinite, and to a feudal authority over the barons of the Campagna and many cities of a state that seemed ever on the point of dissolution. The senate continued to frame laws, to govern, and to administer justice. The army carried on the wars of the republic, as we see by the tragic fate of Tusculum, which was razed to the ground on the 19th

April 1191. Thus the powerful counts of Tusculum disappeared; they sought refuge in the Campagna, and according to all probability the no less potent family of the Colonna sprang from their line. In consequence of these events, the nobles realized that the papacy sought to reduce them to vassalage. And, seeing that the republic remained firmly established and able to help them, they began to adhere to it and succeeded in obtaining admission to the new senate. In fact, whereas since 1143 plebeians and petty nobles had prevailed in its ranks, nobles of ancient descent are now found outnumbering the knights and burghers. But in 1191 this state of things caused a sudden popular outbreak which abolished the aristocratic senate and gave the headship of the republic to a single senator, *summus senator*, named Benedetto "Carissimus" or "Carus Homo" or "Carosomo," of unknown, but undoubtedly plebeian, origin. During the two years he remained in office this personage stripped the pope of his revenues, despatched *justitiarii* even to the provinces, and with the aid of the parliament and other popular assemblies promulgated laws and statutes. But he was overthrown by a counter-revolution, and Giovanni Capoccio of the party of the nobles became senator for two years, and had been succeeded by one of the Pierleoni when, in 1197, a fresh revolution re-established a senate of fifty-six members, chiefly consisting of feudal barons in high favour with Henry VI., who had revived the imperial faction in Rome. But this emperor's life ended the same year as the pope's, in 1198, and the new pontiff Innocent III. (1198–1216) began to make war on the nobles, who were again masters of the republic. Their leader was the prefect Pietro di Vico. Owing to the revolution of 1143 most of the prefectorial attributes were now vested in the senate; nevertheless Pietro still retained a tribunal of police both within and without the city. But his main strength was derived from the vast possessions of the Vico family, in which the office of prefect now became hereditary. Very soon, however, these prefects of Vico were chiefly regarded as the great feudal lords of Tuscia, and the independent municipal office lost its true character. Then the popes made a point of according great pomp and dignity to this nominal prefect, in order to overshadow the senator, who still represented the independence of the republic and had assumed many of the attributes wrested from the prefect.

The office of prefect becomes hereditary.

Innocen III. elects the senate.

But Innocent III., dissatisfied with this state of things, contrived by bribing the people to arrogate to himself the right of electing the senator, who had now to swear fealty and submission to the pope, and also that of nominating the provincial *justitiarii*, formerly chosen by the Government of the Capitol. This was a deadly blow to the republic, for the principal rights of the people, *i.e.*, the election of pope and emperor, prefect and senate, were now lost. The general discontent provoked fresh revolutions, and Innocent III. employed all his political dexterity to ward off their effects. But shortly afterwards the people made a loud outcry for a senate of fifty-six members; and the pope, again making a virtue of necessity, caused that number to be chosen by twelve *mediani* specially named by him for the purpose. Even this did not calm the popular discontent, which was also stirred by other disputes. The consequence was that when, six months later, the pope again elected a single senator the Romans rose to arms, and in 1204 formed a Government of *Buoni Uomini* in opposition to that created by the pope. But an amicable arrangement being concluded, the pope once more nominated fifty-six senators; and when, soon after, he again reduced them to one, the people were too weary to resist (1205). Thus the Capitol was subdued, and Innocent III. spent his last years in tranquillity.

On the 22d November 1220 Honorius III. (1216–27) conferred the imperial crown on Frederick II., who confirmed to the church the possession of her former states, of those bequeathed to her by countess Matilda, and even of the March of Ancona. But it was soon seen that he sought to dominate all Italy, and was therefore a foe to be dreaded. The successor of Honorius, Pope Gregory IX. (1227–41) was speedily insulted and put to flight by the Ghibelline nobles, whose courage had revived, and the republic began to subdue the Latian cities on its own account. Peace was several times made and unmade by pope and people; but no enduring harmony was possible between them, since the former wished to subject the entire state to the church, and the latter to escape from the rule of the church and hold sway over "the universal land from Ceprano to Radicofani" formerly belonging to the duchy. Accordingly the Roman people now appointed judges, imposed taxes, issued coin, and made the clergy amenable to secular tribunals. In 1234 the senator Luca Savelli published an edict declaring Tuscia and Campania territories of the republic, and sent judges thither to exact an oath of obedience. He also despatched the militia to the coast, where it occupied several cities and erected fortresses; and columns were raised everywhere inscribed with the initials S. P. Q. R. The pope, unable to prevent but equally unable to tolerate these acts, fled from Rome, hurling his anathema against Savelli, "et omnes illos consiliarios urbis quorum consilio," &c. The Romans sacked the Lateran and the houses of many cardinals, and marched on Viterbo, but were driven back by the papal troops. When Savelli left office and Angelo Malabranca was elected in his stead, the people made peace and submission in 1235, and were obliged to give up their pretensions of subjecting the clergy to ordinary tribunals and the urban territory to the republic. Thus matters were virtually settled on the footing established by Innocent III., thanks to the aid given to the pope by Frederick II., who had been one of the promoters of the rebellion.

The republic submits to the people.

It may appear strange that, at this period of their history, the Romans, after showing such tenacious adherence to the republic and senate, should have accepted the rule of a single senator without rushing to arms, and passed and repassed from one form of government to another with such surprising indifference. But on closer examination it is plain that these changes were greater in appearance than reality. We have already seen, in treating of Carosomo, how the single senator convoked the people in parliament to pass sanction on the laws. But, whenever there is only one senator, we also continually meet with the expression "consilium vel consilia urbis." It is evident that when, instead of laws to be approved in parliament by a simple placet or rejected by a non-placet, matters requiring consideration had to be discussed, the senator convoked a much smaller council, consisting only of the leaders of the people. These leaders were the heads of the twelve or thirteen regions, of the guilds, now becoming organized and soon to be also thirteen in number, and of the militia. As in the other Italian republics, all these associations had been formed in Rome.

Formation of the greater and lesser council

The senator therefore held consultation with the leading men of the city; and, although, especially at first, these meetings were rather loosely organized, it is clear that they took the form of two councils—one numerous (*consiglio maggiore*), the other limited (*consiglio minore* or *speciale*), co-operating with and forming part of the first. Such was the prevailing custom throughout Italy at the time when Roman institutions most nearly resembled those of the other republics. We already know that, from the date of Arnold's reforms, the senate, with its junta of counsellors, had been divided into two parts, forming when united a species of greater council. Therefore the transition from a senate divided into two parts to the greater and lesser councils must have been very easy and natural. And, seeing that later, when the nomination of a single senator had become a constant practice, the meetings of the two councils are frequently mentioned without the slightest remark or hint as to their origin, it is clear that they had been gradually formed and long established. Not long after the revolution of 1143 the grandees sought to re-enter the senate; and the popes themselves, partly from dread of the people and partly to aggrandize their own kindred, contributed to build up the power of a new and no less turbulent nobility. This class, arising between the 12th and 13th centuries, was composed of families newly created by the popes, together with remnants of the old aristocracy, such as the Frangipani, Colonna, &c. These nobles, regaining possession of the senate, so completely eliminated the popular element that, when the popes again opposed them, and, obtaining from the parliament the right of electing the senators, adopted the expedient of appointing one only, the senator was always chosen from the ranks of the nobles. And then the people, unable and unwilling to renounce republican forms, replaced their suppressed senate by a greater and a lesser council. This was an easy task—a natural consequence of the fact that the people now began to constitute the real strength of the republic. Later, with an increasing detestation for their nobility, the Romans decreed that the single senator should be of foreign birth, and, as we shall see, chose Brancaleone in the middle of the 13th century.

The Roman statutes.

Thus, after a long series of frequent changes and revolutions, the Roman republic became a commonwealth, with an increasing resemblance to those of the other Italian cities. The people were organized and armed, the guilds almost established, the two councils gradually constituted, and the aristocracy, while retaining special local characteristics, assumed its definitive shape. It is not surprising to find that Rome, like other Italian cities, now possessed statutes of its own. There has been much controversy on this point. Certain writers had alluded to a statute of 1246. As no one, however, could discover any statute of that date, others decided that it had never existed. A statute of 1363 was recently published by Professor Camillo Re, who asserted it to be the first and most ancient that Rome had possessed. But the still more recent researches of Messrs La Mantia and Levi prove that Professor Re's assertions were somewhat too bold. There is certain evidence of a *statutum senatus* existing between 1212 and 1227, of a *statutum vel capitulare senatoris vel senatus* of 1235, followed in 1241 by a *statutum urbis.* This brings us very near to the statute of 1246 mentioned by Vitale and others. So it is well ascertained that, in the first half of the 13th century, Rome possessed statutes at large composed of older limited statutes. The consuls of the trade guilds were from 1267 regular members of the councils; and the merchants' guild held general meetings in 1255. Its statutes were confirmed in 1296 by the senator Pandolfo Savelli, and the compilation of these, published in 1880 by Signor Gatti, refers to 1317.

Meanwhile the struggle between Frederick II. and the pope was once more renewed. The former sought to dominate Italy, separate the state from the church, and repress the republics. The latter, although really hostile to the Roman free Government, joined it against the emperor, who on his side favoured the republic of Rome and the nobles most adverse to the pope. Thus the new nobility, composed, as we have seen, of two different elements, was again split into a Guelf party headed by the Orsini and a Ghibelline party under the Colonna. And in 1238 it was deemed advisable to elect two senators instead of one, in the hope of conciliating both factions by simultaneously raising them to power. Afterwards one only was elected, alternately an Orsini and a Colonna, then again two, and so on. But all these changes failed in their aims, since the struggle between emperor and pope exasperated party feeling in Rome. The political genius of Frederick might have wrought great harm to the city had not his mind teemed with contradictory ideas. Although desirous to emancipate the state from the church, he was opposed to the communal democracy, which was then the chief strength of the secular state in Italy. While combating the church and persecuting her defenders, he yet sent heretics to the stake; although excommunicated, he undertook a crusade; he feasted at his table philosophers, sceptic and atheist poets, bishops, and Mussulmans; he proclaimed anti-Christian the possession of wealth by the church, yet made lavish gifts to altar and monastery. Thus, although he had a strong party in Rome, it seemed to dissolve at his approach, inasmuch as all feared that he might abolish the statutes and liberties of the commune. It fact, when he advanced towards Rome on the death of Gregory IX. in 1241 he was energetically repulsed by the people, and later even by Viterbo, a city that had always been faithful to him. But after he had withdrawn his adherents gained strength and put to flight his opponent, Innocent IV. (1243–54), the newly elected pope, who then from his asylum in France hurled an excommunication against him. Frederick's death in December 1250 determined the fall of the Ghibelline party and the close of the imperial epoch in Italy. The pope instantly returned to Rome with the set purpose of destroying the power of the Hohenstaufens. This was no longer difficult when, by the decease of Conrad IV. (1254), the child Conradin became the last legitimate representative of that line, and negotiations were already on foot for placing the Angevins on the Neapolitan throne.

Brancaleone degli Andalò, the first foreign senator.

The republic meanwhile preserved its independence against the pope, who, among other concessions, had entirely given up to it the right of coinage. Nevertheless, being much harassed by the factiousness of the nobility, it was obliged in 1252 to decide on the election of an alien senator armed with ample powers, precisely as other communes gave the government into the hands of a podestà. Accordingly a Bolognese noble, Brancaleone degli Andalò, count of Casalecchio, and a Ghibelline of much energy and talent, was invited to Rome. But before accepting office he insisted on making definite terms. He desired to hold the government for three years; and this, although contrary to the statutes, was granted. Further, to ensure his personal safety, he demanded that many scions of the noblest Roman houses should be sent as hostages to Bologna; and to this also the republic consented. Then, in August 1252, he came with his judges and notaries, made oath to observe justice and the laws, and began to govern. He was head of the republic in peace and in war, supreme judge and captain in chief. He nominated the podestàs of subject territories, despatched ambassadors, issued coin, concluded treaties, and received oaths of obedience. The pope, who was then at Perugia, was greatly afflicted by the arrival of this new master, but, despairing of aid from any quarter, was forced to make a virtue of necessity. Thus Brancaleone was able to seize the reins of power with a firm grasp. The parliament still met in the square of the Capitol, and the greater and lesser councils in the church of Ara Coeli. There were besides frequent assemblies of the college of Capitoline judges or *assectamentum.* Unfortunately, no records having been preserved of the proceedings of the Roman councils and parliament, little can be said of the manner in which affairs were conducted. Certainly Brancaleone's government was not very parliamentary. He convoked the councils as seldom as was possible, although he frequently assembled the people in parliament. The chief complaint made against him was of undue severity in the administration of justice. He rendered the clergy amenable to secular tribunals, subdued the neighbouring cities of Tivoli, Palestrina, &c., and commanded in person the attacking force. But his greatest energy was directed to the repression of the more turbulent nobles who were opposed to him; and he soon made them feel the weight of his hand by hanging some, banishing others, and persecuting several more. But he too recognized the expediency of winning the popular favour. He was the first senator to add to his title that of captain of the people ("Almae Urbis Senator Ill: et Romani Populi Capitaneus"). He befriended the people by promoting the organization of guilds after the manner of those of his native Bologna. There were already a few in Rome, such as the merchants' guild and that of the agriculturists, *Bobacteriorum* or *Bovattari*, who must have resembled the so-called *mercanti di campagna* or graziers of the present day, since no peasant guild existed in Italian republics. The merchants' guild, definitely established in 1255 under Brancaleone's rule, had four consuls and twelve councillors, held meetings, and made laws. The other guilds, thirteen in all, were organized much on the same plan. The admission of their heads into the councils of the republic in 1267 shows how efficaciously their interests had been promoted by Brancaleone.

The death of Innocent IV. and the election of Alexander IV. (1254–61), who was milder and less shrewd than his predecessor, were favourable events for Brancaleone; but he failed to check the growing discontent of the clergy and the more powerful nobles, who had received deadly injuries at his hands. And when, on the expiration of his three years' term of office, his re-election was proposed, his enemies rose against him, accused him before the *sindacato*, threw him into prison, and vehemently protested against the continuance of "foreign tyranny." His life was only spared on account of the hostages sent to Bologna. The next senator chosen was a Brescian Guelf, Emanuele de Madio, a tool of the nobles, who were now masters of the situation. But soon afterwards, in 1257, the guilds rose in revolt, drove the nobles from power, put the pope to flight, and recalled Brancaleone for another three years' term. He ruled more sternly than before, hung several nobles, and made alliance with Manfred, the representative of the Swabian party in Italy. This rendered him increasingly odious to the pope and procured his excommunication. But, disregarding the thunders of the church, he marched against Anagni, the pope's birthplace, and Alexander was quickly obliged to humiliate himself before the senator of Rome. Brancaleone next set to work to destroy the fortified towers of the nobility, and in razing them to the ground ruined many of the adjacent dwellings. Accordingly, a considerable number of nobles became homeless exiles. In 1258, while engaged on the siege of Corneto, Brancaleone was attacked by a violent fever, and, being carried back to Rome, died on the Capitoline Hill. Thus ended the career of a truly remarkable statesman. He was succeeded by his uncle, Castellano degli Andalò, who, lacking the political genius of his nephew, only retained office until the following spring (1259), in the midst of fierce and perpetual disturbances. Then the people, being bribed by the pope, joined with the nobles and drove him away. His life too was saved by having followed his nephew's shrewd plan of sending hostages to Bologna. Two senators of Roman birth were next elected; and on the death of Alexander IV. a French pope was chosen, Urban IV. (1261–64), thus giving fresh predominance in the church to the anti-Swabian policy. But the internal disturbances of the city soon drove Urban to flight.

At this period the fall of the empire had induced many Italian republics to seek strength by placing their governments in the hands of some prince willing to swear respect to their laws and to undertake their defence against neighbouring states and the pope. In Rome the Guelfs and Ghibellines proposed various candidates for this office, and after many fierce quarrels ended by electing a committee of *boni homines*, charged with the revision of the statutes, reorganization of the city, and choice of a senator. This committee sat for more than a year without nominating any one, so, the Guelf party being now predominant, and all being wearied of this provisional state of things, the majority agreed on the election as senator of Charles of Anjou, who, at the pope's summons, was already preparing for the conquest of Naples. He would defend Rome against the pope, and the pope would defend Rome against him. By thus taking advantage of either's jealousy the citizens hoped to keep their republic intact. In fact, although Urban IV. had incited Charles to attack Naples, he was by no means willing to see him established as master in Rome. He accordingly declared that, if Charles really wished to obtain the Neapolitan crown, he must only accept the offered dignity pending the conquest of that kingdom. And he must likewise promise to recognize the supremacy of the pope over the senate. Charles soothed him with the amplest verbal promises, but in fact accepted the senatorship for life. In 1265, when Urban was succeeded by Clement IV. (1265–68), who as a Provençal was a subject of Charles, the latter entered Rome and was immediately made senator. Seven days later (28th June) he received the investiture of the Neapolitan kingdom, and in the following January its crown. On the 26th February 1266 the battle of Benevento was fought, and, the valiant Manfred being killed, the triumph of the Guelf Angevins in Italy was assured. Then, at the urgent command of the pope, Charles was forced to resign the senatorship in the May of the same year. Two Romans were elected in his stead, but soon fell out with the pope, because the Guelf nobles again tried to exercise tyranny. The people, however, profited by these disturbances to rise on its own account, and formed a democratic government of twenty-six boni homines with Angelo Capocci, a Ghibelline, as its captain. By this government Don Henry, son of Ferdinand III. of Castile, was elected senator; and he came to Rome for the purpose of promoting a Ghibelline and Swabian policy in favour of Conradin, who was preparing for conflict. The rule of the new senator was very energetic, for he kept down the clergy, subdued the Campagna, persecuted the Guelf nobles, made alliance with the Tuscan Ghibellines, forcibly drove back the troops of King Charles, who was advancing towards Rome, and gave a splendid reception to Conradin. But the battle of Tagliacozzo (23rd August 1268), followed by the murder of Conradin, proved fatal to the Ghibelline party. Charles was re-elected senator immediately after the battle, and the pope confirmed his powers for a term of ten years, after having already named him imperial vicar in Tuscany. On the 16th September Charles for the second time took possession of the Capitol, and ruled Rome firmly by means of vice-governors or vicars.

Don Henry of Castile senator.

The Swabian line was now extinct, and in Charles's hands the Neapolitan kingdom had become a fief of the church. The empire had fallen so low as to be no longer formidable. Now therefore was the moment for treating with it in order to restrain Charles, and also for making use of the French king to keep the empire in check. And this was the policy of Nicholas III. (1277–80), who hastened to extract advantageous promises from Rudolph of Hapsburg, the new candidate for the imperial crown. In 1278, the ten years' term having expired, he deprived Charles of the senatorship and appointed Rudolph vicar of Tuscany. After declaring that he left to the people the right of electing the senator, he promulgated a new constitution (18th July 1278) which, while confirming the rights of the church over the city, prohibited the election of any foreign emperor, prince, marquis, count, or baron as senator of Rome. Thus the Colonna, Savelli, Orsini, Annibaldi, and other Roman nobles again rose to power, and the republic was again endangered and plunged in disorder. The Romans then gave the reconstitution of the city into the pope's hands by yielding to him the right of nominating senators, declaring, however, that this was a personal concession to himself, and not to the popes in general. So Nicholas proceeded to name senators, alternating a Colonna with an Orsini, or simultaneously choosing one of each faction. The same power over the senate was granted with the same restriction to Martin IV. (1281–85), and he at once re-elected Charles of Anjou. Thus, greatly to the disgust of the Romans, the Capitol was again invaded by French vicars, notaries, judges, and soldiery. But the terrible blow dealt at Charles's power by the Sicilian Vespers (31st March 1282) resounded even in Rome. The Orsini, backed by the people, rose to arms, massacred the French garrison, and quickly re-established a popular Government. Giovanni Cencio, a kinsman of the Orsini, was elected captain and defender of the people, and ruled the city with the co-operation of the senator and a council of priors of the guilds. This Government was of brief duration, for, although the pope had professed his willingness to tolerate the experiment, he quickly arranged fresh terms, and, forsaking Charles of Anjou, again nominated two Roman senators. Pope and king both died in 1285, and Nicholas IV. (1288–92), also holding sway over the senate, favoured the Colonna in order to curb the growing mastery of the Orsini. But thus there were two powerful houses instead of one. In fact Giovanni Colonna, when elected senator, ruled from the Capitol as an independent sovereign, conducted in person the campaign against Viterbo, and subjected that city to the republic on the 3d May 1291.

When one of the Gaetani, Boniface VIII. (1294–1303), was raised to the papal chair, the extent of the Colonnas' power became evident to all. Boniface opposed them in order to aggrandize his own kin, and they showed equal virulence in return. The Cardinals Colonna refused to acknowledge him as the legitimate pope, and he excommunicated them and proclaimed a crusade against their house. Even after he had subdued them and destroyed Palestrina, their principal fief, the drama did not yet come to an end. Boniface had a very lofty conception of the church, and desired to establish her supremacy over the state. The king of France (Philip the Fair) believed, on the contrary, that the Angevin successes entitled him to fill the place in Italy vacated by the Swabians, and to play the master there. This led to a tremendous contest in which all the French sided with their king. And shortly afterwards a plot was hatched against the pope by the agents of France and the Colonna. These determined enemies of the pope met with much favour in Rome, on account of the general irritation against the Gaetani and the enormous power conferred on them by Boniface. Suffice it to say that they were now lords of the whole of lower Latium, from Capo Circeo to Ninfa, from Ceprano to Subiaco. Thus Sciarra Colonna and a Frenchman named Nogaret were able to fall on the pope at Anagni, insult him, and take him prisoner. The people rising to his rescue, the conspirators were put to flight. But when Boniface returned to Rome with the escort and protection of the Orsini, who had made themselves masters of the city, he found that he was virtually a captive in their hands. He felt this so keenly that he died of rage and exhaustion on the 11th October 1303. The brief pontificate of his successor Benedict XI. was followed by that of Clement V. (1305–14), a Frenchman, who, instead of coming to Rome, summoned the cardinals to France. This was the beginning of the church's so-called exile in Avignon, which, although depriving Rome of a source of wealth and influence, left the republic to pursue its own course. It employed this freedom in trying to hold its own against the nobles, whose power was much lessened by the absence of the pope, and endeavoured to gain fresh strength by organizing the thirteen regions, which, as we have shown, were associations of a much firmer nature in Rome than the guilds. Accordingly, in 1305, a captain of the people was elected with thirteen elders and a senator, Paganino della Torre, who governed for one year. The pope was opposed to these changes at first, but in 1310 he issued a brief granting Rome full permission to select its own form of government. Thus, the first pope in Avignon restored the rights of the Romans. But the latter, even with church and empire so far removed, still considered Rome the Eternal City, the source of all law, and the only natural seat of the spiritual and temporal government of the world. To their republic, they thought, appertained a new and lofty destiny, nor could it ever be content to descend to the level of other Italian municipalities.

Henry VII.

On the 6th January 1309 Henry VII. was crowned king of the Romans at Aix-la-Chapelle; and so greatly were men's minds changed in Italy that, throughout the land, he was hailed as a deliverer. He wished to restore the grandeur of the empire, and the Italians, above all Dante Alighieri, beheld in him the champion of the state against the church, who, after becoming the foe of communal liberty, had forsaken Italy and withdrawn to France. The Roman people shared these ideas, and awaited Henry with equal impatience, but the nobles rose in opposition. The Orsini, leaders of the Guelfs, and allied with Robert of Naples, took possession of Castle St Angelo and the Trastevere. Hence, when Henry reached Rome in May 1312, after seizing the iron crown at Milan, he was obliged to act on the offensive. He took the Capitol by assault, but, failing in his attack on Castle St Angelo, was pursued by its Neapolitan garrison. Forsaken by many discouraged adherents, he was forced to recognize the expediency of departure. First, however, he desired to be crowned at the Lateran, St Peter's being held by his foes. The cardinals refused his request, but were compelled to yield by the threats of the people, who, reasserting their ancient rights, insisted that the coronation should take place without delay. And the ceremony was performed on the 29th June 1312. The emperor then resolved to depart in spite of the popular protest against his leaving the natural seat of the empire, and on the 20th August started for Tuscany, where worse fortune awaited him.

Their differences settled, the nobles expelled the captain of the people left by Henry, and elected as senators Sciarra Colonna and Francesco Orsini. But this was the signal for a popular revolt. The Capitol was attacked, the senators put to flight, and Jacopo Arlotti elected captain with a council of twenty-six worthies (*buoni homini*). The new leader instantly summoned the chief nobles before his tribunal, had them chained and cast into prison, and demolished many of their houses and strongholds. But, having thus humiliated their pride, Arlotti dared not put them to death, and, releasing them from confinement, banished them to their estates, where they plunged into hostile preparations. Meanwhile the victorious people convoked a parliament and decreed that, the aristocracy being now overthrown, the *tribunitia potestas* alone should invite the emperor to make his triumphal entry into the Capitol, and receive his authority from the people of Rome. This conception of the Roman power will now be seen to become more and more definite until finding its last expression in Cola di Rienzo. Pope Clement, resigning himself to necessity, acknowledged the new government under the energetic rule of Arlotti. The latter now joined the Ghibellines of the Campagna against the Orsini and the Neapolitans, subdued Velletri, and gave it a podestà. But then the Gaetani, who were Guelfs, united with the Orsini and the Neapolitans, and, giving battle to the Ghibellines in the Campagna, routed them in such wise as to put an end to the popular government. The nobles forced their way into the city, attacked the Capitol, made Arlotti their prisoner, and re-elected the senators Sciarra Colonna and Francesco Orsini. Close upon these reverses came the death of Henry VII. (24th August 1313) at Buonconvento near Siena, which put an end to the Ghibelline party in Italy. Thereupon King Robert of Naples, being named senator by the pope, immediately appointed a vicar in Rome. Clement likewise profited by the vacancy of the imperial throne to name the king imperial vicar in Tuscany. And he died on the 20th April 1314, well content to have witnessed the triumphs of the Guelfs in Italy.

Affairs took a fresh turn under Pope John XXII. (1316–34). Rome was still ruled by the vicars of King Robert; but, owing to the continued absence of the popes, matters grew daily worse. Trade and industry declined, revenue diminished, the impoverished nobles were exceedingly turbulent, deeds of murder and violence occurred on all sides; even by day the streets of the city were unsafe. Hence there was universal discontent. Meanwhile Louis the Bavarian, who in 1314 had been crowned king of the Romans, having overcome his German enemies at Mühldorf in 1322, turned against the pope, one of his fiercest opponents. Louis was surrounded by Minorite friars, supporters of the poverty of the church, and consequently enemies to the temporal power. They were men of the stamp of William of Occam, Marsilio of Padua, Giovanni Janduno, and other philosophers favourable to the rights of the empire and the people. Accordingly the Italian Ghibellines hailed Louis as they had previously hailed Henry. Even the Roman people were roused to action, and, driving out the representatives and partisans of King Robert, in the spring of 1327, seized on Castle St Angelo, and again established a democratic government. "Nearly all Italy was stirred to new deeds," says G. Villani, "and the Romans rose to arms and organized the people" (bk. x. c. 20). Regardless of the reproofs of the pope, they elected a haughty Ghibelline, Sciarra Colonna, captain of the people and general of the militia, with a council of fifty-two *popolani*, four to each region. Then, ranged under the standards of the militia, the Romans gave chase to the foes of the republic, and Sciarra, returning victorious, ascended to the Capitol and invited Louis the Bavarian to Rome. The summons was obeyed; on the 7th January 1328 the king was already encamped in the Neronian Fields with five thousand horse and a considerable number of foot soldiers, and, with better fortune than Henry VII., was able to enter the Vatican at once.

ciarra olonna, ptain f the eople.

Encircled by a crowd of heretics, reformers, and Minorite brethren, he convoked a parliament on the Capitol, asking that the imperial crown might be conferred upon him by the people, from whom alone he wished to receive it. And the people proclaimed him their captain, senator, and emperor. On the 17th January his coronation took place in St Peter's. But, as he had neither money nor practical sense, his method of taxation and the excesses committed by himself and his over-excited philosophers speedily aroused the popular discontent. His ecclesiastical vicar, Marsilio of Padua, and Giovanni Janduno placarded the walls with insulting manifestoes against the pope, whom the Minorites stigmatized as a heretic and wished to depose. In April Louis twice assembled the parliament in St Peter's Square, and, after obtaining its sanction to several anti-papal edicts, declared John XXII. degraded and deposed as a heretic. This was a very strange and novel spectacle, the more so that, as was speedily proved, the Romans were stirred by no anti-Catholic spirit, no yearning for religious reform. Jacopo Colonna, a canon of the Lateran, was able to make his way into Rome with four masked companions, to publicly read, at the top of his voice and before a great multitude, the excommunication launched against the emperor by the deposed pope, to traverse the entire city, and to withdraw unmolested to Palestrina. Meanwhile the emperor contented himself with decreeing that henceforth the popes must reside in Rome,—that if, when invited, they should fail to come they would be thereby held deposed from the throne. As a logical consequence, proceedings were immediately begun for the election of the new pope, Nicholas V., who on the 12th May was proclaimed by the popular voice in St Peter's Square, and received the imperial sanction. But this ephemeral drama came to an end when the emperor departed with his antipope on the 4th August. This caused the immediate downfall of the democratic Government. Bertoldo Orsini, who had returned to Rome with his Guelfs, and Stefano Colonna were elected senators, and confirmed in the office by Cardinal Giovanni Orsini in the name of the pope. A new parliament cancelled the emperor's edicts, and had them burnt by the public executioner. Later, Nicholas, the antipope, went with a rope about his neck to make submission to John XXII., and Louis promised to disavow and retract all that he had done against the church, provided the sentence of excommunication were withdrawn. This, however, was refused. Never had the empire fallen so low. Meanwhile King Robert was again supreme in Rome, and, being re-elected senator, appointed vicars there as before. Anarchy reigned. The city was torn by factions, and the provinces rebelled against the French representatives of the pope, who, in their ignorance of Italian affairs, were at a loss how to act.

And after the election of Benedict XII. (1334–42) confusion reached so great a pitch that, on the expiration of Robert's senatorial term, the Romans named thirteen heads of regions to carry on the government with two senators, while the king still sent vicars as before. The people, for the sake of peace, once more granted the supremacy of the senate to the pope, and he nominated two knights of Gubbio, Giacomo di Cante dei Gabrielli and Bosone Novello dei Gabrielli, who were succeeded by two other senators the following year. But in 1339 the Romans attacked the Capitol, named two senators of their own choice, re-established a democratic Government, and sent ambassadors to Florence to ask for the ordinances of justice (*ordinamenti della giustizia*), by which that city had broken the power of the nobles, and also that a few skilled citizens should lend their help in the reconstitution of Rome. Accordingly some Florentines came with the *ordinamenti*, some portions of which may be recognized in the Roman statutes, and, after first rearranging the taxes, elected thirteen priors of the guilds, a gonfalonier of justice, and a captain of the people after the Florentine manner. But there was a dissimilarity in the conditions of the two cities. The guilds having little influence in Rome, the projected reform failed, and the pope, who was opposed to it, re-elected the senators.

Thereupon public discontent swelled, and especially when, by the foundation of the papal palace of Avignon, it was evident that Benedict XII had no intention of restoring the Holy See to Italy. This pope was succeeded in 1342 by Clement VI. (1342–52), and King Robert in 1343 by his niece Joanna; and the latter event, while plunging the kingdom in anarchy, likewise aggravated the condition of Rome. For not only were the Neapolitan sovereigns still very powerful there, but the principal Roman nobles held large fiefs across the Neapolitan borders.

Shortly before this another revolution in Rome had re-established the government of the Thirteen and the two senators. The people, being anxious to show their intention of respecting the papal authority, had despatched to Avignon as ambassador of the republic, in 1343, a man destined to make much noise in the world. This was Cola di Rienzo, son of a Roman innkeeper, a notary, and an impassioned student of the Bible, the fathers, Livy, Seneca, Cicero, and Valerius Maximus. Thoroughly imbued with a half pagan half Christian spirit, he believed that he had a divinely inspired mission to revive the ancient glories of Rome. Of handsome presence, full of fantastic eloquence, and stirred to enthusiasm by contemplation of the ruined monuments of Rome, he harangued the people with a stilted oratory that enchanted their ears. He hated the nobles, because one of his brothers had been killed by them; he loved the republic, and in its name addressed a stately Latin speech to the astonished pope, and, offering him the supreme power, besought his instant return to Rome. He also begged him to allow the city to celebrate a jubilee every fifty years, and then, as a personal request, asked to be nominated notary to the urban chamber. The pope consented to everything, and Rienzi communicated this good news to Rome in an emphatically worded epistle. After Easter, in 1344, he returned to Rome, and found to his grief that the city was a prey to the nobles. He immediately began to admonish the latter, and then, draped in a toga adorned with symbols, exhibited and explained allegorical designs to the people, and announced the speedy restoration of the past grandeur of Rome Finally he and a few burghers and merchants, whom he had secretly inflamed by his discourses, made a solemn vow to overthrow the nobility and consolidate the republic. The moment was favourable, owing to the anarchy of Naples, the absence of the pope, the weakness of the empire, and the disputes of the barons, although the latter were still very potent and constituted, as it were, a separate government opposed to that of the people. Rienzi, having gained the pope's ecclesiastical vicar to his side, passed in prayer the night of the 19th May 1347, placing his enterprise under the protection of the Holy Spirit, and the following day marched to the Capitol, surrounded by his adherents, convoked a parliament of the people, and obtained its sanction for the following proposals:—that all pending lawsuits should be at once decided; that justice should be equally administered to all; that every region should equip one hundred foot soldiers and twenty-five horse; that the dues and taxes should be rearranged; that the forts, bridges, and gates of the city should be held by the rector of the people instead of by the nobility; and that granaries should be opened for the public use. On the same day, amid general homage and applause, Rienzi was proclaimed head of the republic, with the title of tribune and liberator of the Holy Roman Republic, "by authority of the most merciful Lord Jesus Christ." The nobles withdrew scoffing but alarmed. Rienzi engaged a body-guard of one hundred men, and assumed the command of thirteen hundred infantry and three hundred and ninety light horse; he abolished the senators, retained the Thirteen and the general and special councils, and set the administration on a new footing. These measures and the prompt submission of the other cities of the state brought an instant increase of revenue to Rome.

This revolution, as will be noted, was of an entirely novel stamp. For its leader despatched envoys to all the cities of Italy, exhorting them to shake off the yoke of their tyrants, and send representatives to the parliament convoked for the 1st August, inasmuch as the liberation of Rome also implied the "liberation of the sacred land of Italy." In Rienzi's judgment the Roman revolution must be, not municipal, but national, and even in some points universal. And this idea was welcomed with general enthusiasm throughout the peninsula. Solemn festivals and processions were held in Rome; and, when the tribune went in state to St Peter's, the canons met him on the steps chanting the *Veni, Creator Spiritus.* Even the pope, willingly or unwillingly, accorded his approval to Rienzi's deeds. The provincial cities did homage to Rome and her tribune, and almost all the rest of Italy gave him its enthusiastic adherence. The ancient sovereign people seemed on the point of resuscitation. And others besides the multitude were fascinated and carried off their feet. Great men like Petrarch were transported with joy. The poet lauded Cola di Rienzo as a sublime and supernatural being, the greatest of ancient and modern men. But it was soon evident that all this enthusiasm was mainly factitious. On the 26th of July a new parliament was called, and this decreed that all the rights and privileges granted to the empire and church must now be vested in the Roman people, from whom they had first emanated. But on the convocation of the national parliament few representatives obeyed the summons and the scheme was a failure. All had gone well so long as principles only were proclaimed, but when words had to be followed by deeds the municipal feeling awoke and distrust began to prevail. Nevertheless, on the 1st August Rienzi assumed the spurs of knighthood and passed a decree declaring that Rome would now resume her old jurisdiction over the world, invoking the Holy Spirit upon Italy, granting the Roman citizenship to all her cities, and proclaiming them free in virtue of the freedom of Rome. This was a strange jumble of the ancient Roman idea combined with the mediæval. It was a dream of Rienzi's brain, but it was also the dream of Dante and Petrarch. The conception of the empire and the history of Italy, particularly that of ancient and mediæval Rome, were inevitably preparing the way for the national idea. This Rienzi foresaw, and this constitutes the true grandeur of his character, which in other respects was not exempt from pettiness and infirmity. He pursued his course, therefore, undismayed, and had indeed gone too far to draw back. On the 15th August he caused himself to be crowned tribune with great pomp, and confirmed the rights of Roman citizenship to all natives of Italy. But practical matters had also to be taken into account, and it was here that his weakness and lack of judgment were shown. The nobles remained steadily hostile, and refused to yield to the charm of his words. Hence conflict was unavoidable; and at first Rienzi succeeded in vanquishing the Gaetani by means of Giovanni Colonna. He next endeavoured to suppress the Guelf and Ghibelline factions, and to restore Italy to "holy union" by raising her from her present abasement.

The pope, however, was weary of toleration, and, coming to terms with the nobles, incited them to war. They accordingly moved from Palestrina, and on the 30th November were encamped before Rome. Rienzi now put forth his energy. He had already called the militia to arms, and a genuine battle took place in which eighty nobles, chiefly of the Colonna clan, were left dead. This was a real catastrophe to them, and the aristocracy never again achieved the rule of the republic But Rienzi's head was turned by this sudden success. In great need of money, he began to play the tyrant by levying taxes and exacting instant obedience. The papal legate saw his opportunity and seized it, by threatening to bring a charge of heresy against the tribune. Rienzi was dismayed. He declared himself friendly to the pope and willing to respect his authority; and he even sought to conciliate the nobles. At this moment certain Neapolitan and Hungarian captains, after levying soldiers with the tribune's consent, joined the nobles and broke out in revolt On their proving victorious in a preliminary encounter with some of Rienzi's guards, the tribune suddenly lost heart, resigned the power he had held for seven months, and took refuge with a few trusty adherents in Castle St Angelo, on the 15th December 1347. Thence he presently fled to Naples, vainly hoping to find aid, and afterwards disappeared for some time from the scene.

Meanwhile the Romans remained tranquil, intent on making money by the jubilee; but no sooner was this over than disorders broke out and the tyranny of the baronage recommenced. To remedy this state of things, application was made to the pope. He consulted with a committee of cardinals, who sought the advice of Petrarch, and the poet suggested a popular government, to the complete exclusion of the nobles, since these, he said, were strangers who ruined the city. The people had already elected the Thirteen, and now, encouraged by these counsels, on the 26th December 1351 chose Giovanni Perrone as head of the republic. But the new leader was unable to withstand the hostilities of the nobles; and in September 1353 Francesco Baroncelli was elected tribune. He was a follower of Rienzi, had been his ambassador to Florence, and did little beyond imitating his mode of government and smoothing the way for his return.

Rienzi had spent two years in the Abruzzi, leading a life of mystic contemplation on Monte Maiella Then, in 1350, he had gone to Prague and endeavoured to convert to his ideas the yet uncrowned emperor Charles IV. When apparently on the point of success, he was sent under arrest to the new pope, Innocent VI. (1352–62), a man of great shrewdness and practical sense. On Rienzi's arrival at Avignon it became evident that his popularity was still very great, and that it would be no easy task to dispose of him. The Romans were imploring his return; Petrarch lauded him as a modern Gracchus or Scipio; and the pope finally released him from confinement. Innocent had decided to send to Italy, in order to settle affairs and bring the state into subjection to the church, that valiant captain and skilled politician, Cardinal Albornoz. And, having no fear that the latter's hand would be forced, he further decided that Rienzi should be sent to give him the support of his own popularity in Rome. In fact directly the pair arrived Baroncelli was overthrown, the supremacy of the senate granted to the pope, and the government confided to Albornoz, who, without concerning himself with Rienzi, nominated Guido Patrizi as senator. He then marched at the head of his troops against Giovanni, prefect of Vico, and forced him to render submission at Montefiascone on the 5th June 1354. With the same promptitude and skill he reduced Umbria and the Tuscan and Sabine districts, consented to leave the privileges of the cities intact in return for their recognition of the papal authority, and planted fortresses in suitable positions. In the meantime Rienzi's popularity was increasing in Rome; without either money or arms, the ex-tribune succeeded by his eloquence in winning over the two Provençal leaders, brothers of the famous free captain Fra Monreale; and, seduced by his promises and hopes, they supplied him with funds. Then, profiting by his prestige, the apparent favour of the pope, and the sums received, he was able to collect a band of five hundred soldiers of mixed nationalities and returned towards Rome. On Monte Mario he was met by the cavallerotti. On the 1st August 1354 he entered the Castello gate, took possession of the government, named Monreale's two brothers his captains, and sent them to lay siege to Palestrina, which was still the headquarters of the Colonna. But then money ran short, and he again lost his head. Inviting Fra Monreale to a banquet, he put him to death for the sake of his wealth, and kept the two brothers in confinement. This act excited general indignation. And when, after his ill-gotten gains were spent, he again recurred to violence to fill his purse, the public discontent was vented in a sudden revolt on the 8th October. The people stormed the Capitol with cries of "Death to the traitor." Rienzi presented himself at a window waving the flag of Rome. But the charm was finally broken. Missiles were hurled at him; the palace was fired. He hid himself in the courtyard, shaved his beard, and, disguised as a shepherd with a cloth over his head, slipped into the crowd and joined in their cries against himself. Being recognized, however, by the golden bracelets he had forgotten to remove, he was instantly stabbed. For two days his corpse was left exposed to the insults of the mob, and was then burned. Such was the wretched end of the man who, at one moment, seemed destined to fill the world with his name as the regenerator of Rome and of Italy.

The popes seek to constitute a temporal kingdom.

In all the Italian cities the overthrow of the aristocracy had led to military impotence and pressing danger of tyranny. The same thing had happened in Rome when the nobility, weakened by the absence of church and empire, received its death blow from Rienzi. But, whereas elsewhere tyrants were gradually arising in the citizen class, Rome was always in danger of oppression by the pope. Nor was any aid available from the empire, which had never recovered from its abasement under Louis the Bavarian. In fact, when Charles of Luxembourg came to Rome to be crowned, he was obliged to promise the pope that he would not enter the city. On Easter day 1355 he received the crown, and departed, after counselling the Romans to obey the pope. And the pontiffs had greater need than ever of an established kingdom. Their position in France was much endangered by that country's disorder. New states were being formed on all sides; the mediæval unity was shattered; and the shrunken spiritual authority of the church increased her need of material strength. As Italian affairs stood, it would be easy for the popes to found a kingdom, but their presence was required in Rome before it could be firmly established. The blood-stained sword of Albornoz had prepared the way before them. In 1355-56 he vanquished the lords or tyrants of Rimini, Fano, Fossombrone, Pesaro, Urbino, and other cities. And all these places had been so rudely oppressed that the cardinal was often hailed as a liberator after subduing their masters by fire and sword. But everywhere he had been obliged to leave existing Governments and rulers *in statu quo* after exacting their oaths of fealty. Thus the state was still dissevered, and it was impossible to bind it together with the pope at Avignon and Rome a republic. Bologna was still independent, Ordelaffi still lord of Forlì; Cesena and other cities were still rebellious; and the Campagna was still in the hands of the barons. Some places were ruled by rectors nominated by the pope; at Montefiascone there was an ecclesiastical rector, with a bench of judges, and a captain commanding a mixed band of adventurers. Rome had submitted to the haughty cardinal, but hated him mortally, and, on his departure for Avignon in 1357 to assist the threatened pontiff, immediately conceded to the latter the supremacy of the senate. And the pope, instead of two senators, hastened to name a single one of foreign birth. This was a shrewd device of Albornoz and another blow to the nobles, with whom he was still at war. Thus was inaugurated, by the nomination of Raimondo de' Tolomei in 1358, a series of foreign senators, fulfilling the functions of a podestà, and changed every six months, together with their staff of judges, notaries, and knights. The people approved of this reform as being inimical to the nobles and favourable to the preservation of liberty. Hitherto the senators had been assisted, or rather kept in check, by the thirteen representatives of the regions. These were now replaced by seven reformers, in imitation of the priors of Florence, the better to follow that city's example. The reformers were soon the veritable chiefs of the republic. They first appeared in 1360, were either *popolani* or *cavallerotti*, and were elected by ballot every three months. When Albornoz returned to Italy, although desirous to keep Rome in the same subjection as the other cities, he had first to vanquish Ordelaffi and reduce Bologna. The latter enterprise was the more difficult task, and provoked a lengthy war with Matteo Visconti of Milan. Thus Rome, being left to herself, continued to be governed by her reformers; and the nobles, already shut out from power, were also excluded from the militia, which had been reorganized, like that of Florence, on the democratic system. Three thousand men, mostly archers, were enrolled under the command of two banderesi, "in the likeness," says M. Villani, "of our gonfaloniers of the companies," with four *antepositi* constituting a supreme council of war. And the whole body was styled the "Felix Societas Balestrariorum et Pavesatorum." It was instituted to support the reformers and re-establish order in the city and Campagna, to keep down the nobles and defend the republic. It fulfilled these duties with much, and sometimes excessive, severity. Banderesi and antepositi had seats in the special council beside those of the reformers, as, in Florence, the gonfaloniers of the companies were seated beside the priors. Later these officials constituted the so-called *signoria dei banderesi*. In 1362, the Romans having subjected Velletri, which was defended by the nobles, the latter made a riot in Rome. Thereupon the banderesi drove them all from the city, killed some of their kindred, and did not even spare the cavallerotti. The fight became so furious that from gate to gate all Rome was in arms, and even mercenaries were hired. But in the end renewed submission was made to the pope.

The banderesi

On the death of Innocent VI. in 1362, an agreement was concluded with his successor Urban V. (1362–70), also a Frenchman, who was obliged to give his sanction to the government of the reformers and banderesi. And then, Albornoz being recalled in disgrace to Avignon, and afterwards sent as legate to Naples, these Roman magistrates were able, with or without the co-operation of the foreign senator, to rule in their own way. They did justice on the nobles by hanging a few more; and they defended the city from the threatening attacks of the mercenaries, who had now become Italy's worst foes. It was at this period that the Roman statutes were revised and rearranged in the compilation erroneously attributed by some writers to Albornoz, which has come down to us supplemented by alterations of a later date.

But now the popes, being no longer in safety at Avignon, really decided to return to Italy. Even Urban V. had to pay ransom to escape from the threatened attacks of the free companies. The Romans implored his return and he was further urged to it by the Italian *literati* with Petrarch at their head. In April 1367 he finally quitted Avignon, and, entering Rome on the 16th October, was given the lordship of the city. Cardinal Albornoz had fallen mortally ill at Viterbo, but, though unable to accompany the pope to Rome, had, before dying, suggested his course of action. Certainly Urban showed much acumen in profiting by the first burst of popular enthusiasm to effect quick and dexterous changes in the constitution of the republic. After naming a senator, he abolished the posts of reformers and banderesi, substituting three conservators, or rather a species of municipal council, alone charged with judicial and administrative powers, which has lasted to the present day. The thirteen leaders of the regions and the consuls of the guilds still sat in the councils, which were left unsuppressed. But all real power was in the hands of the pope, who, in Rome, as in his other cities, nominated the principal magistrates. Thus, by transforming political into civil institutions and concentrating the supreme authority in his own grasp, Urban V. dealt a mortal blow to the liberties of Rome. Yet he felt no sense of security among a people who, after the first rejoicings over the return of the Holy See, were always on the brink of revolt. Besides he felt himself a stranger in Italy, and was so regarded. Accordingly, in April 1370 he decided to return to France; on the 20th of that month he wrote from Viterbo that no change was to be made in the government; and he died in Avignon on the 19th of December.

Urb begins destry the republic.

The Romans retained the conservators, conferring on them the political power of the reformers; they re-established the banderesi with the Florentine title of *executores justitiae* and the four antepositi with that of consiliarii. Thus the "Felix Societas Balestrariorum et Pavesatorum Urbis" was restored, and the two councils met as before. The new French pope, Gregory XI. (1370–78), had to be content with obtaining supremacy over the senate and the possession of the Castle St Angelo. It was a difficult moment for him. The Florentines had come to an open rupture with his legates, and had adopted the expedient of inviting all the cities of the Roman state to redeem their lost freedom. Accordingly in 1375 many of them rose against the legates, who were mostly French and regarded with dislike as foreigners. Florentine despatches, full of classical allusions and chiefly composed by the famous scholar, Secretary Coluccio Salutati, were rapidly sent in all directions. Those addressed to the Romans were specially fervid, and emphatically appealed to their patriotism and memories of the past. But the Romans received them with doubt and mistrust, for they saw that the revolution threatened to dismember the state, by promoting the independence of every separate city. Besides, while maintaining their republic, they also desired the pope's presence in Rome. Nevertheless they went with the current to the extent of reforming their constitution. In February 1376 they nominated Giovanni Cenci captain of the people, and gave him uncontrolled power over the towns of the patrimony and the Sabine land. The conservators, with their new political authority, the executores, the antepositi, and the two councils were all preserved, and a new magistracy was created, the "Tres Gubernatores Pacis et Libertatis Reipublicae Romanae." This answered to the Eight (afterwards Ten) of War in Florence, likewise frequently called the Eight of Liberty and Peace. It was this Council of Eight that was now directing the war against the pope and braving his sentence of excommunication; and their fiery zeal had won them the title of the Holy Eight from the Florentines.

Re-esta lishmen of the republic and the banderesi.

Realizing that further absence would cost him his state, Gregory XI. quitted Avignon on the 13th September 1376, and, reaching Corneto in December, despatched to

Rome three legates, who, on the 21st of the month, concluded an agreement with the parliament. The people gave up the gates, the fortresses, and the Trastevere, and promised that if the pope returned to Rome he should have the same powers which had been granted to Urban V. But, on his side, he must pledge himself to maintain the executores, their council, the Three of War, and allow the Romans the right of reforming the banderesi, who would then swear fealty to him. The terms of this peace and the pope's epistles clearly prove that the two councils still exercised their functions, that the banderesi were still the virtual heads of the Government, and that their suppression was not contemplated. In fact, when the pope made his entry on the 17th January 1377 accompanied by two thousand armed men, he perceived that there was much public agitation, that the Romans did not intend to fulfil their agreement, and that the Government of the banderesi went on as before. Accordingly, after naming Gomez Albornoz, a nephew of the deceased cardinal, to the office of senator, he retired to Anagni, and remained there until November 1377. The Romans presently waited on him with conciliating offers, and begged him to negotiate a peace for them with the prefect of Vico. In fact the treaty was concluded at Anagni in October, and on the 10th November confirmed in Rome by the general council. The meeting was held in the great hall of the Capitol, "ubi consilia generalia urbis fieri solent," in the presence of all the members of the republican Government. But the pope was enraged by the survival of this Government, and, being worn out by the persistent hostility of the Florentines, which reduced his power to a low ebb, had determined to make peace, when surprised by death on the 27th March 1378.

The next pope, Urban VI. (1378–89), a Neapolitan, was the spirit of discord incarnate. His election was not altogether regular: the French party among the cardinals was against him; and the people were ripe for insurrection. But, regardless of all this, Urban threatened the cardinals in his first consistory, saying that church reform must begin with them; and he used the same tone with the people, reproving them for failing to suppress the banderesi. In consequence of this the cardinals of the French party, assembling at Fondi, elected the antipope Clement VII. (1378–94) and started a long and painful schism in the church. Clement resided in Avignon, while Urban in Rome was engaged in opposing Queen Joanna I. of Naples and favouring Charles of Durazzo, who, on conquering the Neapolitan kingdom, was made gonfalonier of the church and senator of Rome, where he left a vicar as his deputy. Shortly afterwards the pope went to Naples, and made fierce war on the king. Then, after many adventures, during which he tortured and put to death several cardinals whom he suspected of hostile intentions, he returned to Rome, where the utmost disorder prevailed. The conservators and the banderesi were still at the head of the Government, and, the pope speedily falling out with them, a riot ensued, after which he excommunicated the banderesi. These at last made submission to him, and Urban VI. became master of Rome before his death in 1389. He was succeeded by Boniface IX. (1389–1404), another Neapolitan, but a man of greater shrewdness and capacity. His first act was to crown Ladislaus king of Naples, and secure the friendship and protection of this ambitious and powerful prince. In all the principal cities of the state he chose the reigning lords for his vicars. But he allowed Fermo, Ascoli, and Bologna the privilege of assuming their own vicariate for twenty-five years. And, as these different potentates and Governments had only to pay him an annual tribute, all parties were satisfied, and the pope was able to bestow at least an appearance of order and unity on his state. But fresh tumults soon arose, partly because the conservators and banderesi sought to govern on their own account, and especially because the pope seems for a time to have omitted naming the senator. Boniface was a prudent man; he saw that events were turning in his favour, now that throughout Italy liberty was tottering to its fall, and bided his time. He was satisfied for the moment by obtaining a recognition of the immunities of the clergy, rendering them solely amenable to ecclesiastical tribunals, and thus distinguishing the powers of the church from those of the state in Rome. The republic also pledged itself neither to molest the prelates nor to levy fresh contributions on them towards repairing the walls, to aid in recovering the estates of the church in Tuscia, and to try to conciliate the baronage. This concordat, concluded with the conservators and banderesi on the 11th September 1391, was also confirmed on the 5th March 1392 by the heads of the regions, together with a fresh treaty binding both parties to furnish a certain number of armed men to combat the prefect of Vico and the adherents of the antipope at Viterbo. With the exception of this city, Orchi, and Civita Vecchia, all other conquered territory was to belong to the republic. But the Romans soon discovered that they were playing into the hands of the pope, who kept everything for himself, without even paying the troops. Upon this a riot broke out; Boniface fled to Perugia in October 1392, and resolved to exact better terms when next recalled to Rome. Meanwhile the Romans subdued the prefect, captured Viterbo, and, being already repentant, handed it over to the pope and implored his return. He then proposed his own terms, which were approved, not only by the conservators, banderesi, and four councillors, but also by the special council and by the unanimous vote of a general assembly composed of the above-mentioned authorities, heads of regions, other officials, and a hundred citizens (8th August 1393). These terms prescribed that the pope was to elect the senator, and that, on his failing so to do, the conservators would carry on the government after swearing fealty to him. The senatorial function was to be neither controlled nor hampered by the banderesi. The immunities of the clergy were to be preserved, and all church property was to be respected by the magistrates. The expenses of the pope's journey were to be paid, and he was to be escorted to Rome in state. Boniface tried to complete his work by abolishing the banderesi, the last bulwarks of freedom; but the people, although weakened and weary, made efforts to preserve them, and, although their fall was inevitable, the struggle went on for some time.

Boniface IX. continues the destruction of the republic.

During the spring of 1394 the banderesi provoked an insurrection in which the pope's life was endangered; it was only saved by the arrival of King Ladislaus, who came from Naples with a large force in the early autumn. But for the Neapolitan soldiery Boniface could not have withstood the long series of revolts that continually exposed him to fresh perils and the anxiety caused by the persistent schism of the church. The death of Clement VII. in 1394 was followed by the election of another antipope, Benedict XIII. But a new jubilee was in prospect for the year 1400, and this was always an efficacious means of bending the will of the Romans. Depending upon this and the assistance of Ladislaus, Boniface not only demanded full powers to nominate senators (none having been recently elected), but insisted on the suppression of the banderesi. Both requests were granted; but, directly Angelo Alaleoni was made senator, a conspiracy was hatched for the re-establishment of the banderesi. However, the pope felt sure of his strength; the plot was discovered and the conspirators were beheaded on the stairs of the Capitol. This proved the end of the banderesi and of the liberties of Rome. The government was again directed by an alien senator together with three conservators, but the latter were gradually deprived of their political attributes, and became mere civil officers. The militia, regions, guilds, and other associations now rapidly lost all political importance, and before long were little more than empty names. Thus in 1398 the Romans submitted to the complete sway of the pope, and in July of the same year the senator chosen by him was Malatesta dei Malatesti of Rimini, one of a line of tyrants, a valiant soldier, who was also temporal vicar and captain general of the church Boniface continued to appoint foreign senators during the rest of his life; he fortified Castle St Angelo, the Vatican, and the Capitol; he stationed galleys at the mouth of the Tiber, and proved himself in all things a thoroughly temporal prince. He aggrandized all his kindred, especially his brother, and, with the aid of his senator, his armed force, and the protection of Ladislaus, succeeded in keeping down all the surviving nobles. In 1400, however, these made an attempt to upset the Government. Niccolò Colonna forced his way into the city with cries of "Popolo, popolo! death to Boniface!" But the Romans had grown deaf to the voice of liberty; they refused to rise, and the senator, a Venetian named Zaccaria Trevisan, behaved with much energy. Colonna and his men had to beat a swift retreat to Palestrina. A charge of high treason was immediately instituted against him, and thirty-one rebels were beheaded. The pope then proclaimed a crusade against all the Colonna, and sent a body of two thousand men and some of the Neapolitan soldiery to attack them. Several of their estates were seized and devastated, but Palestrina continued to hold out, and on the 7th January 1401 the Colonna finally made submission to the pope. Nevertheless they obtained advantageous terms, for Boniface left them their lands, appointed them vicars of other territories, and made similar agreements with the Gaetani and Orsini. In this way he became absolute master of Rome. One chronicler remarks that "Romanis tanquam rigidus imperator dominabatur," and the same tone is taken by others. But he did not succeed in putting an end to the schism of the church, which was still going on when he died in the Vatican on the 1st October 1404.

Innocent VII (1404–6) was the next pope. He too was a Neapolitan, and on his election the people again rose in revolt and refused to acknowledge him unless he consented to resign the temporal power. But Ladislaus of Naples hastened to his help, and an agreement was made which, under the cover of apparent concessions, really riveted the people's chains. Rome was recognized as the seat of the temporal and spiritual sovereignty of the pope; and the pope continued to appoint the senator. The people were to elect seven governors of the city, who were to swear fealty to the pope and carry on the government in conjunction with three other governors chosen by the pontiff or Ladislaus. The stipulations of Boniface IX. concerning ecclesiastical immunities were again confirmed. The barons were forbidden to place more than five lances each at the service of the people, and—which was the real gist of the covenant—the people were henceforth forbidden to make laws or statutes without the permission of the pope. The captain of the people, deprived of his political and judicial functions and reduced to a simple judge, was also to be chosen by the pope. But this treaty, drawn up on the 27th October 1404, was not signed at the time, and many difficulties and disturbances arose when its terms were to be put into effect. The Romans nominated the seven governors, but, without waiting until the pope had chosen three more, placed the state in their hands, and styled them governors of the liberty of the Roman republic They were in fact banderesi or reformatori under a new name. But the attempt proved inefficacious, for, at the pope's first threat of departure, the Romans made their submission, and the treaty of October was subscribed on the 15th May 1405. Nevertheless, as it only bears the signatures of the "seven governors of the liberty of the Roman republic," the pope would seem to have made some concessions. His position was by no means assured. Ladislaus was known to aspire to absolute dominion in Italy, and, although willing to aid in suppressing the republic, tried to prepare the way for his own designs, and frequently held out a helping hand to the vanquished. On the 6th August fourteen influential citizens of Rome boldly presented themselves at the Vatican, and in a threatening manner called the pope to account for giving his whole attention to worldly things, instead of endeavouring to put a stop to the schisms of the church. But, on leaving his presence, they were attacked by Luigi Migliorati, the pope's nephew, and notorious for his violence, who killed eleven of their number, including several heads of the regions and two of the governors. An insurrection ensued, and the pope and his nephew fled to Viterbo. The Colonna tried to profit by these events, and applied to Ladislaus, who, hoping that the moment had come to make himself master of Rome, sent the count of Troia thither with a troop of three thousand horse. But the people, enraged by this treachery, and determined not to fall under the yoke of Naples, awoke for an instant to the memory of their past glories, and bravely repulsed the Colonna and the Neapolitans. And, on the speedy arrival of the Orsini with some of the papal troops, the people voluntarily restored the papal government, and, assembling the parliament, besought the pope to return on his own terms. Accordingly, after first naming Francesco Panciatichi of Pistoia to the senatorship, the pope came back on the 13th March 1406, bringing his whole curia with him, and also the murderer Migliorati, who, triumphing in impunity, became more arrogant than before. Here indeed was a proof that the Romans were no longer worthy of liberty! And now, by means of the Orsini, Innocent had only to reduce the Colonna and other nobles raised to power by Ladislaus; nor was this very difficult, seeing that the king, in his usual fashion, abandoned them to their fate, and, making terms with the pope, was named gonfalonier of the church and again protected her cause.

Innocent, dying in 1406, was succeeded by Gregory XII., a Venetian, who, as we shall presently see, resigned the chair in 1415. On his accession, finding his state firmly established, he seemed to be seriously bent on putting an end to the Great Schism, and for that purpose arranged a meeting with the antipope Benedict XIII. at the congress of Savona in 1408. But Gregory and Benedict only used the congress as a pretext for making war upon each other, and were urged on by Ladislaus, who hoped by weakening both to gain possession of Rome, where, although opposed by the Orsini, he had the support of the Colonna. Gregory, who had then fled from Rome, made a momentary attempt to win the popular favour by restoring the government of the banderesi; but Ladislaus marched into Rome in June 1408 and established a senator of his own. Meanwhile the two popes were continuing their shameful struggle, and the council of Pisa (March 1409), in attempting to check it, only succeeded in raising up a third pontiff, first in the person of Alexander V. (1409–10), and then in the turbulent Baldassare Cossa, who assumed the name of John XXIII. The latter began by sending a large contingent to assist Louis of Anjou against Ladislaus. But the enterprise failed, and, seeing himself deserted by all, Pope John next embraced the cause of his foe by naming him gonfalonier of the church. Thereupon Ladislaus concluded a sham peace, and then, seizing Rome, put it to the sack and established his own government there. Thus John, like the other two popes, became a wanderer in Italy. In August 1414 Ladislaus died and was succeeded by the scandalous Queen Joanna II. The Roman people promptly expelled the Neapolitans, and Cardinal Isolani, John's legate, succeeding in rousing a reaction in favour of the church, constituted a government of thirteen "conservators" on the 19th October.

In November 1414 the council of Constance assembled, and at last ended the schism by deposing all the popes, and incarcerating John XXIII., the most turbulent of the three. On the 11th November 1417 Oddo Colonna was unanimously elected to the papal chair; he was consecrated in the cathedral on the 27th as Pope Martin V., and, being acknowledged by all, hastened without delay to take possession of his see. Meanwhile disorder was at its height in Rome. The cardinal legate Isolani governed as he best could, while Castle St Angelo remained in the hands of the Neapolitans, who still had a party in the city. In this divided state of affairs Braccio, a daring captain of adventurers, nicknamed Fortebraccio, was inspired with the idea of making himself master of Rome. Overcoming the feeble resistance opposed to him, he succeeded in this on the 16th June 1416 and assumed the title of "Defensor Urbis." But Joanna of Naples despatched Sforza, an equally valiant captain, against him, and, without offering battle, Fortebraccio withdrew on the 26th August, after having been absolute master of the eternal city for seventy days. Sforza marched in on the 27th, and took possession of the city in the name of Joanna. Martin V. instantly proved himself a good statesman. He confirmed the legate Isolani as his vicar, and Giovanni Savelli as senator. Leaving Constance on the 16th May 1418, he reached Milan on the 12th October, and slowly proceeded on his journey. While in Florence he despatched his brother and nephew to Naples to make alliance with Joanna, and caused her to be crowned on the 28th October 1419 by his legate Morosini. Upon this she promised to give up Rome to the pope. Her general, Sforza, then entered the service of Martin V., and compelled Fortebraccio, who was lingering in a threatening attitude at Perugia, to make peace with the pope. The latter entrusted Fortebraccio with the conduct of the campaign against Bologna, and that city was reduced to submission on the 15th July 1420. The Romans had already yielded to Martin's brother the legate, and now earnestly besought the arrival of their pope. Accordingly he left Florence on the 19th September 1420, and entered the Vatican on the 28th. Rome was in ruins; nobility and burghers were equally disorganized, the people unable to bear arms and careless of their rights, while the battered walls of the Capitol recorded the fall of two republics.

Martin V. had now to fulfil a far more difficult task than that of taking possession of Rome. Throughout Italy municipal freedom was overthrown, and the Roman republic had ceased to exist. The Middle Ages were ended; the Renaissance was beginning. The universal unity both of church and of empire was dissolved; the empire was now Germanic, and derived its principal strength from direct dominion over a few provinces. Independent and national states were already formed or forming on all sides. The papacy itself had ceased to claim universal supremacy over the world's Governments, and the possession of a temporal state had become essential to its existence. In fact Martin V. was the first of the series of popes who were real sovereigns, and more occupied with politics than religion. Involved in all the foreign intrigues, falsehoods, and treacheries of Italian diplomacy in the 15th century, their internal policy was imbued with all the arts practised by the tyrants of the Renaissance, and nepotism became necessarily the basis of their strength. It was natural that men suddenly elected sovereigns of a new country where they had no ties, and of which they had often no knowledge, should seek to strengthen their position by aggrandizing so-called nephews who were not unfrequently their sons.

Martin V. reduced the remains of the free Roman Government to a mere civil municipality. Following the method of the other despots of Italy, the old republican institutions were allowed to retain their names and forms, their administrative and some of their judicial attributes, while all their political functions were transferred to the new Government. Order was re-established, and justice rigidly observed. Many rebellious places were subdued by the sword, and many leaders of armed bands were hanged. The pope, however, was forced to lean on his kinsmen the Colonna and again raise them to power by grants of vast fiefs both in his own state and the Neapolitan territory. And, after first supporting Joanna II., who had assisted his entry into Rome, he next sided with her adversary, Louis of Anjou, and then with Alphonso of Aragon, the conqueror of both and the constant friend of the pope, who at last felt safe on his throne. Rome now enjoyed order, peace, and security, but had lost all hope of liberty. And when Martin died (20th February 1431) these words were inscribed on his tomb, *Temporum suorum felicitas.*

A revolution expels the pope.

Eugenius IV. (1431–47) leant on the Orsini, and was fiercely opposed by the Colonna, who excited the people against him. Accordingly on the 29th May 1434 the Romans rose in revolt to the old cry of "Popolo e popolo," and again constituted the rule of the seven governors of liberty. The pope fled by boat down the Tiber, and, being pursued with stones and shots, narrowly escaped with his life. On reaching Florence, he turned his energies to the recovery of the state. It was necessary to quell the people; but, first of all, the Colonna and the clan of the prefects of Vico, with their renewed princely power, had to be overthrown. The Orsini were still his friends. Eugenius entrusted the campaign to Patriarch (afterwards Cardinal) Vitelleschi, a worthy successor of Albornoz, and of greater ferocity if less talent. This leader marched his army towards Rome, and, instantly attacking Giovanni, prefect of Vico, captured and beheaded him. The family was now extinguished; and, its possessions reverting to the church, the greater part of them were sold or given to Count Everso d'Anguillara, of the house of Orsini. The prefecture, now little more than an honorary title, was bestowed at will by the popes. Eugenius gave it to Francesco, founder of the powerful line of the Gravina-Orsini. Thus one noble family was raised to greatness while another perished by the sword. Vitelleschi had already begun to persecute the Colonna and the Savelli, and committed terrible slaughter among them. Many castles were demolished, many towns destroyed; and their inhabitants, driven to wander famine-stricken over the Campagna, had to sell themselves as slaves for the sake of bread. Finally the arrogant patriarch marched into Rome, as into a conquered city, at the head of his men, and the Romans crouched at his feet. The pope now began to distrust him, and sent Scarampo, another prelate of the same stamp, to take his place. This new commander soon arrived, and, perceiving that Vitelleschi proposed to resist, had him surrounded by his soldiers, who were obliged to use force to compel his surrender. Vitelleschi was carried bleeding to Castle St Angelo, where he soon afterwards died. The pope at last returned to Rome in 1443, and remained there quietly till his death in 1447.

His successor Nicholas V. (1447–55) was a scholar solely devoted to the patronage of literati and artists. During his reign there was a fresh attempt to restore the republic, but it was rather prompted by literary and classical enthusiasm than by any genuine patriotic ardour. Political passions and interests had ceased to exist. The conspiracy was headed by Stefano Porcari, a man of the people, who claimed to be descended from Cato. He had once been captain of the people in Florence, and was made podestà of Bologna by Eugenius IV. He was a caricature of Cola di Rienzo, and extravagantly proud of his Latin speeches in honour of ancient republican liberty. The admiration of antiquity was then at its height, and Porcari found many enthusiastic hearers. Directly after the death of Eugenius IV. he made a first and unsuccessful attempt to proclaim the republic. Nevertheless Nicholas V., with the same indulgence for scholars that had prompted him to pardon Valla for denying the temporal power of the papacy and laughing to scorn the pretended donation of Constantine, freely pardoned Porcari and named him podestà of Anagni. He filled this office with credit, but on his return to Rome again began to play the agitator, and was banished to Bologna with a pension from the pope. Nicholas V. had conferred all the state offices upon priests and abbots, and had erected numerous fortresses. Hence there were many malcontents in Rome, in communication with Porcari at Bologna, and ready to join in his plot. Arms were collected, and on the day fixed he presented himself to his fellow-conspirators adorned with rich robes and a gold chain, and harangued them in Latin on the duty of freeing their country from the yoke of the priests. His design was to set fire to the Vatican on the 6th January 1453, the feast of the Epiphany; he and his followers were to seize the pope, the cardinals, and Castle St Angelo. But Nicholas received timely warning; the conspirators' house was surrounded; and Porcari himself was seized while trying to escape, confined in Castle St Angelo, and put to death with nine of his companions on the 9th January. Others shortly suffered the same fate.

Under Calixtus III. and Pius II. affairs went on quietly enough, but Paul II. (1464–71) had a somewhat troubled reign. Yet he was a skilled politician. He re-ordered the finances and the courts of justice, punished crime with severity, was an energetic foe to the Malatesta of Rimini, put an end to the oppression exercised in Rome by the wealthy and arrogant house of Anguillara, and kept the people in good humour with continual festivities. But—and this was a grave defect at that period—he extended no favour to learning, and, by driving many scholars from the curia to make room for his own kinsmen, brought a storm about his ears. At that time the house of Pomponio Leto was the rendezvous of learned men and the seat of the Roman Academy. Leto was an enthusiast of antiquity; and, as the members of the Academy all assumed old Latin names, they were suspected of a design to re-establish paganism and the republican government. It is certain that they all inveighed against the pope; and, as the latter was no man of half measures, during the carnival of 1468 he suddenly imprisoned twenty Academicians, and even subjected a few of them to torture. Pomponio Leto, although absent in Venice, was also arrested and tried; but he exculpated himself, craved forgiveness, and was set at liberty. His friends were also released, for the charge of conspiracy proved to be unfounded. Certain members of the Academy, and notably Platina in his *Lives of the Popes*, afterwards revenged themselves by stigmatizing Paul II. as the persecutor of philosophy and letters. But he was no more a persecutor than a patron of learning; he was a politician, the author of some useful reforms, and solely intent on the consolidation of his absolute power. Among his reforms may be classed the revision of the Roman statutes in 1469, for the purpose of destroying the substance while preserving the form of the old Roman legislation, and entirely stripping it of all political significance. In fact the pope's will was now absolute, and even in criminal cases he could trample unhindered on the common law.

There was still a senator of Rome, whose nomination was entirely in the hands of the pope, still three conservators, the heads of the rioni, and an elected council of twenty-six citizens. Now and then also a shadowy semblance of a popular assembly was held to cast dust in the eyes of the public, but even this was not for long. All these officials, together with the judges of the Capitol, retained various attributes of different kinds. They administered justice and gave sentence. There were numerous tribunals all with undefined modes of procedure, so that it was very difficult for the citizens to ascertain in which court justice should be sought. But in last resort there was always the supreme decision of the pope. Thus matters remained to the time of the French Revolution.

For the completion of this system a final blow had to be dealt to the aristocracy, whose power had been increased by nepotism; and it was dealt by bloodshed under the three following popes—Sixtus IV. (1471–84), Innocent VIII. (1484–92), and Alexander VI. (1492–1503)—each of whom was worse than his predecessor. The first, by means of his nephews, continued the slaughter of the Colonna, sending an army against them, devastating their estates at Marino, and beheading the protonotary Lorenzo Colonna. Innocent VIII. was confronted by the power of the Orsini, who so greatly endangered his life by their disturbances in the city that he was only saved by an alliance with Naples. Neither peace nor order could be lastingly established until these arrogant barons were overthrown. This task was accomplished by the worst of the three pontiffs, Alexander VI. All know how the massacre of the Orsini was compassed, almost simultaneously, by the pope in Rome and his equally iniquitous son, Cæsar Borgia, at Sinigaglia (1502). This pair dealt the last blow to the Roman aristocracy and the tyrants of Romagna, and thus the temporal dominion of the papacy was finally assured. The republic was now at an end; it had shrivelled to a civil municipality. Its institutions, deprived of all practical value, lingered on like ghosts of the past, subject from century to century to unimportant changes. The history of Rome is henceforth absorbed in that of the papacy.

Nevertheless the republic twice attempted to rise from its grave, and on the second occasion gave proofs of heroism worthy of its past. It was first resuscitated in February 1798, by the influence of the French Revolution, and the French constitution of the year III. was rapidly imitated. Rome had again two councils—the tribunate and the senate, with five consuls constituting the executive power. But in the following year, owing to the military reverses of the French, the government of the popes was restored until 1809, when Napoleon I. annexed to his empire the States of the Church. Rome was then governed by a consulta straordinaria—a special commission—with the municipal and provincial institutions of France. In 1814 the papal government was again reinstated, and the old institutions, somewhat modified on the French system, were recalled to life. Pius IX. (1846–77) tried to introduce fresh reforms, and to improve and simplify the old machinery of state; but the advancing tide of the Italian revolution of 1848 drove him from Rome; the republic was once more proclaimed, and had a brief but glorious existence. Its programme was dictated by Joseph Mazzini, who with Saffi and Armellini formed the triumvirate at the head of the Government. United Italy was to be a republic with Rome for her capital. The rhetorical idea of Cola di Rienzo became heroic in 1849. The constituent assembly (9th February 1849) proclaimed the fall of the temporal power of the popes, and the establishment of a republic which was to be not only of Rome but of all Italy. France, although then herself a republic, assumed the unenviable task of re-establishing the temporal power by force of arms. But the gallant defence of Rome by General Garibaldi covered the republic with glory. The enemy was repulsed, and the army of the Neapolitan king, sent to restore the pope, was also driven off. Then, however, France despatched a fresh and more powerful force; Rome was vigorously besieged, and at last compelled to surrender. With June 1849 begins the new series of pontifical laws designed to restore the government of Pius IX., whose reign down to 1870 was that of an absolute sovereign. Then the Italian Government entered Rome (20th September 1870), proclaimed the national constitution (9th October 1870), and the Eternal City became the capital of Italy. Thus the scheme of national unity, the natural outcome of the history of Rome and of Italy, impossible of accomplishment under the rule of the popes, was finally achieved by the monarchy of Savoy, which, as the true representative and personification of Italian interests, has abolished the temporal power of the papacy and made Rome the seat of government of the united country. (P. V.)

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PART II.—TOPOGRAPHY AND ARCHÆOLOGY.

Rome[1] is situated (41° 53′ 52″ N. lat., 12° 28′ 40″ E. long.) on the banks of the Tiber, Italy, 14 miles from its present mouth, in a great plain of alluvial and marine deposit, broken into elevations by numerous masses of volcanic matter. The nine or ten hills and ridges on which the city stands are formed of masses of tufa or conglomerated sand and ashes thrown out by neighbouring volcanoes now extinct, but active down to a very recent period. One group of these volcanoes is that around Lago Bracciano, while another, still nearer to Rome, composes the Alban Hills. That some at least of these craters have been in a state of activity at no very distant period has been shown by the discovery at many places of broken pottery and bronze implements below the strata of tufa or other volcanic deposits. Traces of human life have even been found below that great flood of lava which, issuing from the Alban Hills, flowed towards the site of Rome, only stopping about 3 miles short, by the tomb of Cecilia Metella.

The superficial strata on which Rome is built are of three main kinds: (1) the plains and valleys on the left bank of the Tiber are covered, as it were, by a sea of alluvial deposit, in the midst of which (2) the hills of volcanic origin rise like so many islands; and (3) on the right bank of the Tiber, around the Janiculan and Vatican Hills, are extensive remains of an ancient sea-beach, conspicuous in parts by its fine golden sand and its deposits of greyish white potter's clay. From its yellow sand the Janiculan has been sometimes known as the Golden Hill, a name which survives in the church on its summit called S. Pietro in Montorio (Monte d'Oro). In addition to these three chief deposits, at a few places, especially in the Aventine and Pincian Hills, under-strata of travertine crop out—a hard limestone rock, once in solution in running water, and deposited gradually as the water lost its carbonic-acid solvent, a process still rapidly going on at Terni, Tivoli, and other places in the neighbourhood. The conditions under which the tufa hills were formed have been very various, as is clearly seen by an examination of the rock at different places. The volcanic ashes and sand of which the tufa is composed appear in parts to lie just as they were showered down from the crater; in that case it shows but little sign of stratification, and consists wholly of igneous products. In parts time and pressure have bound together these scoriæ into a soft and friable rock; in other places they still lie in loose sandy beds and can be dug out with the spade. Other masses of tufa again show signs either of having been deposited in water, or else washed away from their first resting-place and redeposited with visible stratifications; this is shown by the water-worn pebbles and chips of limestone rock, which form a conglomerate bound together by the volcanic ashes into a sort of natural cement. A third variety is that which exists on the Palatine Hill. Here the shower of red-hot ashes has evidently fallen on a thickly-growing forest, and the burning wood, partly smothered by the ashes, has been converted into charcoal, large masses of which are embedded in the tufa rock. In some places charred branches of trees, their form well preserved, can be easily distinguished. The so-called "wall of Romulus" is built of this conglomerate of tufa and charred wood; a very perfect section of the branch of a tree is visible on one of the blocks by the Scalæ Caci.

Physical changes in site.

So great have been the physical changes in the site of Rome since the first dawn of the historic period that it is difficult now to realize what its aspect once was. The Forum Romanum, the Velabrum, the great Campus Martius (now the most crowded part of modern Rome), and other valleys were once almost impassable marshes or pools of water (Ov., *Fast.*, vi. 401; Dionys., ii. 50). The draining of these valleys was effected by means of the great cloacæ, which were among the earliest important architectural works of Rome (Varro, *Ling. Lat.*, iv. 149). Again, the various hills and ridges were once more numerous and very much more abrupt than they are now. At an early period, when each hill was crowned by a separate village fort, the great object of the inhabitants was to increase the steepness of its cliffs and render access difficult. At a later time, when Rome was united under one government, the very physical peculiarities which had originally made its hills so populous, through their natural adaptability for defence, became extremely inconvenient in a united city, where architectural symmetry and splendour were above all things aimed at. Hence the most gigantic engineering works were undertaken: tops of hills were levelled, whole ridges cut away, and gentle slopes formed in the place of abrupt cliffs. The levelling of the Velia and the excavation of the site for Trajan's forum are instances of this. The same works were continued in the Middle Ages, as when in the 14th century an access was made to the Capitoline Arx[2] from the side of the Campus Martius; up to that time a steep cliff had prevented all approach except from the side of the Forum

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[1] The limited space available for the following article is devoted mainly to those buildings of which some remains still exist, to the unavoidable neglect of a large number which are known only from documentary evidence. The plan of the Forum (Plate VII.) and nearly all the cuts have been measured and drawn by the author specially to illustrate this article.

[2] By the great flight of marble steps up to S. Maria in Ara Cœli.

And under the present Government an even more extensive plan, called the "piano regolatore," is being (1886) gradually carried out, with the object of reducing hills and valleys to one uniform level, on which wide boulevards are being constructed on the chess-board plan of an American city. The constant fires which have devastated Rome have been a great agent in obliterating the natural contour of the ground. The accumulated rubbish from these and other causes has in some places covered the ground to the depth of 40 feet, especially in the valleys.

The climate of Rome in ancient times appears to have been colder than it is at present. Malarious fever in and around the city existed to some extent, but to a much less degree than it does now. The magnificent villa of Hadrian and other country houses near Rome are built on sites which are now very unhealthy. The sanitary superiority of the Campagna in ancient times was mainly due to its more complete drainage and thicker population. That fever did exist is, however, proved in many ways. Altars to the goddess Febris were erected on the Palatine and other hills, and on the Esquiline was a grove dedicated to Mephitis. The population of Rome[1] increased with great rapidity, till, during its most populous period in the 4th century, it was probably not less than 2½ millions.[2]

Ancient Rome.

Architecture and Construction

Building materials. The chief building materials used in ancient Rome were those enumerated below. (1) *Tufa*, the "ruber et niger tophus" of Vitruvius (ii. 7), the formation of which has been described above, is usually a warm brown or yellow colour. The Aventine, Palatine, and Capitoline Hills contained quarries of the tufa, much worked at an early period (see Liv., xxvi. 27, xxxix. 44, and Varro, *L.L.*, iv. 151). It is a very bad "weather-stone," but stands well if protected with stucco (Plin., *H.N.*, xxxvi. 48). (2) *Lapis Albanus*, from Alba Longa, is also of volcanic origin, a conglomerate of ashes, gravel, and fragments of stone; its quarries are still worked at Albano and Marino. (3) *Lapis Gabinus*, from Gabii, is very similar to the last, but harder and a better weather-stone; it contains large lumps of broken lava, products of an earlier eruption, and small pieces of limestone. According to Tacitus (*Ann.*, xv. 43), it is fire-proof, and this is also the case with the Alban stone. Both are now called *peperino*, from the black scoriæ, like pepper-corns, with which the brown conglomerate mass is studded. (4) *Silex* (mod. *selce*), a lava from the now extinct volcanoes in the Alban Hills, was used for paving roads, and when broken into small pieces and mixed with lime and pozzolana formed an immensely durable concrete. It is dark grey, very hard, and breaks with a slightly conchoidal fracture (Plin., *H.N.*, xxxvi. 29; Vitr., ii. 7), but does not resemble what is now called *silex* or flint. (5) *Lapis Tiburtinus* (travertine), the chief quarries of which are at Tibur (Tivoli) and other places along the river Anio, is a hard pure carbonate of lime, of a creamy white colour, deposited from running or dripping water in a highly stratified form, with frequent cavities and fissures lined with crystals. As Vitruvius (ii. 5) says, it is a good weather-stone, but is soon calcined by fire. If laid horizontally it is very strong, but if set on end its crystalline structure is a great source of weakness, and it splits from end to end. Neglect on the part of Roman builders of this important precaution in many cases caused a complete failure in the structure. This was notably the case in the rostra (see below). (6) *Pulvis Puteolanus* (pozzolana), so called from extensive beds of it at Puteoli, is a volcanic product, which looks like red sandy earth, and lies in enormous beds under and round the city of Rome. When mixed with lime it forms a very strong hydraulic cement, of equal use in concrete, mortar, or undercoats of stucco. It is to this material that the concrete walls of Rome owe their enormous strength and durability, in many cases far exceeding those of the most massive stone masonry. Vitruvius devotes a chapter (bk. ii. ch. 6) to this very important material.

Bricks were either sun-dried or kiln-baked (*lateres crudi aut cocti*). The remarks of Vitruvius (ii. 3) seem to refer wholly to sun-dried bricks, of which no examples now exist in Rome. It is very important to recognize the fact that among the existing ancient buildings of Rome there is no such thing as a brick wall or a brick arch in the true sense of the word; bricks were merely used as a facing to concrete walls and arches and have no constructional importance. Concrete (*fartura, cæmentum*, or *opus structuræ cæmentitiæ*, Vitr., ii. 4, 6, 8), the most important of all the materials used, is made of rough pieces of stone or of fragments of brick, averaging from about the size of a man's fist and embedded in cement made of lime and pozzolana,—forming one solid mass of enormous strength and coherence. Stucco, cement, and mortar (*tectorium, opus albarium, structura testacea*, and other names) are of many kinds; the ancient Romans especially excelled in their manufacture. The cement used for lining the channels of aqueducts (*opus signinum*) was made of lime mixed with pounded brick or potsherds and pozzolana; the same mixture was used for floors under the "nucleus" or finer cement on which the mosaic or marble paving-slabs were bedded, and was called *cæmentum ex testis tunsis*. For walls, three or four coats of stucco were used, often as much as 5 inches thick altogether; the lower coats were of lime and pozzolana, the finishing coats of powdered white marble (*opus albarium*) suitable to receive painting. Even marble buildings were usually coated with a thin layer of this fine white stucco, nearly as hard and durable as the marble itself—a practice also employed in the finest buildings of the Greeks—probably because it formed a more absorbent ground for coloured decoration; stone columns coated in this way were called "columnæ dealbatæ" (Cic., *In Verr.*, ii. 1, 52 *sq.*). For the kinds of sand used in mortar and stucco Vitruvius (ii. 4) mentions sea, pit, and river sand, saying that pit sand is to be preferred.

Decorative mater Marble appears to have come into use about the beginning of the 1st century B.C. Its introduction was at first viewed with great jealousy, as savouring of Greek luxury. The orator Crassus was the first to use it in his house on the Palatine, built about 92 B.C.; and, though he had only six small columns of Hymettian marble, he was for this luxury nicknamed the "Palatine Venus" by the stern republican M. Brutus (Plin., *H.N.*, xxxvi. 3). The temporary wooden theatre of the ædile M. Æmilius Scaurus, built in 58 B.C., appears to have been the first building in which marble was more largely used; its 360 columns and the lower order of its scena were of Greek marble (see Plin., *H.N.*, xxxvi. 3, 24). In a very few years, under the rule of Augustus, marble became very common.[3]

Of white statuary marble four principal varieties were used. (1) *Marmor Lunense*, from Luna, near the modern Carrara (Strabo, v.), is of many qualities, from the purest creamy white and the finest grain to the coarser sorts disfigured with bluish grey streaks. (Ex., the eleven Corinthian columns in the Dogana di Terra.) (2) *Marmor Hymettium*, from Mount Hymettus, near Athens, is coarser in grain than the best Luna marble and is usually marked with grey or blue striations (Strabo, x.). (Ex., the forty-two columns in the nave of S Maria Maggiore and the columns in S. Pietro in Vincoli.) (3) *Marmor Pentelicum*, from Mount Pentelicus, also near Athens, is very fine in grain and of a pure white; it was more used for architectural purposes than for statues, though some sculptors preferred it above all others, especially Scopas and Praxiteles (Paus., *Arcad.*, viii.). (Ex., the bust of the young Augustus in the Vatican.) (4) *Marmor Parium*, from the Isle of Paros, is very beautiful, though coarse in texture, having a very crystalline structure.

Coloure marbles Nine chief varieties of coloured marbles were used in Rome. (1) *Marmor Numidicum* (mod. *giallo antico*; Plin., *H.N.*, v. 3), from Numidia and Libya, hence also called *Libycum*, is of a rich yellow, deepening to orange and even pink. Enormous quantities of it were used, especially for columns, wall-linings, and pavements. (Ex., six large columns in the Pantheon and seven on the arch of Constantine, taken from the arch of Trajan; the eighth column is in the Lateran basilica.) (2) *Marmor Carystium* (mod. *cipollino*), from Carystus in Eubœa (Strabo, x.), has alternate wavy strata of white and pale green—the "undosa Carystos" of Statius (*Silv.*, i. 5, 36). From its well-defined layers like an onion (*cipolla*) is derived its modern name. (Ex., columns of temple of Faustina.) (3) *Marmor Phrygium* or *Synnadicum* (mod. *pavonazetto*), from Synnada in Phrygia (Strabo, xii.; Juv., xiv. 307; Tibull., iii. 3, 13), is a slightly translucent marble, with rich purple markings, violet verging on red. It was fabled to be stained with the blood of Atys (Stat., *Silv.*, i. 5, 36). (Ex., twelve fluted columns in S. Lorenzo fuori le Mura, and large columns in the apse of S. Paolo fuori, saved from the ancient nave of the basilica, burnt in 1823.) (4) *Marmor Iasium* (probably the modern *porta santa*), from Iasus, is mottled with large patches of dull red, olive green, and white. The "holy door" of St Peter's is framed with it, hence its modern name. (Ex., the slabs in front of the Græcostasis and four columns in S. Agnese fuori le Mura.) (5) *Marmor Chium* (probably the modern *Africano*), from Chios, is similar in colour and marking to the porta santa, but more brilliant in tint. (Ex., a great part of the paving of the Basilica Julia and two large columns in the centre of the façade of St Peter's.) (6) *Rosso antico* (the ancient name is unknown) is a very close-grained marble of a rich deep red, like blood. As a rule it does not occur in large pieces, but was much used for

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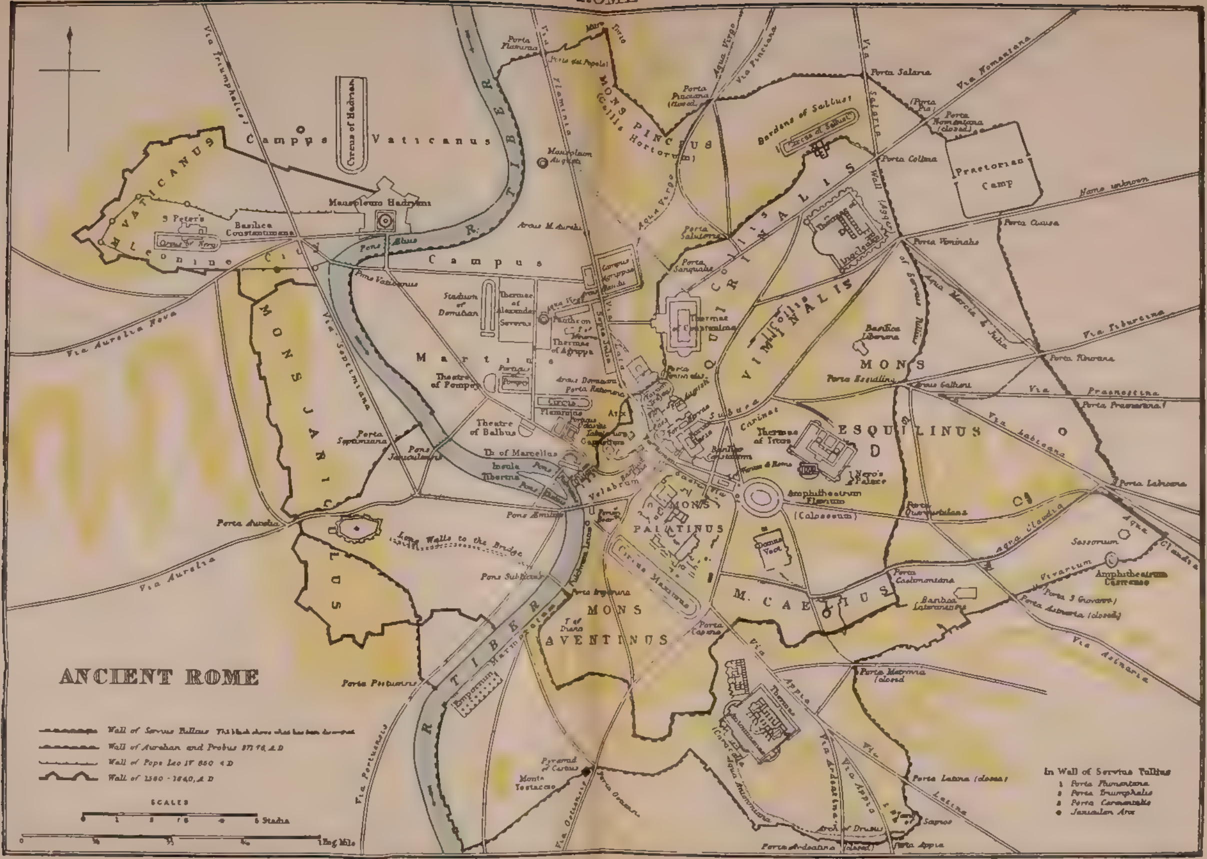
[1] See a good article on this subject in the *Monografia di Roma*, vol. ii., 1878.

[2] *Works to be consulted.*—GEOLOGY.—Brocchi, *Suolo di Roma*, 1820, and its supplement by Ponzi, *Storia fisica di Roma*, 1867; Mantovani, *Descrizione geologica della Campagna di Roma*, 1875; Giordano and Mantovani, *Monografia di Roma*, 1878, vol. i. pp. i.-cxxiii., and pp. 51-79; Mauro, *Analisi chimica delle aque potabili di Roma*, 1884; Pinto, *Aque potabili nell' Agro Romano*, 1883. BOTANY AND ZOOLOGY.—Bonaparte, *Fauna Italica*, 1835; Sanguinetti, *Prodromus Floræ Romanæ*; Deakin, *Flora of the Colosseum*, 1855; Terrigi, "Flora, &c. del Quirinale," in *Acad. Pont. d. Lincei*, May 1882.

[3] The oft-quoted boast of Augustus (Suet., *Aug.*, 29) that he "found Rome of brick and left it of marble" has probably much truth in it, if for "brick" we read "peperino and tufa." In the time of Augustus burnt brick was very little used, the usual wall-facings being *opus quadratum* of tufa or peperino, and *opus reticulatum* of tufa only. The *confessiones* or crypts in front of the high altars of St Peter's, S. Maria Maggiore, S. Pietro in Vincoli, and other churches in Rome are museums of the rarer and more splendid marbles used by the ancient Romans, as their walls and pavements are covered with the richest specimens found during excavations. All the fine marbles in Roman churches have been taken from ancient buildings; an excellent account of these is given by Corsi, *Pietre antiche*, 1845.

ROME



ANCIENT ROME
Wall of Servius Tullius The black shows what has been destroyed
Wall of Aurelian and Probus 271-76, A.D.
Wall of Pope Leo IV 850 A.D.
Wall of 1560 - 1640, A.D.
SCALES
0 1 2 3 4 5 Stadia
0 1 Eng. Mile
In Wall of Servius Tullius
1 Porta Flumentana
2 Porta Triumphalis
3 Porta Carmentalis
● Janiculan Arx
Campus Vaticanus
Circus of Hadrian
Mons Vaticanus
Leonine City
S. Peter's
Basilica Constantiniana
Circus of Nero
Mausoleum Hadriani
Pons Aelius
Pons Vaticanus
Via Triumphalis
Via Aurelia Nova
Via Aurelia
Via Septimiana
Porta Aurelia
Porta Septimiana
Mons Janiculus
Long Walls to the Bridge
Porta Portuensis
Via Portuensis
Tiber
Porta Flaminia
Muro Torto
Porta del Popolo
Via Flaminia
Mausoleum Augusti
Arcus M. Aurelii
Campus Martius
Stadium of Domitian
Thermae of Alexander Severus
Pantheon
Thermae of Agrippa
Aqua Virgo
Campus Agrippae
Saepta Julia
Theatre of Pompey
Porticus Pompeii
Circus Flaminius
Theatre of Balbus
Th. of Marcellus
Insula Tiberina
Pons Janiculensis
Pons Aemilius
Pons Sublicius
Velabrum
Arx
Capitolium
Porta Ratumena
Arcus Domitiani
Mons Pincius (Collis Hortorum)
Porta Pinciana (closed)
Via Pinciana
Gardens of Sallust
Circus of Sallust
Porta Salaria
Via Salaria
Porta Pia
Porta Nomentana (closed)
Via Nomentana
Porta Collina
Praetorian Camp
Name unknown
Porta Chiusa
Porta Viminalis
Porta Salutaris
Porta Sanqualis
Collis Quirinalis
Thermae of Constantine
Thermae of Diocletian
Collis Viminalis
Porta Fontinalis
Subura
Carinae
Basilica Liberiana
Mons Esquilinus
Porta Esquilina
Arcus Gallieni
Porta Tiburtina
Via Tiburtina
Via Praenestina
Porta Praenestina
Via Labicana
Porta Labicana
Aqua Marcia & Julia
Agger of Servius Tullius
Thermae of Titus
Nero's Palace
Basilica Constantini
Templum Veneris & Romae
Sacra Via
Amphitheatrum Flavium (Colosseum)
Porta Querquetulana
Aqua Claudia
Sessorium
Amphitheatrum Castrense
Vivarium
Porta S. Giovanni
Porta Asinaria (closed)
Via Asinaria
Porta Caelimontana
Basilica Lateranensis
M. Caelius
Mons Palatinus
Domus Vecti
Circus Maximus
Porta Trigemina
Mons Aventinus
T. of Diana
Marmorata
Emporium
Porta Capena
Via Appia
Thermae Antoninianae (Caracalla)
Aqua Antoniniana
Porta Metronia (closed)
Porta Latina (closed)
Via Latina
Via Ardeatina
Arch of Drusus
Porta Ardeatina (closed)
Porta Appia
Pyramid of Cestius
Monte Testaccio
Via Ostiensis
Porta Ostiensis
Porta Portuensis

small cornices and other mouldings in interiors of buildings. Its quarries in Greece are still worked. (The largest pieces known are the fourteen steps to the high altar of S. Prassede and two columns nearly 12 feet high in the Rospigliosi Casino dell' Aurora.) (7) *Nero antico* is probably the ancient *marmor Tænarium*, from Cape Tænarus in Sparta. It is mentioned by Tibullus (iii. 3, 14) in conjunction with Phrygian and Carystian marbles; see also Prop., iii. 2, and Plin., *H.N.*, xxxvi. 43. (Ex., two columns in the choir of the church of Ara Cœli.) (8) *Lapis Atracius* (*verde antico*), found at Atrax in Thessaly (Liv., xxxii. 15), was one of the favourite materials for decorative architecture; it is not strictly a marble (*i.e.*, a calcareous stone) but a variety of "precious serpentine," with patches of white and brown on a brilliant green ground. It seldom occurs in large masses. (The finest known specimens are the twenty-four columns beside the niches in the nave of the Lateran basilica.) (9) The hard Oriental alabaster, the "onyx" or "alabastrites" of Pliny (*H.N.*, xxxvi. 12, xxxvii. 32); its chief quarries were on the Nile near Thebes,[1] in Arabia, and near Damascus. In Pliny's age it was a great rarity; but in later times it was introduced in large quantities, and fragments of a great many columns have been found on the Palatine, in the baths of Caracalla, and elsewhere. It is semi-transparent, and beautifully marked with concentric nodules and wavy strata. An immense number of other less common marbles have been found, including many varieties of breccia, but their ancient names are unknown.

anite
lts.

From the latter part of the 1st century B.C. hard stones—granites and basalts—were introduced in great quantities. The basalts—"basanites" of Pliny (xxxvi. 11)—are very refractory, and can only be worked by the help of emery or diamond dust. The former was obtained largely at Naxos; diamond-dust drills are mentioned by Pliny (*H.N.*, xxxvii. 76). The basalts are black, green, and brown, and are usually free from spots or markings; examples of all three exist, but are comparatively rare. The red variety called "porphyry" was used in enormous quantities. It is the "porphyrites" of Pliny (*H.N.*, xxxvi. 11), and was brought from Egypt. It has a rich red ground, covered with small specks of white felspar; hence it was also called "leptopsephos." A large number of columns of it exist, and it was much used for pavements of *opus Alexandrinum*. A rich green porphyry or basalt was also largely used, but not in such great masses as the red porphyry. It has a brilliant green ground covered with rectangular light green crystals of felspar. This is the *lapis Lacedæmonius* (wrongly called by the modern Romans "serpentino"), so named from its quarries in Mount Taygetus in Lacedæmonia (Paus., *Lac.*, iii. and viii.; Plin., *H.N.*, xxxvi. 11; Juv., xi. 173). It appears to have been mostly used for pavements and panels of wall linings. The granites used in Rome came mostly from near Philæ on the Nile (Plin., *H.N.*, xxxvi. 13). The red sort was called *lapis pyrrhopœcilus* and the grey *lapis psaronius*. The columns in the Basilica Ulpia are a fine example of the latter; both sorts are used for the columns of the Pantheon and those of the temple of Saturn in the Forum. Gigantic ships were specially made to carry the obelisks and other great monoliths (Plin., *H.N.*, xxxvi. 1, 14).

Archi-tectural styles.

The style of architecture employed in ancient Rome may be said to have passed through three stages,—the Etruscan, the Greek, and the Roman. During the first few centuries of the existence of the city, both the methods of construction and the designs employed appear to have been purely Etruscan. The earliest temples were either simple cellæ without columns, as we see on the Palatine by the Scalæ Caci, or else, in the case of the grander temples, such as that of Capitoline Jupiter, the columns were very widely spaced (aræostyle), and consequently had entablatures of wooden beams. The architectural decorations were more generally in gilt bronze or painted terra-cotta than in stone, and the paintings or statues which decorated the buildings were usually the work of Etruscan artists.[2] The Greek influence is more obvious; almost all the temples of the earlier imperial age are Greek, with certain modifications, not only in general design but in details and ornaments. Greek architects were largely employed; and Roman architects such as Vitruvius and C. Mutius in the 1st century B.C., Severus and Celer under Nero, and Rabirius under Domitian were Greek by education, and probably studied at Athens (see Vitr., vii., *Præf.*; Hirt, *Gesch. d. Baukunst*, ii. p. 257; Burn, *Rome*, p. 76).[3] The Romans, however, though quite devoid of artistic originality, were very able engineers, and this led to the development of a new and more purely Roman style, in which the restrictions imposed by the use of the stone lintel were put aside and large spaces were covered with vaults and domes cast in semifluid concrete, a method which had the enormous advantage of giving the arched form without the constant thrust at the springing which makes true arches or vaults of wide span so difficult to deal with. The enormous vaults of the great thermæ, the basilica of Constantine, and the like cover their spaces with one solid mass like a metal lid, giving the form but not the principle of the arch, and thus allowing the vault to be set on walls which would at once have been thrust apart had they been subjected to the immense leverage which a true arched vault constantly exerts on its imposts.[4] This is a very important point, and one which is usually overlooked, mainly owing to the Roman practice of facing their concrete with bricks, which (from an examination of the surface only) appear to be a principal item in the construction. The walls of the Pantheon, for example, are covered with tiers of brick arches, and many theories have been invented as to their use in distributing the weight of the walls. But a recognition of the fact that these walls are of concrete about 20 feet thick, while the brick facing averages scarcely 6 inches in thickness, clearly shows that these "relieving arches" have no more constructional use as far as concerns the pressure than if they were painted on the surface of the walls. Exactly the same reasons apply to the superficial use of brick in all arches and vaults.

Opus quadratum.

At first tufa only was used in opus quadratum, as we see in the so-called wall of Romulus. Next the harder peperino began to be worked: it is used, though sparingly, in the great Servian wall, and during the later republic appears to have been largely employed for exterior walls or points where there was heavy pressure, while other parts were built of tufa. Thirdly, travertine appears to have been introduced about the 2d century B.C., but was used at first for merely ornamental purposes, very much as marble was under the empire; after about the middle of the 1st century A.D. travertine began to be largely used for the solid mass of walls, as in the temple of Vespasian and the Colosseum. The tufa or peperino blocks were roughly 2 (Roman) feet thick in regular courses, *isodomum*, by 2 feet across the end, and under the republic often exactly 4 feet long, so that two blocks set endways ranged with one set lengthways. They were then arranged in alternate courses of headers and stretchers, so as to make a good bond; this is the "emplecton" of Vitruvius (ii. 8). The so-called Tabularium of the Capitol is a good example of this (see fig. 1). The harder and more valuable travertine was not cut in this regular way, but pieces of all sizes were used, just as they happened to come from the quarry, in order to avoid waste: blocks as much as 15 by 8 feet were used, and the courses varied in thickness—the "pseudisodomum" of Vitruvius. When tufa or peperino was mixed with the travertine, it was cut so as to range with the irregular courses of the latter.

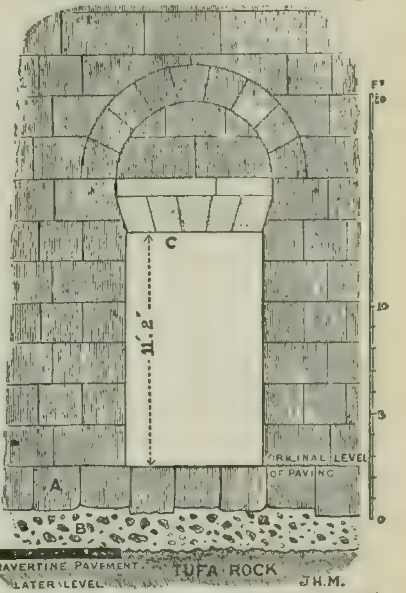


FIG. 1.—Example of opus quadratum, 78 B.C. Arch at foot of the stairs of the Tabularium (see Plate VI.). The flat arch C is of travertine, the rest of peperino. A. Footing-course of rough stones. B. Concrete foundation, exposed by the lowering of the paving when the temple of Vespasian was built

It is an interesting point to note the manner in which the Roman builders mixed their different materials according to the weight they had to carry. While tufa was frequently used for the main walls, peperino (*e.g.*, in the Servian wall on the Aventine) or travertine (*e.g.*, in the forum of Augustus and the temple of Fortuna Virilis, so called) was inserted at points of special pressure, such as piers or arches (see fig. 21 below). The Colosseum is a particularly elaborate example of this mixed construction with three degrees of pressure supported by three different materials (see fig. 2).

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[1] These Nile quarries have been worked during the present century, and many blocks were imported into Rome for the rebuilding of S. Paolo fuori le Mura.

[2] Pliny (*H.N.*, xxxv. 45), quoting Varro, says that the decorations in painting and sculpture of the temple of Ceres near the Circus Maximus (now S. Maria in Cosmedin) were the work of the first Greek artists employed in Rome, and that before that (c. 493 B.C.) "all things in temples were Etruscan." Vitruvius (iii. 3) says, "Ornantque signis fictilibus aut æreis inauratis earum fastigia Tuscanico more, uti est ad Circum Maximum Cereris, et Herculis Pompeiani, item Capitolii" (comp. iv. 7, vi. 3).

[3] The frequent use of engaged columns is a peculiarity of Roman architecture, but it is not without precedent in Greek buildings of the best period, *e.g.*, in the lion-tomb at Cnidus and the temple of Zeus at Agrigentum. Surface enrichments over the mouldings were used far more largely by the Romans than by the Greeks.

[4] In the beautiful drawings of Choisy (*L'Art de bâtir chez les Romains*, Paris, 1873) the structural importance of the brick used in vaults and arches is very much exaggerated.

The use of mortar with opus quadratum is a sign of an early rather than a late date.[1] It occurs in the Servian wall on the Aventine, in the Tabularium, and, most striking of all, in the Tullianum under the "Mamertine prison" — certainly one of the oldest buildings in Rome (see fig. 11). Under the empire massive blocks, whether of tufa, travertine, or marble, are set without any mortar. It must, however, be observed that in these early instances the "mortar" is but a thin stratum of lime, little thicker than stout paper, used not as a cement to bind the blocks together, but simply to give the joints a smoothly fitting surface. The actual binding together was done by clamps and dowels, as well as by the mass and weight of the great blocks used. Except in the earliest masonry, each block was very carefully fastened, not only to the next blocks on the same course, which was done with double dove-tailed dowels of wood, but also to those above and below with stout iron clamps, run with lead (Vitr., ii. 8).[2] In more ornamental marble work bronze clamps were often used.

Clamps.

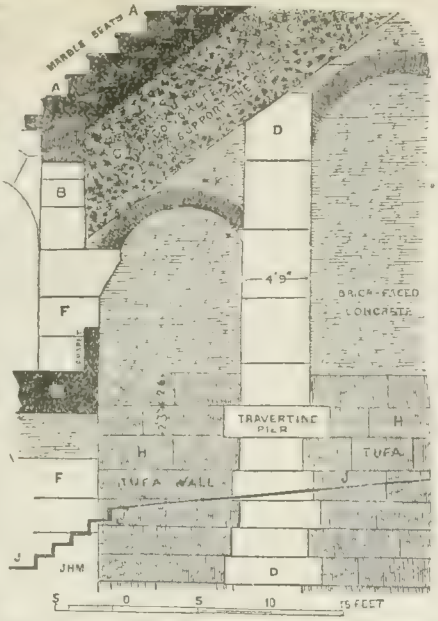

FIG. 2.—Example of construction in which many materials are used; upper part of one of the inner radiating walls under the cunei of the Colosseum. A, A. Marble seats on brick and concrete core, supported on vault made of pumice-stone concrete (C). B. Travertine arch at end of raking vault (C). D. One of the travertine piers built in flush with the tufa wall to give it extra strength. E, E. Wall of tufa concrete faced with triangular bricks, carrying the vaults of pumice concrete which support the marble seats. F. Travertine pier at end of radiating wall. G. Brick-faced arch of concrete to carry floor of passage. H, H. Tufa wall, opus quadratum. J, J, J. Line of steps in next bay. K, K. Surface arches of brick, too shallow to be of any constructional use, and not meant for ornament, as the whole was stuccoed; they only face the wall (which is about 4 feet thick) to the average depth of 4 inches.

When concrete was employed it was faced either with blocks of opus quadratum (*e.g.*, the Servian wall along the Aventine) or with opus incertum—small irregularly shaped blocks of tufa 3 to 6 inches across, with pointed ends driven into the concrete while it was soft, and worked smooth on the face only (see fig. 3). Thirdly, in the 1st century B.C. opus reticulatum,[3] also of tufa, was largely used alone; after that it began to be mixed with brickwork. It is very neat in appearance, and is often fitted with great care, though it was generally covered with stucco. The so-called "house of Livia" on the Palatine is a good example of the earlier sort, when the quoins were made of small rectangular blocks of tufa. The palace of Caligula has it with quoins of brick facing. Though in Rome opus reticulatum was always made of tufa, in the neighbourhood of the city it was sometimes of peperino or even lava, where these materials were found on the spot.

Opus reticulatum.

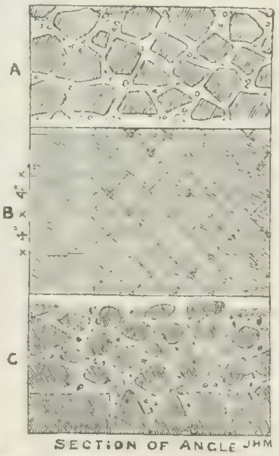

FIG. 3.—Concrete wall faced with (A) opus incertum and (B) opus reticulatum. C shows the section, similar in both.

Of concrete walls faced with burnt bricks no dated example earlier than the middle of the 1st century B.C. is known. The Pantheon (27 B.C.) is the most important early specimen of certain date. The bricks used are always triangular in shape, so as to present a large surface on the face with little expenditure of brick, and also to improve the bond with the concrete behind (see fig. 4). Even party walls of small rooms, only 7 inches thick, are not built solid, but have a concrete core faced with brick triangles about 3 inches long. Owing to this method of forming the walls it was necessary to support the facing until the concrete was set, which appears to have been done with a wooden framing covered with planks on the inside. In some cases the planks were nailed outside the wooden uprights, as was done with the unfaced concrete walls (see below), and then a series of perpendicular grooves appear in the face of the brickwork. Walls faced with opus reticulatum must have been supported temporarily in the same way.

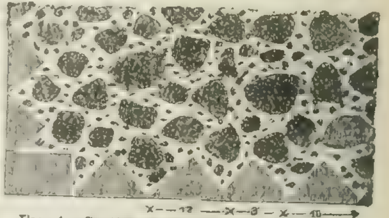

FIG. 4.—Section of concrete wall, showing the use of bricks merely as a facing.

The character of the brick facing is a great help towards determining the date of Roman buildings; it has been stated that this can be done simply by measuring the number of brick courses that go to a foot,—the more the bricks the earlier the work. This, however, is not the case. In early work the bricks are thick and the joints thin, while in later times the reverse is the case. Thus brickwork of the time of Severus and later usually has more bricks to the foot than that of the Flavian period. The following list gives a few characteristic specimens of different dates.

Building.	Average thickness of Bricks.	Average thickness of Joints.
	Inches.	Inches.
Rostra of Julius Cæsar, 44 B.C.	1½	¾
Pantheon of Agrippa, 27 B.C.	1¼	⅜ to ½
Pretorian camp of Tiberius, 23 A.D.	1¼ to 1¾	½ to ¾
Aqueduct of Nero, c. 62 A.D.	1 to 1¼	⅜ to ½
Baths of Titus, c. 80 A.D.	1½	½
Palace of Domitian, c. 90 A.D.	1½	½
Hadrian's temple of Venus and Rome, c. 125 A.D.	1½	1 to 1¼
Palace of Severus, c. 200 A.D.	1	⅝ to ¾
Aurelian's walls, c. 271 A.D.	1¼ to 1¾	1¼ to 1½

The length of the bricks as it appears on the face is no guide to the date, owing to the fact that one or more of the sharp points of the brick triangles were very frequently broken off before they were used. Moreover, varieties both in quality of workmanship and size of the bricks often occur in work of the same date; a new gang of workmen or a batch of bricks from a fresh *figlina* might easily occasion this. In the remains of Nero's Golden House great varieties appear, and some of the walls in the inferior rooms are faced with very irregular and careless brickwork.[4] Special care and neatness were always employed in the rare cases when the wall was not to be covered with stucco, which in the absence of marble was usually spread over both inside and outside walls. All these circumstances make great caution necessary in judging of dates; fortunately after the 1st century A.D., and in some cases even earlier, stamps impressed on bricks, and especially on the large tiles used for arches, give clearer indications. The reason of the almost universal use of smooth facings either of opus reticulatum or of brick over concrete walls is a very puzzling question; for concrete itself forms an excellent ground for the stucco coating or backing to the marble slabs, while the stucco adheres with difficulty to a smooth facing, and is very liable to fall away. The modern practice of raking out the joints to form a key was not employed by the Romans, but before the mortar was hard they studded the face of the wall with marble plugs and iron or bronze nails driven into the joints, so as to give a hold for the stucco—a great waste both of labour and material.[5] The quality of the mortar varies according to its date: during the 1st and 2d centuries it is of most remarkable hardness,—made of lime with a mixture of coarse pozzolana of a bright red colour; in the 3d century it began to be inferior in quality; and the pozzolana used under the later empire is brown instead of red.

Concrete was at first always made of lumps of tufa; then travertine, lava, broken bricks, and even marble were used, in fact all the chips and fragments of the mason's yard. Under the empire the concrete used was of travertine or lava mostly for foundations, of tufa or broken bricks for walls, and of tufa or pumice-stone (for the sake of lightness) for vaults. Massive walls were cast in a mould; upright timbers, about 6 by 7 inches thick and 10 to 14 feet long, were set in rows on each face of the future wall; planks 9 to 10 inches wide were nailed to them, so as to form two sides of a sort of box, into which the semi-fluid mass of stones, lime, and pozzolana was poured. When this was set the timbers were removed and refixed on the top of the concrete wall; then fresh concrete was poured in; and this process was repeated till the wall was raised to the required height. Usually such cast-work was only used for foundations and cellar walls, the upper parts being faced with brick; but in some cases the whole wall to the top was cast in this way and the brick facing omitted. In strength and durability no masonry, however hard the stone or large the blocks, could ever equal these walls of concrete when made with hard lava or travertino, for each wall was one perfectly coherent mass, and could only be destroyed by a laborious process like that of quarrying hard stone from its native bed. Owing to this method of forming the Roman buildings the progress of the work from day to day can often be traced by a change in the look of the concrete. About 3 feet high appears to have been the average amount of wall raised in a day.

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[1] Choisy (*L'Art de bâtir chez les Romains*, Paris, 1873) is mistaken in his denial of the early use of mortar by the Romans.

[2] The expansion of the iron through rust, which caused the stone to split, has frequently been a great source of injury to Roman walls, as well as the practice, common in the Middle Ages, of breaking into the stones in order to extract the metal.

[3] These two kinds of stone facings are mentioned thus by Vitruvius (ii. 8), "*reticulatum*, quo nunc [reign of Augustus] omnes utuntur, et antiquum, quod *incertum* dicitur."

[4] Some of the bricks are as much as 2¼ inches thick, while 1½ inches is the usual maximum for Roman bricks.

[5] The Roman method of applying stucco to walls with a wooden "float," exactly as is done now, is shown in a painting from Pompeii (see *Ann. Inst.*, 1881).

Marble linings were fixed very firmly to the walls with long clamps of metal, hooked at the end so as to hold in a hole made in the marble slab. Fig 5 gives an example, of the time of Augustus, fixed against a stone wall. The quantity of rich marbles which, for at least three centuries, were being dug out in countless quarries in the East, by whole armies of workmen, and constantly poured into Rome is almost beyond calculation. Scarcely a church is without columns and wall-linings stolen from ancient buildings, and the more magnificent chapels, such as those of the Borghese, Corsini, and Cibo families, with the whole church of S. Maria della Vittoria, owe their splendour entirely to their wall-linings of ancient marbles, porphyry, and alabaster.[1] The blocks were usually marked in the quarry with a number, and often with the names of the reigning emperor and the overseer of the quarry. These quarry-marks are often of great value as indications of the date of a building or statue.[2] Metropolitan building Acts, not unlike those of modern London, were enacted by several of the emperors. These fixed the materials to be used, the thickness of walls, the minimum width of streets, the maximum height allowed for houses, and the like. After the great fire in Nero's reign, 64 A.D., an Act was passed requiring external walls to be faced with fire-proof materials, such as peperino or burnt brick; this Act was being prepared long before the fire,—strong evidence as to this being a wilful act on Nero's part, as is asserted by Suetonius (*Nero*, 38).

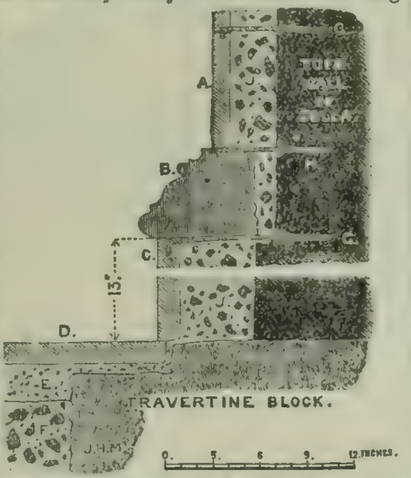

Fig. 5.—Example of marble lining, from the cella of the temple of Concord. A. Slabs of Phrygian marble. B. Plinth moulding of Numidian "giallo." C. Slab of cipollino (Carystian marble). D. Paving of porta santa. E and F. "nucleus" and "rudus" of concrete bedding. G, G. Iron clamps run with lead to fix marble lining. H. Bronze clamp. J. Cement backing.

Enormous accumulations of statues and pictures enriched Rome during its period of greatest splendour. In the first place, the numerous statues of the republican and even of the regal period were religiously preserved at a time when, from their archaic character, they must have been regarded rather as objects of sacred or archæological interest than as works of art (Plin., *H.N.*, xxxiv. 9-16, xxxv. 7). Secondly came the large Græco-Roman class, mostly copies of earlier Greek works, executed in Rome by Greek artists. To this class belongs most of the finest existing sculpture preserved in the Vatican and other museums. Thirdly, countless statues and pictures were stolen from almost every important city in Greece, Magna Græcia, Sicily, and western Asia Minor. These robberies began early, and were carried on for many centuries. The importations included works of art by all the chief artists from the 5th century downwards. Long lists are given by Pliny (*H.N.*, xxxiii.-xxxvi.), and pedestals even now exist with the names of Praxiteles, Timarchus, Polycletus, Bryaxis, and others (see *Bull. Comm. Arch. Rom.*, ii. p. 176). These accumulated works of sculpture were of all materials—gold and ivory (Suet., *Tit.*, 2), of which seventy-four are mentioned in the catalogue of the Breviarium (see Preller, *Regionen*, p. 231), many hundreds or even thousands of silver[3] (Plin., *H.N.*, xxxiii. 54), while those of gilt bronze and marble must have existed in almost untold numbers (Paus., viii. 46). Nor were the accumulated stores of Greek paintings much inferior in number; not only were easel pictures by Zeuxis, Apelles, Timanthes, and other Greek artists taken, but even mural paintings were carefully cut off their walls and brought to Rome secured in wooden frames (Plin., *H.N.*, xxxv. 49, and compare *ibid.*, 45).

The basalt (*silex*) roads were made of polygonal blocks of lava neatly fitted together and laid on a carefully prepared bed, similar to that used for mosaic paving (see MOSAIC and ROADS). Roads thus made were called "viæ stratæ." One portion only exists in Rome of early date, when the blocks were fitted together with the utmost accuracy viz., a piece of the Clivus Capitolinus in front of the temple of Saturn (see fig. 6, which also shows the massive travertine curb which bordered the road; in some cases the curb was of lava). The other best preserved viæ stratæ in Rome are those leading up to the Palatine from the Summa Sacra Via and that which follows the curved line of shops in Trajan's forum. Many others exist, but have all been relaid in later times, with badly fitting joints.[4]

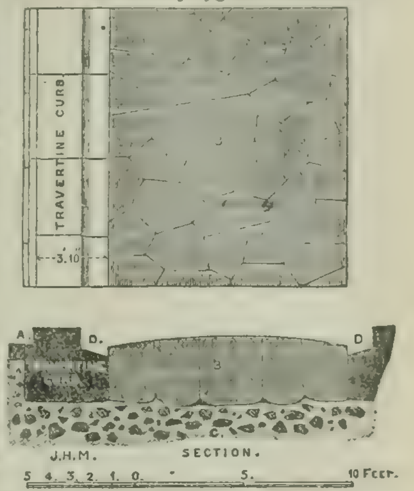

Fig. 6.—Example of early basalt road by the temple of Saturn on the Clivus Capitolinus. A. Travertine paving. B. Polygonal basalt blocks. C. Concrete bedding. D. Rain-water gutter. The curb shown is taken from another part of the road.

The following is a list of the chief roads which radiated from Rome (see Plate VI.):—(1) Via Appia and (2) Via Latina, both issued from the Servian Porta Capena, and both met at Beneventum; (3) Via Labicana, from the P. Esquilina, passing Labicum, joined the Via Latina 30 miles from Rome; (4) Via Gabina (later called Prænestina), also issued from the P. Esquilina and joined the Via Latina,—these two roads pass through the Claudian aqueduct gate (mod. Porta Maggiore); (5) Via Tiburtina, from the gate of that name to Tibur; (6) Via Nomentana, from the P. Collina, passing Nomentum, joined the Via Salaria; (7) Via Salaria, also from the P. Collina, joined the Via Flaminia at Ancona; (8) Via Flaminia, its first half-mile or so after leaving the Servian Porta Ratumena was known as the Via Lata; it afterwards passed out of the Aurelian P. Flaminia, and with many branches led to the chief towns of Northern Italy, and so into Cisalpine Gaul; (9) Via Aurelia, issued from the trans-Tiberine P. Aurelia and passed through Pisa to Gaul; (10) Via Portuensis, from the gate of that name, also on the right bank of the Tiber, to Portus Augusti near its mouth; (11) Via Ostiensis, from the Servian P. Trigemina and the Aurelian P. Ostiensis to Ostia; (12) Via Ardeatina, probably a branch from the Via Appia, led to Ardea.

Remains of Prehistoric Rome.

It is evident from recent discoveries that the site of Rome was populous at a very remote period. Flint implements and remains of the early Bronze Age have been found on the Aventine and in other places;[5] and in 1874, near the arch of Gallienus on the Esquiline, the important discovery was made of a necropolis[6] apparently of considerable extent, the tombs of which and their contents—fictile vases and other objects—were of Phœnician and Etruscan character, dating probably about the time of the traditional founding of Rome. In February 1883 a number of very early cist tombs, formed by two slabs of stone set on edge with a third for the lid, were found during excavations on the Esquiline between the Piazza Vitt. Emmanuele and the Via di Napoleone

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[1] Yet for many centuries during the Middle Ages the richest sites of ancient Rome were riddled with lime-kilns, in which the greater part of the marble was destroyed; see Raphael's letter to Leo X. on this subject published by Visconti (Rome, 1834).

[2] See Bruzza, in *Ann. Inst.*, 1870, p. 106.

[3] Eighty silver statues of Augustus, some equestrian and some in quadrigæ, are mentioned in the *Mon. Ancyr.* See p. 822 below.

[4] See Nibby, *Vie degli Antichi*, in Nardini, vol. iv. 1820; also Livy, x. 23, xl. 51, xli. 27.

[5] Under the Servian wall on the Esquiline has been found pottery of that very primitive sort which is ornamented only with rudely incised lines, zigzags, hatchings, and dots, similar to that found under a stratum of peperino rock at Alba Longa.

[6] See "Necrop. dell. Esquilino," in *Ann. Inst.*, 1882, p. 5 *sq.*, and *Mon. Inst.*, xi., pl. xxxvii.; also *Bull. comm. Arch.*, iii.

III.[1] Some of the pottery found in the Esquiline necropolis was of that rare kind which is coated with white and coloured stanniferous enamels, examples of which have been found in Ægina and at Camirus in Rhodes,—a method of decoration which is not Hellenic, but was common in Assyria and Egypt.[2] Some of the Esquiline tombs also contained terra-cotta reliefs of Oriental character, covered with plumbo-vitreous glaze, coloured brilliant blues and greens, like the little figures so commonly found in Egypt. Some dim traditions of these earlier inhabitants certainly existed among the Romans: Dion Cassius (iii. 5), to account for the existence of a city on the Palatine earlier than the traditional Roma Quadrata, invents an earlier Romulus and Remus to be its founders.[3]

The most important existing relics of the time when Roman history first begins, though dimly, to take a definite shape are the so-called "wall of Romulus," forming the circuit of the famous Roma Quadrata of the Palatine. Unfortunately the accounts of the extent of the Pomœrium (*Postmœrium*) or sacred enclosure give but little help towards defining its circuit. Even its precise nature is a matter of doubt, in spite of the accounts of it given by Varro (*L.L.*, v. 143), Livy (i. 44), and Dionysius (i. 88), as is usually the case with descriptions in ancient writers of what was in their time purely an archæological matter. It is, however, certain that the Pomœrium in some way or other followed the circuit of the primitive city, called from its shape Roma Quadrata.[4] Its boundaries are given thus by Tacitus (*Ann.*, xii. 24): starting from the Forum Boarium at the west corner of the Palatine, it goes to the Ara Maxima (see *Ann. Inst.*, 1854, p. 28) and the Ara Consi, both probably in the Vallis Murciæ, afterwards occupied by the Circus Maximus; but the exact positions of these points are unknown.[5] The next stages are the Curiæ Veteres, the Sacellum Larum, and lastly the Forum Romanum. Unfortunately the known points in this description, namely the two fora, are precisely those which mark that part of the circuit known from existing remains of the walls. It is therefore to the scanty relics of the wall which still exist on the other sides that we must turn to determine the extent of Roma Quadrata. These enable us to fix its line along the whole valley of the Velabrum, on the west of the hill, and along the valley of the Circus Maximus as far as the so-called Domus Gelotiana, about half-way on the south side (see fig. 17). The doubtful point has been whether the line of the wall from north to south included the whole extent of the hill, or passed across it, along the line of that deep natural valley which once divided the Palatine into two parts, and was in later times filled up and built upon by Domitian in the construction of his great palace. Recent excavations have, however, disclosed at several points the existence of this ancient wall extending along the south-eastern part of the Palatine; moreover, there is strong evidence as to Roma Quadrata being coextensive with the whole hill from Cicero, *De Rep.*, ii. 6, and Aul. Gell., xiii. 14. Traces of the wall have been found running eastwards from the Porta Mugonia, and that piece of wall by the Domus Gelotiana which starts to run northwards across the middle of the hill has been found to be merely a projecting spur, which again turns eastwards, so as to include apparently the rest of the Palatine where the palace of Severus now stands.

The most perfect remains of the Romulean wall are those near the west angle of the hill (see fig. 7). These show that the fortifications of Roma Quadrata were formed in the usual manner of Etruscan cities, in which the natural strength given by cliffs was increased by artificial means. The wall was set neither at the top nor at the foot of the hill, but more than half-way up, a level terrace or shelf all round being cut in the rock on which the base of the wall stood. Above that the hill was cut away into a cliff, not quite perpendicular but slightly "battering" inwards, to give greater stability to the wall, which was built up against it, like a retaining wall, reaching to the top of the cliff, and probably a few feet higher. The stones used in this wall are soft tufa, a warm brown in colour, and full of masses of charred wood. The cutting to form the steep cliff probably supplied part of the material for the wall; and ancient quarries, afterwards used as reservoirs for water, exist in the mass of rock on which the so-called temple of Jupiter Victor stands. It has been asserted that these tufa blocks are not cut but split with wedges; this, however, is not the case. Tufa does not split into rectangular masses, but would be shattered to pieces by a wedge; moreover, distinct tool-marks can be seen on all the blocks whose surface is well preserved and in the quarries themselves. Chisels from one-fourth to three-fourths of an inch in width were used, and also a sharp-pointed pick or hammer. The wall is about 10 feet thick at the bottom, and increases in thickness above as the scarped cliff against which it is built recedes. It is built of blocks laid in alternate courses of headers and stretchers, varying in thickness from 22 to 24 inches, in length from 3 to 5 feet, and in width from 19 to 22 inches. These blocks are carefully worked on their beds, but the face is left rough, and the vertical joints are in some cases open, spaces of nearly 2 inches being left between block and block; in other cases the vertical joints are worked true and close like the beds. The open vertical joints are peculiar to the masonry of this early period; in the wall of Servius they always fit closely, at least on the visible face of the wall. No mortar was used. At two points on the side of the Velabrum (see 8 and 9 on the plan of the Palatine, fig. 17) winding passages are excavated in the tufa cliff, the entrance to which was once closed by the ancient wall. One of these (No. 8) in early times (before water in abundance was brought to the Palatine on aqueducts) was used as a reservoir to collect surface water, probably for use in case of siege; circular shafts for buckets are cut downwards through the rock from the top of the hill; fig. 7 shows it in section. An exactly similar rock-cut cistern with vertical shafts, of very early date, exists at Alba Longa. Opposite the church of S. Teodoro a series of buttresses belonging to the wall of Romulus exists, partly concealed by a long line of buildings of the later years of the republic and the early empire, to make room for which the greater part of the then useless wall was pulled down, and only fragments left here and there, where they could be worked into the walls of the later houses.

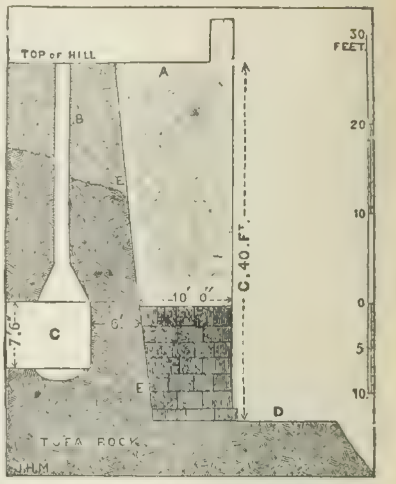

FIG. 7.—Section of primitive wall of Roma Quadrata. A. Original height of wall. B. Upper part of cliff, now crumbled away. C. Cistern cut in the tufa rock. D. Levelled platform to receive base of wall. E, E. Cliff made steeper by cutting.

Gate
Roma
Quad

Three accesses only to the ancient city can now be traced. One is the so-called Scalæ Caci, a long sloping ascent cut through the rock (see fig. 17) from the side of the Circus Maximus; some remains of the earliest wall still exist along the sides of this steep ascent or staircase. The upper part of this has remains of a basalt pavement, added in later times, probably covering the more ancient rock-cut steps. The name of the gate which led at this point into Roma Quadrata is unknown. The only two gates whose name and position can be (with any degree of probability) identified are the Porta Romanula and the Porta Mugionis (Plin., *H.N.*, iii. 5, 9). The former of these, called Porta Romana by Festus (ed. Müller, p. 262), was at the foot of the Clivus Victoriæ (see fig. 17), at the angle next the Forum Romanum.[6] According to Festus it was so called by the Sabines of the Capitol because it was their natural entrance to Roma Quadrata (see also Varro, *L.L.*, v. 164, vi. 24). The original approach to it was by a road running up the lower extra-mural part of the hill from the direction of the Velabrum. In later times a more direct ascent to it was made from the Forum by a flight of steps, probably the Scalæ Anulariæ of Suetonius (*Aug.*, 72; see figs. 16 and 17 and plan of the Forum, Plate VII.). The lower part of these stairs, now buried under S. Maria Liberatrice, is shown in the marble plan of Rome; the upper part, that from the Nova Via to the Clivus Victoriæ, still exists, and has recently been exposed. Traces of the Porta Mugionis or Mugonia (see Sol., i. 24) have been discovered near the temple of Jupiter Stator, where a basalt paved road leads up into the Palatine from the Summa Sacra Via and the Summa Nova Via, which join near the arch of Titus; exposure to weather has now destroyed the soft tufa blocks of which this gate was built. This is probably the "veterem portam Palatii" of Livy (i. 12) through which the Romans fled when defeated by the Sabines. A third entrance,[7] according to the ancient Etruscan rule (see Servius, *Ad Æn.*, i. 422), probably existed on the east side of the hill, but its site is uncertain. Judging from the shape of the hill, it may very possibly have been under the existing palace of Severus, where a road leads from the stadium down to the valley of the Cœlian; at other places the east side is precipitous. The buildings of the emperors have, however, made such radical changes in the form of the ground that any degree of certainty on this point is impossible. This third gate, according to Varro, who mentions (*L. L.*, v. 164-5) all three, was called Janualis.[1] With regard to the last gate there is some doubt whether he is right in its position; Macrobius (*Satur.*, i. 9) places it on the slopes of the Viminal.[2]

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[1] *Not. degli Scavi*, February 1883. An account of pottery found in Rome with archaic incised inscriptions is given in *Ann. Inst.*, 1880.

[2] See also Brizio, *Pitture e Sepolcri sull' Esquilino*, 1876, and De Rossi, *Ogetti arcaici rinvenuti nel Viminale*, 1878.

[3] See Becker, *Handb. der röm. Alterth.*, Leipsic, 1843, i. pp. 105-6.

[4] See Dionys., ii. 65; Solinus, i. 17; Plut., *Rom.*, 9.

[5] The Ara Maxima of Hercules was probably near the carceres or starting end of the circus (Dionys., i. 40). The Ara Consi (Equestrian Neptune) gave its name to the Consualia, games in honour of this deity held by Romulus, at which the celebrated capture of the Sabine women took place. In later times this altar existed on or below the spina of the circus, apparently near the meta at the opposite end to the carceres; it was usually hidden from sight, but during the Ludi Circenses was uncovered and exposed to view (see Plut., *Rom.*, 14; Varro, *L. L.*, vi. 20; Tertull., *De Spec.*, v. 8).

[6] The present entrance to Caligula's palace is probably exactly on the site of the ancient Porta Romana.

[7] The stairs of Cacus, being only an access for men on foot, would not be counted as one of the three necessary gates which existed in every Etruscan city, and were dedicated to Jupiter, Juno, and Minerva.

Remains of Period of Kings (753-509 B.C.).

The most important remains of the regal period are the great wall, principally the work of Servius Tullius, by which he included within one circuit the separately fortified hills which were then inhabited,—the Palatine, Capitoline, Aventine, Quirinal, and Cœlian, and added two more, the Esquiline and Viminal. These seven hills formed the Septimontium[3] (Varro, *L. L.*, iv. 41, vi. 24). Of even earlier date was the fort (Liv., i. 33) on the top of the Janiculum, connected by walls with the Pons Sublicius, some massive foundations of which still exist, though now buried near the church of S. Pietro in Montorio. Existing remains show that the great wall is of more than one date; part is probably earlier than Servius, and may be remains of the wall which, according to Livy (i. 36, 38) and Dionysius (iii. 37), was planned and in part carried out by Tarquinius Priscus; it would seem impossible that a work of such gigantic magnitude could have been begun and completed in the lifetime of one man. It should, however, be remembered that a complete circuit of new wall was not required in this undertaking; each, probably, of the five hills first inhabited had its own fortifications, and these were utilized in the line of the new wall. The space thus included was divided by Servius for political, military, and religious purposes into four regiones (Varro, *L. L.*, v. 46-54)—(1) the Suburana, including the Cœlian, and probably most of its adjacent valleys, with the Subura, the Carinæ, and part of the Esquiline—the derivation of Suburana from *sub urbe* is from Junius, quoted by Varro; (2) Esquilina, the main part of the Esquiline, including the Oppius and Cispius (es-quil-iæ, dwellings *outside*, cf. in-quil-inus); (3) Collina, the Viminal and Quirinal, which were called "colles" in contradistinction to the other five hills, which were called "montes"; (4) Palatina, the Palatine and its adjacent spurs, the Velia and Germalus. It will be observed that these four regiones do not include the Aventine, the Capitol, and some of their adjacent valleys,—an omission for which it is not easy to account.[4]

Excavations of the last fifteen years have done much to determine the line of the Servian wall (see Plate VI.), especially the great works undertaken in laying out a new quarter of the city on the Quirinal, Esquiline, and Viminal, which have laid bare and then mostly destroyed long lines of wall, especially along the agger. Beginning from the Tiber, which the Servian wall touched at a point near the present Ponte Rotto, and separating the Forum Olitorium (outside) from the Forum Boarium (inside), it ran in a straight line to the Capitoline Hill, the two crests of which, the Capitolium and the Arx, with the intermediate valley the Asylum, were surrounded by an earlier fortification, set (Dionys., ix. 68) ἐπὶ λόφοις . . . καὶ πέτραις ἀποτόμοις. In this short space there were three gates,—(1) the Porta Flumentana next the river (see Cic., *Ad Att.*, vii. 3; Liv., xxxv. 19, 21); (2) Porta Triumphalis, site unknown and usually only mentioned in connexion with triumphal processions (see Cic., *In Pis.*, 23; Joseph., *Bell. Jud.*, vii. 5, 4),—it was probably not used except on the occasion of triumphs; (3) Porta Carmentalis, close to the Capitolium.[5] From the Capitoline Hill the wall passed to the Quirinal along a spur of elevated ground, afterwards completely cut away by Trajan. Close to the Capitol was the gate afterwards called the Porta Ratumena, whence issued the Via Lata (Plut., *In Publ.*, 13; Plin., *H.N.*, viii. 42). Remains of the wall and foundations of the gate exist in Via di Marforio, Nos. 81 C and 81 E. After passing Trajan's forum, the first remains of the walls are on the slope of the Quirinal in the Colonna gardens. Near the foot of the Quirinal was the Porta Fontinalis (Liv., xxxv. 10). A piece of the wall has been exposed in the new Via Nazionale, and also an archway under the Palazzo Antonelli, which has been thought to be the Porta Fontinalis. This arch is, however, only 6 feet 6 inches wide and (to the springing of the arch) 5 feet high, which seems too small for one of the principal gates. The Porta Sanqualis (see Festus, ed. Müller, p. 345) was also on the Quirinal, probably on the slope between the Trevi fountain and the royal palace. Its position is indicated by the existence of some tombs which give the line of the road. On the north-west of the Quirinal was the Porta Salutaris (Festus, p. 327; Liv., ix. 43), probably near the "Quattro Fontane." In the Barberini palace gardens, and especially in those of the Villa Barberini (Horti Sallustiani), extensive remains of the wall have been recently exposed and destroyed,—which was also the fate of that fine piece of wall that passed under the new office of finance, with the Porta Collina, which was not on the line of the present road, but about 50 yards to the south (see Dionys., ix. 68; Strabo, v. 3). Thus far in its course from the Capitol the wall skirted the slopes of hills, which were once much more abrupt than they are now; but from the Porta Collina to the Porta Esquilina it crossed a large tract of level ground; and here, by the construction of his great agger, Servius gained the strength which elsewhere was given by the natural formation of the hills. The whole line of this agger has been recently traced and mostly destroyed. About the middle of it the Porta Viminalis was found in 1872; it stood, as Strabo says, ὑπὸ μέσῳ τῷ χώματι, and from it led a road which passed through the Porta Chiusa (ancient name unknown) in Aurelian's wall. Foundations of the Porta Esquilina were found in 1876 close behind the arch of Gallienus. The further course of the wall across the valley of the Colosseum, with its Porta Querquetulana and Porta Cœlimontana, probably a little beyond, is the least known part of the circuit. Hence the wall skirts the slopes of the Cœlian to the valley along which the Via Appia passed through the Porta Capena, near the church of S. Gregorio. Its line along the Aventine is fairly distinct, and near S. Balbina and in the Vigna Torlonia are two of the best-preserved pieces,—the former 11 courses high (22 feet), the latter 25 (50 feet). Under the Aventine it appears to have touched the river near the existing foundations supposed to be those of the Pons Sublicius. The Porta Trigemina was close by the bank. Hence to our starting-point the river formed the defence of the city, with its massive quay wall,—the κάλη ἀκτη of Plutarch (*Rom.*, 20). A fragmentary passage of Varro (*L. L.*, v. 163) mentions two other gates, Nævia and Rauduscula, "the bronze gate," but their positions are unknown. The site of the Porta Navalis is also very doubtful; it was probably not in the Servian wall.

Its construction. The wall is built of blocks of tufa, usually the softer kinds, but varying according to its position, as in most cases the stone used was that quarried on the spot. In some places a good deal of peperino is used. The blocks average from 23 to 24 inches in thickness—roughly 2 Roman feet—and are laid in alternate courses of headers and stretchers. The best preserved piece of wall—that on the Aventine in the Vigna Torlonia—has one complete arch and the starting of another; their sills are about 34 feet from the ground outside, and probably level with the ground inside (see fig. 8). These arches, though built of the harder stone, are not later insertions, but are contemporary with the wall itself. The blocks, both beds and vertical joints, are very carefully worked and set in mortar; in most cases they are bevelled round the joints. Some blocks are of great length,—ἀμάξιοι λίθοι Dionysius calls them. At this place the wall is backed with a thick mass of concrete; the use of the arched openings is doubtful: they may have been embrasures for catapults. The discoveries of recent years have shown the correctness of the description given by Dionysius (ix. 68) of the great agger, with its wall and foss, begun by the earlier kings and completed by the last Tarquin. Fig. 9 shows it in section; the earth taken from the foss (which was 100 feet wide at the bottom by 30 deep) was heaped up to form the agger, and was kept in its position by a lofty retaining wall on the front and a lower one behind. The outer wall was in places strengthened with massive buttresses closely set, or with towers; in other places it had no projections. The back wall, the position of which shows the thickness of the

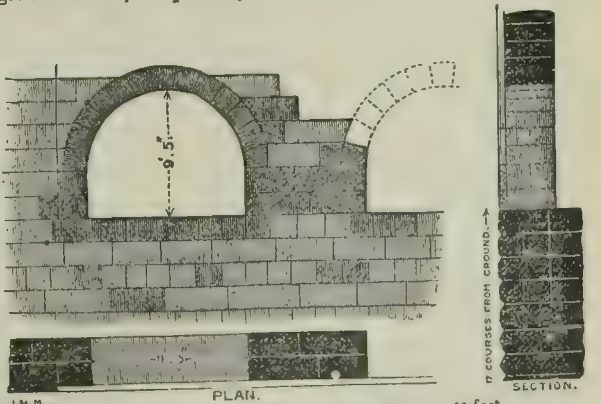

Fig. 8.—Part of Servian wall on Aventine.

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[1] See Dionys., ii. 65; Plut., *Rom.*, ix.; Dion Cass., various fragments; Liv., i. 7, 9; Sol., i. 17; Festus (ed. Müller), pp. 258, 262.

[2] See Becker, *De Muris et Portis Romæ*, Leipsic, 1842; also "La fondazione di Roma," in *Bull. Comm. Arch.*, ix., 1881.

[3] At an early date the term "Septimontium" had a different meaning (see Plut., *Quæs. Rom.*, 69; Burn, *Rome*, p. 37).

[4] Becker suggests (*Handbuch*, i. 386) that the Capitoline Hill was excluded on account of its sacred character, while the Aventine was not yet thickly populated, and the Janiculum was only occupied by the fort; see also *Ann. Inst.*, 1861, p. 61.

[5] See Sol., i. 13; Liv., ii. 49, xxiv. 47, xxv. 7; Ascon., *Ad Cic. in Toga*, p. 90, Orell.

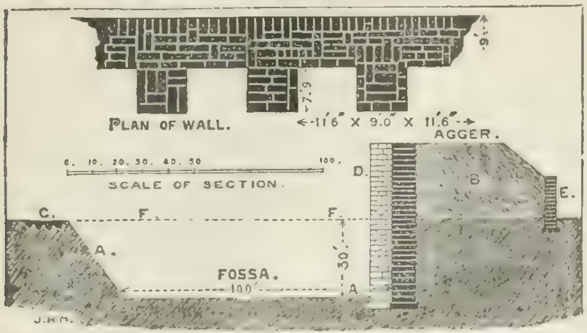

FIG. 9.—Section and plan (double scale) of wall and agger of Servius. A, A. Undisturbed earth of fossa. B. Earth heaped up to form the agger. C. Road at brink of fossa. D. Wall and buttress. E. Back retaining wall of agger. F. Level to which the fossa was filled up and built upon under the empire.

agger, is in parts about 33 feet from the front one, but it varies in this respect; in other parts the agger appears to have been more than 50 feet thick. Between the railway station and the Dogana a fine lofty piece of the front wall remains, with traces of the Porta Viminalis and of the lower back wall. Unfortunately the whole of the bank or agger proper has been removed, and the rough back of the great retaining wall exposed. Both tufa and peperino are used; the blocks vary in length, but average in depth the usual 2 Roman feet. The railway cutting which has destroyed a great part of the agger showed clearly the section of the whole work: the strata of different kinds of soil which appeared on the sides of the foss appeared again in the agger, but reversed as they naturally would be in the process of digging out and heaping up. Dionysius (ix. 68) states the length of the agger to have been 7 stadia—that is, about 1400 yards—which agrees (roughly speaking) with the actual discoveries. Originally one road ran along the bottom of the foss and another along its edge; the latter existed in imperial times. But the whole foss appears to have been filled up, probably in the time of Augustus, and afterwards built upon; houses of mixed brick and opus reticulatum still exist against the outside of the great wall, which was itself used as the back wall of these houses, so that we now see painted stucco of the time of Hadrian covering parts of the wall of the kings. Another row of houses seems to have faced the road mentioned above as running along the upper edge of the foss, thus forming a long street. As early as the time of Augustus a very large part of the wall of the kings had been pulled down and built over, so that even then its circuit was difficult to trace (Dionys., iv. 13). A very curious series of

Masons' marks. masons' marks exists on the buildings of the regal period, especially on the stones of the agger wall and those of the small cellæ on the Palatine near the Scalæ Caci. They are deeply incised, usually on the ends of the blocks, and average from 10 to 14 inches in length: some are single letters or monograms; others are numbers; and some are doubtful signs, *e.g.*, ↓, which may be the numeral 50 or the Etruscan CH. Fig. 10 shows the chief forms from the Palatine and Esquiline.[1]

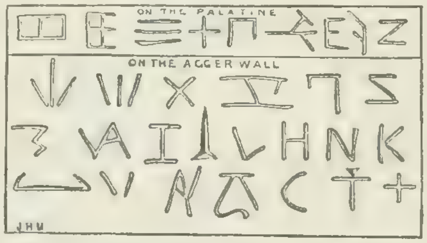

FIG. 10.—Masons' marks on walls of the regal period.

The Servian city did not include what is now the most crowded part of Rome, and which under the empire was the most architecturally magnificent,[2] namely, the great Campus Martius, which was probably to a great extent a marsh. It was once called Ager Tarquiniorum, but after the expulsion of the Tarquins was named Campus Martius from an altar to Mars, dating from prehistoric times (Liv., ii. 5).[3]

Of that wonderful system of massive arched sewers[4] by which, as Dionysius (iii. 68) says, every street of Rome was drained into the Tiber considerable remains exist, especially of the Cloaca Maxima, which runs from the valley of the Subura, under the Forum (see Plate VII.), along the Velabrum, and so into the Tiber by the round temple in the Forum Boarium; it is still in use, and well preserved at most places. Its mouth, an archway in the great quay wall (κάλη ἄκτη) nearly 11 feet wide by 12 high, consists of three rings of peperino "voussoirs," most neatly fitted. The rest of the vault and walls is built of mixed tufa and peperino.[5] Pliny (*H.N.*, xxxvi. 24) gives an interesting account of what is probably this great sewer, big enough (he says) for a loaded hay-cart to pass along. The mouths of two other similar but smaller cloacæ are still visible in the great quay wall near the Cloaca Maxima, and a whole network of sewers exists under a great part of the Servian city. Some of these are not built with arched vaults, but have triangular tops formed of courses of stone on level beds, each projecting over the one below,—a very primitive method of construction, employed in the Tullianum (see fig. 11). The great quay wall of tufa and peperino which lined both banks of the Tiber for a considerable distance also belongs to the regal period, and was a work of great solidity and strength; it is now mostly destroyed by the action of the river. In later times this massive wall was extended, as the city grew, all along the bank of the Campus Martius, and, having lost its importance as a line of defence, had frequent flights of stairs built against it, descending to the river. Some of these are shown in one of the fragments of the marble plan (see Jordan, *For. Ur. Rom.*; *Frag.* 169). In 1879 a travertine block was dredged up inscribed **P. BARRONIVS. BARBA. AED. CVR. GRADOS. REFECIT**, dating from the 1st century B.C. This records the repair of one of these numerous river stairs. The name "pulchrum littus" is not a classical term, but simply a translation of Plutarch's κάλη ἄκτη.[6]

The Tullianum is probably, next to the remains of Roma Quadrata, the earliest of the existing buildings of Rome. It is partly cut in the tufa rock of the Capitoline Hill and partly built of 2-feet blocks of tufa, set with thin beds of pure lime mortar, in courses projecting one over the other (see fig. 11). Its name is probably derived, not from Servius Tullius, as Varro (v. 151) asserts, but from an early Latin word, *tullius*, a spring of water; its original use was probably that of a cistern or well. It was closed by a conical vault, arched in shape, but not constructionally an arch,—very like the so-called "tomb of Agamemnon" at Mycenæ, and many early Etruscan tombs. When the upper room with its arched vault, also of tufa, was built the upper part of the cone seems to have been removed, and a flat stone floor (a flat arch in construction) substituted. This cannot be other than the "carcer . . . media urbe imminens foro" of Livy (i. 33), who speaks also (xxxiv. 44) of an "inferiorem carcerem," and at xxix. 22 of a criminal being put in the Tullianum. That its use as a cistern was abandoned is shown by the cloaca which leads from it, through the rock, to a branch of the Cloaca Maxima. This horrible place was used as a dun-

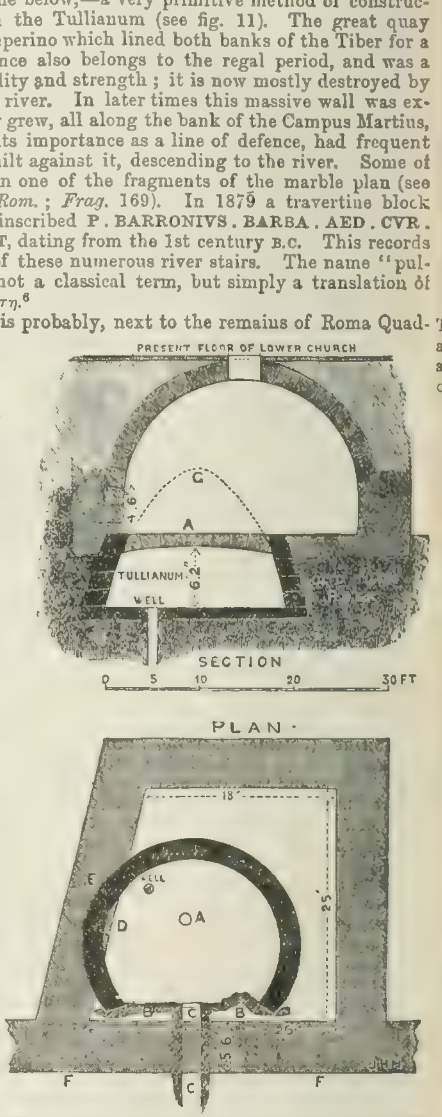

FIG. 11.—Plan and section of the Tullianum or "Mamertine prison." A. Opening in floor over the Tullianum. B, B. Solid tufa rock. C, C. Branch of cloaca. D, E. Position of modern stairs and door. F, F. Front wall of prison with inscription of 22 A.D. G. Probable original top of Tullianum.

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[1] See Bruzza, in *Ann. Inst.*, 1876, p. 72; Jordan, *Topogr.*, i. p. 259.

[2] It was specially that part of the Campus Martius which was named after the Circus Flaminius that was remarkable for its architectural splendour.

[3] On this whole subject consult Nibby and Gell, *Le Mura di Roma*, 1820; Piale, *Porte del Recinto di Servio*, 1833; Becker, *De Romæ Muris*, Leipsic, 1842; Lanciani, *Ann. Inst.*, 1871, p. 40, *Mon. Inst.*, ix. pl. xxvii., also *Ann. Inst.*, 1857, p. 62, and *Mon. Inst.*, vi. pl. iv.; Quarenghi, *Le Mura di Roma*, 1880 (taken from Lanciani); comp. Vitruvius, i. 5.

[4] See Liv., i. 38, 56; Dionys., iv. 44.

[5] Mommsen is mistaken in his assertion that travertine is used in the vault of this cloaca; and hence his argument as to its being of later date falls to the ground.

[6] A great quay wall with arched cloaca, similar in style to those in Rome, exists among the remains of the Etruscan city of Graviscæ, by the sea near Tarquinii, and also in other Etruscan cities,—a similarity not unnatural if we accept the statement of historians that the great cloacæ were the work of Tarquinius Priscus.

geon, prisoners being lowered through a hole in the stone floor, —the only access. The present stairs are modern. The two chambers are vividly described by Sallust (*Cat.*, 55). The entrance to the upper prison was on the left of the stairs leading up from the Forum to the Clivus Argentarius. the road to the Porta Ratumena (see Plate VI.). Lentulus and the Catiline conspirators, as well as Jugurtha and other prisoners of importance, were killed or starved to death in this fearful dungeon, which is called *τὸ βαραθρον* by Plutarch (*Marius*, xii.). According to a doubtful tradition of the Catholic Church St Peter and St Paul were imprisoned in the Tullianum. The name Mamertine prison is of mediæval origin. The front wall of the prison was restored in the reign of Tiberius 22 A.D., and bears this inscription on a projecting string-course—C. VIBIVS. C. F. RVFINVS. M. COCCEIV[S NERVA] COS. EX. S. C.[1] The floor of the upper prison is about 16 feet above the level of the Forum, to which access was given by a flight of steps—Scalæ Gemoniæ—on which the bodies of criminals were exposed;[2] Pliny (*H.N.*, viii. 61) calls it the "stairs of sighs" (*gradus gemitorii*).

Forum Romanum and Adjacent Buildings.

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The Forum Romanum or Magnum, as it was called in late times to distinguish it from the imperial fora, occupies a valley which extends from the foot of the Capitoline Hill to the north-east part of the Palatine. Till the construction of the great cloacæ it was, at least in wet seasons, marshy ground, in which were several pools of water. In early times it was bounded on two sides by rows of shops and houses, dating from the time of the first Tarquin (Liv., i. 35). The shops on the south-west side facing the Sacra Via, where the Basilica Julia afterwards was built, were occupied by the Tabernæ Veteres.[3] The shops on the northern side, being occupied by silversmiths, were called Tabernæ Argentariæ (see Liv., xxvi. 27, xl. 51), and in later times, when rebuilt after a fire, were called Tabernæ Novæ.[4] An altar to Saturn (Dionys., i. 34, vi. 1), traditionally set up by the companions of Hercules, and an altar to Vulcan, both at the end towards the Capitol, with the temple of Vesta and the Regia at the opposite end, were among the earliest monuments grouped around the Forum. The Lacus Curtius vanished, as Varro says (*L.L.*, v. 148-149), probably with other stagnant pools, when the cloacæ were constructed (Liv., i. 38, 56).[5] Another pool, the Lacus Servilius, near the Basilica Julia, was preserved in some form or other till the imperial period. Under Sulla it was used as a place to expose the heads of many senators murdered in his proscriptions (Cic., *Rosc. Am.*, 32; Seneca, *De Prov.*, 3). The Vulcanal or Hephæsteum was an open area, so called from the early altar to Vulcan, and was (like the Comitium) a place of public meeting, at least during the regal period.[6] It was raised above the Comitium, and probably was a space levelled on the lower slope of the Capitoline Hill behind the arch of Severus; but its exact form and position are very doubtful. It was probably much encroached upon when the temple of Concord was enlarged in the reign of Augustus.

Plate VII. gives a carefully measured plan of the Forum, showing the most recent discoveries.

References to Numbers in Plate (VII.) of Forum Romanum.[7]

1, 1. (Basilica Julia) existing marble piers and fragment of screen. 2. Impression of marble pier in the late archway of brick-faced concrete. 3. Only remaining one of ancient travertine piers. 4, 4. Chambers of tufa and travertine, with traces of stairs. 5. Tabula lusoria, with inscription, see p. 817. 6. Opening into Cloaca Maxima. 7. Massive travertine pedestal. 8, 8. Paving of porta santa and Africano marbles. 9, 9. Paving of various Oriental marbles. 10. Probable position of arch of Tiberius. 11, 11. Existing granite columns of temple of Saturn. 12. Main flight of steps, of which only the concrete core remains. 13. Starting of small side stairs to chamber under main flight of steps. 14. Only piece existing of ancient basalt paving (see fig. 6). 15. Platform of porticus of Dii Consentes. 16. Upper door in Tabularium blocked up by porticus of Dii Consentes. 17. Door at foot of stairs of Tabularium, blocked up by temple of Vespasian (see fig. 1). 18. Travertine paving of time of Domitian. 19. Pedestal of Vespasian's statue. 20. Three existing columns of temple of Vespasian. 21. Ædicula built by Domitian. 22. Travertine paving of time of Domitian. 23, 23. Long passage and windows in lower story of Tabularium. 24. Pedestal of statue of Concord. 25. Pedestal added by one of the Flavian emperors. 26. Fragment of a later pedestal. 27. White marble door-jamb and massive threshold of porta santa marble. 28. Remains of some early structure in tufa. 29. Three travertine steps down to lower paved level, perhaps that of the Comitium. 30. Marble steps to this lower level. 31. Large marble pedestal (not *in situ*) inscribed to Fl. Jul. Constantius. 32. Late addition to rostra. 33. Remains of a small marble structure. 34. Marble pedestal of a column, with rude reliefs of the 4th century. 35. Marble pedestal of an equestrian statue, set on end, and inscribed to Arcadius and Theodosius. 36. Marble walls (*plutei*) with reliefs of time of Trajan (not *in situ*). 37. Remains of a small marble structure. 38. Large concrete core of a late pedestal. 39. Steps to column of Phocas, part marble and part tufa. 40 Late building of brick and concrete lined with marble. 41. Existing three columns of temple of Castor. 42, 42. Existing pieces of mosaic pavement. 43. Main steps of temple of Castor. 44. Side steps; only the three lowest remain. 45. Part of circular travertine curb; *puteal Scribonis*? 46, 46. Original line of Sacra Via, covered with late paving of travertine. 47. Line of side steps of Ædes Divi Julii. 48. Small front stairs up to podium of Ædes Divi Julii. 49 Curved recess in podium, which probably once contained an altar to Divus Julius; now blocked up by late masonry. 50. Fragment of a wall faced with opus reticulatum. 51. Concrete core of podium of temple of Vesta 52. Small ædicula by entrance to Atrium Vestæ. 53, 53. Shops adjoining Atrium Vestæ. 54. Stairs from Nova Via up to Clivus Victoriæ and palace of Caligula. 54A. Stairs, shown on a fragment of the marble plan, leading up from the level of the Forum to that of the Nova Via. 55, 55. Windows in curia of Diocletian (S. Adriano), now below the ground level; see fig. 12, p. 816. 56. Marble doorway shown by Du Perac, now missing.

Unlike the fora of the emperors, each of which was surrounded by a lofty wall and built at one time from one design, the architectural form of the Forum Romanum was a slow growth. The marshy battle-field of the early inhabitants of the capitol and Palatine became, when the ground was drained by the great cloacæ, under a united rule the most convenient site for political meetings, for commercial transactions, and for the pageants of rich men's funerals, *ludi scenici*, and gladiatorial games.[8] For these purposes a central space, though but a small one, was kept clear of buildings; but it was gradually occupied in a somewhat inconvenient manner by an ever-accumulating crowd of statues and other honorary monuments. On three sides the limits of this open space are marked by paved roads, faced by the stately buildings which gradually took the place of the simple wooden tabernæ and porticus[9] of early times. This central space was essentially the meeting-place of the plebs, or the Comitia Tributa, while the patricians, the Comitia Curiata, met on the Comitium, which adjoined the Forum. The Comitium[10] was a level space in front of the Curia; the construction of both is ascribed to Tullus Hostilius. For the position of the Comitium and the Curia[11] see plan of Forum (Plate VII.). Varro (*L. L.*, v. 155-156) gives the following account of the buildings which were grouped along the northern angle of the Forum.

"Comitium ab eo quod coibant eo comitiis curiatis et litium causa. Curiæ duorum generum, nam et ubi curarent sacerdotes res divinas, ut Curiæ Veteres, et ubi senatus humanas, ut Curia Hostilia, quod primum ædificavit Hostilius rex. Ante hanc Rostra, quojus loci id vocabulum, quod ex hostibus capta fixa sunt rostra. Sub dextra hujus a Comitio locus substructus, ubi nationum subsisterent legati qui ad senatum essent missi. Is Græcostasis appellatus a parte ut multa. Senaculum supra Græcostasim, ubi Ædis Concordiæ et Basilica Opimia. Senaculum vocatum, ubi senatus, aut ubi seniores consisterent."

The Curia or senate-house passed through many vicissitudes. Cur

At first called Curia Hostilia from its founder Tullus Hostilius (Liv., i. 30), it lasted till 52 B.C., when it was burnt at the funeral of Clodius, and was then rebuilt by the son of Sulla, and from his gens called Curia Cornelia (Dion Cass., xl. 50; Plin., *H.N.*, xxxiv. 12). It was again rebuilt by Augustus (29 B.C.) under the name of the Curia Julia, as recorded in the inscription of Ancyra (see ANGORA)—CVRIAM. ET. CONTINENS. EI. CHALCIDICVM... FECI. Little is known about the adjoining buildings called the Athenæum and Chalcidicum; Dion Cassius (li. 22) mentions the group. In the reign of Domitian the Curia Julia was again rebuilt (Prosp. Aquit., p. 571), and lastly by Diocletian. There is strong evidence to show that the existing church of S. Adriano is the Curia of Diocletian, though of course much altered, and with its floor raised about 20 feet above the old level. Fig. 12 shows the front existing towards the Forum, omitting later windows and doors. As late as the time of Du Perac (*Vestigj di Roma*) the old entrance and level were preserved. He gives a drawing[12] of it with steps descending to the doorway. The ancient bronze doors now at the end of the nave of the Lateran basilica originally belonged to this building, and were removed thence by Alexander VII. Fig. 12 is derived from actual measurements of the part above ground, while the lower part, now buried, is derived from Du Perac's drawing and from the bronze doors at the Lateran, which give the size of the opening, and show how deeply the buried part descends below the present level. The brick cornice and marble consoles. covered with enriched mouldings in stucco, and the sham marble facing, also of stucco, if compared with similar details in the baths of Diocletian, leave little doubt as to this being a work of his time, and not. as has been usually assumed, the work of Pope Honorius I., who (625-638 A.D.) consecrated it as the church of S. Adriano.

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[1] Consules suffecti for 22 A.D.

[2] See Tac., *Hist.*, iii. 74, 85; Suet., *Vit.*, 17.

[3] See Livy (xliv. 16), who mentions a house of P. Africanus, "pone veteres ad Vortumni signum," which was bought by T. Sempronius to clear the site for the Basilica Sempronia in 169 B.C. This basilica appears to have been afterwards absorbed in the Basilica Julia.

[4] Hence these two sides of the Forum are frequently referred to in classical writings as "sub veteribus" and "sub novis."

[5] In later times it appears to have been an enclosed space containing an altar; it is described by Ovid (*Fast.*, vi. 403); according to one tradition it marked the spot where Curtius's self-immolation filled up the chasm which had opened in the Forum (see Dionys., ii. 41).

[6] See Dionys., ii. 50, vi. 67; Plin., *H.N.*, xvi. 86; Plut., *Quæs. Rom.*, 47.

[7] A larger plan, coloured in detail, is given in J. H. Middleton, *Ancient Rome in 1885* (A. & C. Black, Edinburgh).

[8] The first gladiatorial show in Rome was given in 264 B.C. in the Forum Boarium by D. Junius Brutus at his father's funeral (Liv., *Epit.*, xvi.), the first in the Forum Romanum in 216 B.C. (Liv., xxiii. 30). See also Liv., xxxi. 50, xli. 28; and Suet., *Cæs.*, 39; *Aug.*, 43; and *Tib.*, 7.

[9] "Porticus" means a covered colonnade in one or more stories, either in one straight line or enclosing a space like a cloistered quadrangle. A "cryptoporticus" usually implies a covered passage, with walls instead of columns at its sides.

[10] See a valuable paper on the Comitium by Detlefsen, *Ann. Inst.*, 1860; and Dernburg, *Die Lage des Comitiums*. The Comitium was also the chief law-court, where criminal cases were heard by the triumviri capitales. Dictators, consuls, and other officials of Rome held courts there, and received foreign envoys. It was also used for public shows and games and was a place of execution of criminals.

[11] Livy (xlv. 24) indicates their relative positions by the phrase "Comitium vestibulum Curiæ."

[12] This valuable set of drawings was not published till 1575; but internal evidence shows that many of them, if not all, were made as early as 1540. A good account of the Curia and its vicissitudes is given by Lanciani, *L'Aula e gli Uffici del Senato Romano*, 1883.

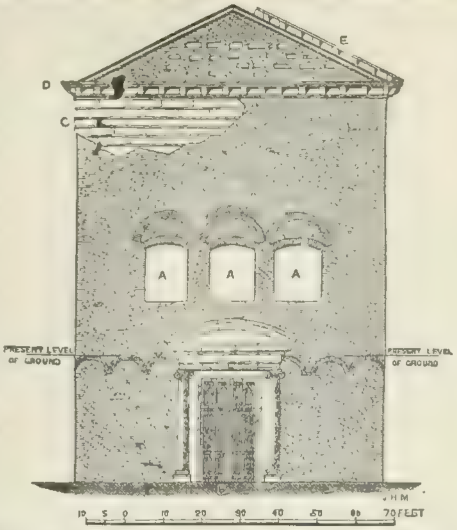

FIG. 12.—Curia of Diocletian, as it was in the 16th century. A, A, A. Original windows now blocked up. B. Bronze doors. C. Stucco facing. D. Cornice with marble consoles and enriched stucco mouldings, both existing. E. Raking cornice now gone, but shown by Du Perac.

Comitium. From the Curia a flight of steps led down to the Comitium (Liv., i. 36), the level of which appears from the existing steps and pavement near the arch of Severus (see Plate VII.) to have been about 2 feet below that of the Forum, and not above it, as Bunsen and others have asserted. **Original rostra.** On the Comitium stood the ancient rostra till they were rebuilt on a new site by Julius Cæsar in 44 B.C. The ancient rostra were so called in 338 B.C., when Camillus and Mænius defeated the Latin fleet at Antium, and the beaks (rostra) of the captured ships were fixed to an existing platform on the Comitium for orators. It was also called a "templum" because the structure was consecrated by the augurs (Cic., *De Orat.*, iii. 3). Other rostra, named for distinction Rostra Julia, were so called from the beaks of ships taken at Actium and affixed by Augustus to the podium of the temple built by him in honour of the deified Julius. Both are mentioned by Suetonius (*Aug.*, 100). There were several other platforms or tribunals for orators in and about the Forum, but they were not called rostra. From the original rostra Cicero delivered his *Second* and *Third Catiline Orations*, and they were the scene of some of the most important political struggles of Rome, such as the enunciation of their laws by the Gracchi. Beside the Comitium another monument was erected, also adorned with beaks of ships, to commemorate the same victory at Antium. This was the Columna Mœnia, so called in honour of Mœnius (Plin., *H.N.*, xxxiv. 11, vii. 60). The Columna Duilia was a similar monument, erected in honour of the victory of C. Duilius over the Punic fleet in 260 B.C.; a fragment of it with inscription (restored in imperial times) is preserved in the Capitoline Museum.[1] Columns such as these were called "columnæ rostratæ."

Græcostasis. Near the Comitium, on the side towards the Capitol, was the Græcostasis, a platform where foreign ambassadors stood to hear the speeches (see Varro, *loc. cit.*). It appears probable that, like the rostra, the Græcostasis was moved in the 1st century B.C.; and this name has been given with some probability to the curved marble-faced platform behind the existing rostra.

The Senaculum appears to have been a place of preliminary meeting for the Senate before entering the Curia (Liv., xli. 27; Val. Max., ii. 2, 6); it adjoined the temple of Concord, and when this was rebuilt on an enlarged scale in the reign of Augustus it appears probable that its large projecting portico became the Senaculum (Dionys., i. 34, vi. 1). It may possibly have once been identical with the Area Concordiæ mentioned by Livy (xl. 19) in connexion with the Area Vulcani (comp. xxxix. 46).

A great part of the north-east side of the Forum was occupied by two basilicæ, which were more than once rebuilt under different names. The first of these appears to have been adjacent to the Curia, on its south side; it was called the Basilica Porcia, and was founded by the elder Cato in 184 B.C. (see Liv., xxxix. 44, and Plut., *Cato Major*, 19); it was burnt with the Curia at Clodius's funeral. Adjoining it another basilica, called Æmilia et Fulvia (Varro, vi. 4), was built in 176 B.C. by the censors M. Fulvius and M. Æmilius Lepidus;[2] it stood, according to Livy (xl. 51), "post argentarias novas," the line of silversmiths' shops along the north-east side of the Forum. In 50 B.C. it was rebuilt by L. Æmilius Paulus (Plut., *Cæs.*, 29; Appian, *Bell. Civ.*, ii. 26), and was more than once restored within the few subsequent years by members of the same family. Its later name was the Basilica Pauli, and it was remarkable for its magnificent columns of Phrygian marble (Plin., *H.N.*, xxxvi. 24) or pavonazetto.

Near the middle of the north-east side of the Forum stood also the small bronze temple of Janus,[3] the doors of which were shut on those rare occasions when Rome was at peace.[4] A first brass of Nero shows it as a small cella, with richly ornamented frieze and cornice. Another ædicula near that of Janus was the shrine of Venus Cloacina (or the Purifier), probably on the line of the great cloaca (Liv., iii. 48; Plin., *H.N.*, xv. 36). Two or more other shrines of Janus stood on this side, behind the shops of the money-lending argentarii; and the word "Janus" was used to imply the place of usurers (Hor., *Sat.*, ii. 3, 18).

So far the buildings mentioned have been mostly those whose sites are still buried under the line of modern houses on the north-east of the Forum, the only part which has not yet been excavated. Turning to those of which existing remains are visible, at the north-west end the rostra of Julius Cæsar mark the limit of the Forum in this direction, as the arch of Fabius beside the temple of Faustina did in the other.

Exi th rostra. Plate VII. shows the plan of the rostra, with the curved Græcostasis behind it. It is an oblong platform about 78 feet long and 11 feet high above the level of the Forum; its ground floor, paved with herring-bone bricks, is 2 feet 6 inches below the Forum paving. Its end and side walls are of tufa blocks, 2 feet thick and 2 feet wide, each carefully clamped to the next with wooden dovetail dowels. Its floor was supported by a series of travertine piers, carrying travertine lintels, on which the floor slabs rested (see fig. 13). Outside it was completely lined with Greek marble and had a richly moulded plinth and cornice; none of the latter is *in situ*, but many pieces lie scattered around. A groove cut in the top of the cornice shows the place where marble cancelli were fixed; one of the cornice blocks is partly without this groove, showing that the screen did not extend along the whole front of the rostra. This agrees with a relief on the arch of Constantine, representing the emperor making an oration from the rostra, with other buildings at this end of the Forum shown behind. In this relief the screen is shown with a break in the middle, so that the orator, standing in the centre, was visible from head to foot. Two tiers of large holes to hold the bronze rostra are drilled right through the tufa wall, and even through the travertine pilasters where one happens to come in the way; these holes show that there were nineteen rostra in the lower tier, and twenty above set over the intermediate spaces of the lower row. The back wall of the rostra is of concrete faced with brick, which, being probably the work of Julius Cæsar in 44 B.C., is the earliest dated example of brickwork in Rome. The inside space, under the main floor of the rostra, is coated thickly with stucco,—the brick wall being studded in the usual way with iron nails to form a key for the plaster.

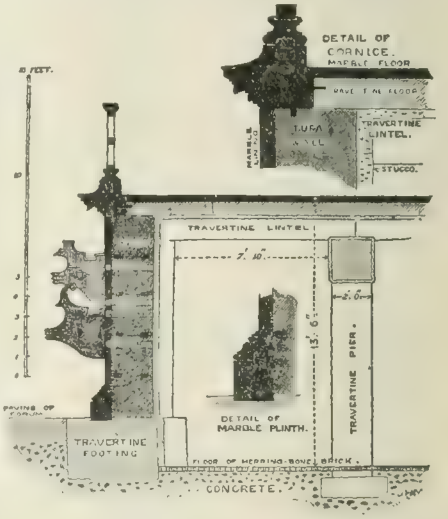

FIG. 13.—Section through front of rostra, showing the marble lining, screen, and bronze beaks, the position of which is shown by the holes in the existing tufa wall. The details are to double scale.

In spite of the assertions of Bunsen, Jordan, and others that the curved platform behind (conjecturally called the Græcostasis) is a work of late date. it is evident from various constructional points, visible at the junction of the two structures, that it existed before the rostra, which when built completely hid its rich lining and the pilasters of porta santa marble which decorated its front,—very strong evidence as to the curved platform being earlier in date. The level

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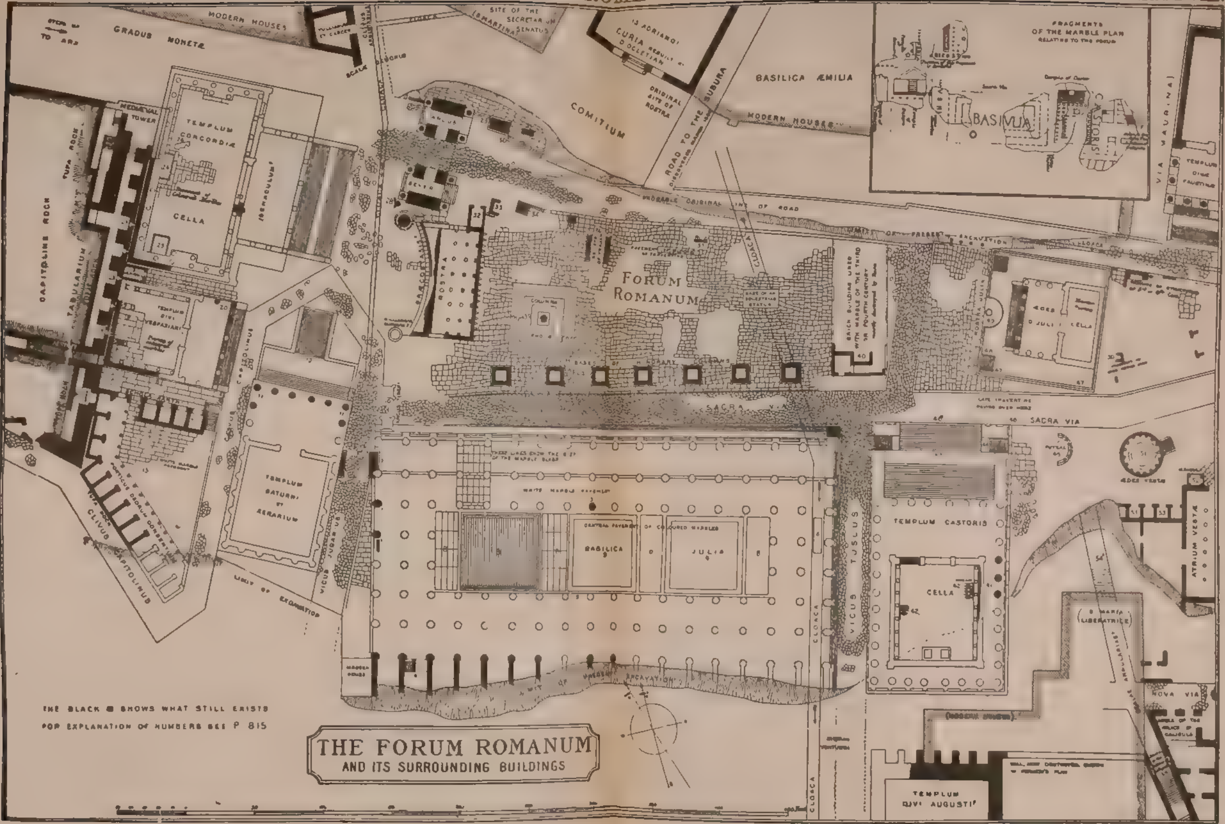
[1] The column itself is a copy made by Michelangelo; it is at the foot of the stairs of the Palazzo dei Conservatori.

[2] The Forum Piscatorium or fish-market appears to have been at the back of this basilica (see Liv., xl. 51).

[3] The original temple was one of the prehistoric buildings attributed to Romulus and Tatius (Serv., *Ad Æn.*, i. 291), or by Livy (i. 19) to Numa.

[4] See *Mon. Ancyr.*; Procop., *Bell. Goth.*, i. 25; Liv., i. 19; Suet., *Aug.*, 22



THE BLACK ■ SHOWS WHAT STILL EXISTS

FOR EXPLANATION OF NUMBERS SEE P 815

THE FORUM ROMANUM
AND ITS SURROUNDING BUILDINGS

of the top of this platform and that of the rostra appear to have coincided exactly, so that the whole formed one continuous marble-paved platform, and the rostra would be reached, not by steps, but from the higher ground towards the Capitol, from which access is given to the curved platform and so on to the floor of the rostra. The bronze rostra on this structure of 44 B.C. were believed to be the original beaks from Antium, moved from the old rostra (Florus, i. 11). On its marble platform stood many statues,[1] *e.g.*, of Sulla, Pompey, two of Julius Cæsar, and others (see Dion Cass., xlii. 18, and xliv. 4). Owing probably to the weight of the many statues proving too much for the travertine piers, which are not set on their natural beds but endways, and therefore are very weak, the structure seems to have given way at more than one time and the floor has been supported by piers and arches of brick-faced concrete, inserted either in place of or at the sides of the shattered piers. These later additions, apparently of the 3d and 4th centuries, are omitted in Plate VII. for the sake of clearness. The moulded plinth of the curved platform is of Pentelic marble, some of the blocks of which are incised with masons' marks, namely, the Greek letters Γ, Δ, Ε, Ζ, Η, Θ, and Κ. A number of metal pins on the face of the slabs of porta santa marble which line its front show that emblemata or reliefs, probably of gilt bronze, were once fastened to the marble.[2] The use of Greek marble shows that this platform can be but little earlier than the rostra (44 B.C.); and it appears possible that this is the Græcostasis, transferred, like the rostra, to a new site.[3] See Varro (*L.L.*, v. 155) and Cicero (*Ad Quint. Fr.*, ii. 1), who mention the original structure. Restorations of the later one by Antoninus Pius and Diocletian are mentioned by Capitolinus (*Ant. Pius*, 8), and in the *Catal. Imp. Vienn.* given by Preller (*Regionen*, p. 143),—in both cases after injury by fire, a fact which seems to show that in later times the Græcostasis had some roofed porticus or shelter and was not a mere open platform as it was originally.

Umbilicus and Milliarium.

At the northern end of the curved platform there is a cylindrical structure of concrete faced with brick, and lined with thin marble slabs; it is in three stages, each diminishing in size, and appears to be an addition of about the time of Severus. This is usually identified with the Umbilicus Romæ, or central point of the city, mentioned in the *Notitia* and the Einsiedeln MS. (see Preller, *Regionen*, Reg. viii.). According to another theory it is the base of the gilt statue of the Genius Populi Romani set up by Aurelian; but this is contradicted by the form of the structure, which is not that of the pedestal of a statue.[4] At the other extremity probably stood the Milliarium Aureum, a marble column sheathed in gilt bronze and inscribed with the names and distances of the chief towns on the roads which radiated from the thirty-seven gates of Rome (Plin., *H.N.*, iii. 9). It was set up by Augustus in 29 B.C. and its position "sub æde Saturni" is indicated by Tacitus (*Hist.*, i. 27; see schol. on Suet., *Otho*, 6, and Plut., *Galba*, 24). The Milliarium is mentioned in the *Notitia* (Reg. viii.) as being near the Vicus Jugarius. The position shown in Plate VII. agrees with both these indications, being near the start of the Vicus Jugarius, and close under the temple of Saturn. Fragments of a curved marble plinth and frieze with floriated reliefs, now lying in the Basilica Julia, probably belonged to the pedestal of this column; they were found by Canina near the supposed site.[5]

Temple of Saturn.

The position of the temple of Saturn is described in *Mon. Ancyr.* (see below) and shown on the marble plan, and is also identified by various passages in ancient writers. Varro (*L.L.*, v. 42) speaks of it as being "in faucibus Capitolii";[6] Servius (*Ad Æn.*, ii. 115) says that it is in front of the Clivus Capitolinus, and near the temple of Concord (see Plate VII.). It was built against a steep slope or outlying part of the Capitoline Hill (comp. Dionys., i 34) on the site of a prehistoric altar to Saturn, after whom the Capitoline Hill was originally called Mons Saturnius. The public treasury was part of this temple (Serv., *Ad Æn.*, ii. 116, and Macrob., *Sat.*, i. 8).[7] The original temple is said by Varro (ap. Macrob., i. 8) to have been begun by the last Tarquin, and dedicated by T. Lartius, the first dictator, 501 B.C.; but Dionysius (vi. 1) and Livy (ii. 21) attribute it to the consuls A. Sempronius and M. Minucius in 497 B.C. It was rebuilt on a larger scale by Munatius Plancus in the reign of Augustus (Suet., *Aug.*, 29). The only part remaining of this date is the very lofty podium of massive travertine blocks, and part of the lower course of Athenian marble, with which the whole was faced. In the 16th century a piece of the marble frieze was found, inscribed L . PLANCVS . L . F . COS . IMPER . ITER . DE . MANIB . (*C.I.L.*, vi. 1316). The erection of the six granite columns in the front and two at the sides, with their clumsily patched entablature, belongs to the last rebuilding in the time of Diocletian. Some of these fine columns are evidently earlier than this rebuilding, but were refixed with rude caps and bases. One of the columns is set wrong way up, and the whole work is of the most careless sort. Part of the inscription, once inlaid with bronze, recording this latest rebuilding still exists on the entablature (see Gori, *L'Erario di Saturno*, 1873).[8] On the Forum side the temple is flanked by the Vicus Jugarius, while the steep Clivus Capitolinus winds round the front of the great flight of steps leading up to the cella, and then turns along the north-west side of the temple.[9]

Vicus Jugarius

The Vicus Jugarius (see Plate VII.), part of the basalt paving of which is now exposed, was so called (see Festus, ed. Müller, p. 104) from an altar to Juno Juga, the guardian of marriage. Starting from the Forum, it passed between the temple of Saturn and the Basilica Julia, then close under the cliff of the Capitolium (see Liv., xxxv. 21) and on to the Porta Carmentalis. It was spanned at its commencement by a brick-faced arch lined with marble, the lower part of which exists, and is not earlier than the 3d or 4th century.[10] At this end of the Forum the arch of Tiberius was built across the Sacra Via, which is narrowed as if to bring it under the span of the arch. It was erected in 17 A.D. to commemorate the recovery of the standards lost by Varus.[11] A few fragments remain, scattered about in various places

Basilica Julia.

The Basilica Julia[12] occupies a great part of the south-west side of the Forum, along the line of the Sacra Via; its ends are bounded by the Vicus Jugarius and the Vicus Tuscus. It was begun by Julius Cæsar, finished by Augustus, and again rebuilt by him, as is recorded in the *Mon. Ancyr.*,[13] in an important passage which gives its complete early history. In plan it was a large double porticus, open on three sides, with a range of rooms, two or three stories high, on the south-west side. These rooms, of which considerable remains exist, are built of tufa with travertine pilasters and bands in the tufa wall. This part probably is of the time of Julius Cæsar; Augustus surrounded it with an arcade of arches in two stories and engaged Tuscan columns in Luna marble, fragments of which exist at the north-west end. The double aisle which surrounded it was vaulted in concrete, forming upper galleries (*mæniana*), whence spectators heard the law-cases which were conducted in the area below (see Plin., *Ep.*, vi. 33). The central space was not roofed, but probably was sheltered by an awning.[14] It is paved with richly coloured Oriental marbles, namely, pavonazzetto, cipollino, giallo, and Africano. The covered aisles are paved with large slabs of white marble.[15] Many *tabulæ lusoriæ*, or gambling boards, are scratched on this marble paving (comp. Cic., *Phil.*, ii. 23).[16] Low marble cancelli, with moulded plinth, closed the otherwise open arches of the basilica; many fragments exist, and one piece of the subplinth is still *in situ*. This basilica held four law-courts with 180 *judices* or jurors. Trajan and other emperors held law-courts there (Dion Cass., lxxxviii. 10). An inscription found near it records its restoration by Septimius Severus in 199 A.D. after a fire; it was again burnt in 282 and restored by Diocletian. These fires had destroyed nearly all the fine marble arches of Augustus; and Diocletian rebuilt it mostly with brick or travertine piers, a few of which remain.[1] A final restoration is recorded in an inscription discovered in the 16th century, and another in 1882, as being carried out by Gabinius Vettius Probianus, præfect of the city in 377 (Gruter, *Inscr.*, clxxi. 7); the latter is on a pedestal which now stands in the Vicus Jugarius. Suetonius (*Cal.*, 37) mentions that it was one of Caligula's amusements to throw money to the people below from the roof of this basilica, which probably was a link in the bridge by which this maniac connected the Palatine with the Capitolium. The line of the bridge, which starts in the upper part of Caligula's palace, passes over a lofty and massive brick-faced building, once lined with marble, which stands on the lower slopes of the Palatine. Suetonius's account (*Cal.*, 22) of the bridge makes it very probable that this building is the temple of Augustus, as there is no other possible site for it on the line from the Palatine to the Capitolium. The intermediate stages from the temple to the basilica and thence to the Capitolium were probably merely a wooden structure, as no traces of it now remain. The temple of Augustus was begun by Tiberius and finished by Caligula (Suet., *Cal.*, 21).

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[1] The original rostra had specially honorary statues to those Roman ambassadors who had been killed while on foreign service (Liv., iv 17); these were probably removed during Cicero's lifetime (Cic., *Phil.*, ix. 2; see also Dion Cass., xliii 49, and Plin., *H.N.*, xxxiv. 11). Ghastly ornaments fixed to these rostra in the year 43 B.C., shortly after they were built, were the head and hands of the murdered Cicero (Appian, *Bell. Civ.*, iv. 20; Dion Cass., xlvii. 8; Juv., x. 120), as on the original rostra had been fixed many heads of the chief victims of the proscriptions of Marius and Sulla (see Appian, *Bell. Civ.*, i. 71, 94, Florus, iii. 21; and Cic., *Pro Sext.*, 35, 36). The denarius of the gens Lollia with the legend **PALIKANVS** was once supposed to have a representation of the rostra on its reverse, but it is now generally admitted that the subject is a harbour containing ships, the beaks of which only are shown. Even if the rostra of the Forum are represented it would be the original suggestum, not that of Julius Cæsar

[2] This method of decoration was much employed by the Greeks and largely followed by their Roman imitators. For further details on the rostra, &c., see Jordan and Fabricius, in *Ann. Inst.* for 1883; Nichols, *Gli Avanzi dei Rostri*, &c., 1885; and a paper by the present writer in *Archæologia* (read November 1884).

[3] It must, however, be admitted that there is very little evidence in support of this theory.

[4] Becker, *Handbuch*, i. p. 360, adopts this view, and maintains that the Umbilicus and Milliarium were identical, in spite of their being separately catalogued in the *Notitia*.

[5] What is probably the column of the Milliarium is still lying near its supposed site; it is of Greek marble, and is covered with holes by which the bronze casing was attached. Since the above was written the existing pieces of the marble base have been replaced on its conjectural site.

[6] In the same passage he mentions a gate near this temple into the Capitolium once called Porta Saturnia, but in his time P. Pandana.

[7] In several inscriptions occurs the title "præfecti" or "quæstores ærarii Saturni" (see Gudius, *Ant. Insc.*, p. 125; Suet., *Claud.*, 24; Tac., *Ann.*, xiii. 28, 29).

[8] Another important treasury was the temple of Ops, in which were stored the 700,000,000 sesterces left by Julius Cæsar at his death (Cic., *Phil.*, ii. 37, and i. 7). It is usually supposed, though without much reason, to have adjoined the temple of Saturn. Livy (xxvii. 10) mentions another treasury, the Ærarium Sanctius, in which a reserve store of gold was kept.

[9] A portion of these streets with part of the temple of Saturn and the Basilica Julia is shown on fragments of the marble plan (see Plate VII.)

[10] One side of this gate was built against one of the marble piers of the Basilica Julia, a perfect print of which still exists in the concrete of the gate, though the marble pier itself has disappeared. The other side of the gate abutted against the marble-lined podium of the temple of Saturn.

[11] See Tac., *Ann.*, ii. 41, who says it was "propter ædem Saturni."

[12] See Suet., *Aug.*, 29; Gerhard, *Bas. Giulia*, &c., 1823; and Visconti, *Escavazione della Bas. Giulia*.

[13] "Forvm . Ivlivm . et . basilicam . qvae . fvit . inter . aedem . Castoris . et . aedem . Satvrni . coepta . profligataqve . opera . a . patre . meo . perfeci . et . eandem . basilicam . consvmptam . incendio . ampliato . eivs . solo . svb . titvlo . nominis . filiorvm . inchoavi . et . si . vivvs . non . perfecissem . perfici . ab . haeredibvs . [meis . ivssi]." The "filii" here referred to are Augustus's grandsons, Caius and Lucius (see Dion Cass., lvi. 27).

[14] One of the late reliefs on Constantine's arch shows this (or a similar building) with the upper galleries crowded with people (see Plin., *Ep.*, vi. 33, 5). The open arches seem to have curtains to keep out the sun.

[15] Three mediæval lime-kilns were found by Canina within this basilica, which accounts for the scantiness of the existing remains.

[16] A few have inscriptions. *e.g.*, "Vinces . gaudes : perdes . plangis."

Vicus Tuscus. The Vicus Tuscus passes from the Sacra Via between the Basilica Julia and the temple of Castor to the Velabrum and Circus Maximus; its basalt paving has been exposed at many points along its whole line (see Liv., xxvii. 37). A very early statue of one of the chief Etruscan deities, Vortumnus, stood in this street, a little to the south-west of the Basilica Julia, where part of its pedestal was found in 1549 inscribed VORTVMNVS TEMPORIBVS DIOCLETIANI . ET . MAXIMIANI . . . (*C. I. L.*, vi. 804;[2] see also Pseudo-Ascon., *Ad Cic. Verr.*, ii. 1, 59). The Vicus Tuscus was also called Thurarius, from shops of perfume-sellers (see Hor., *Sat.*, ii. 3, 228, and *Ep.*, ii. 269). It is the street along which processions passed, mentioned by Cicero (*Verr.*, ii. 1, 59) as extending "a signo Vertumni in Circum Maximum."

Temple of Castor. The temple of Castor[3] on the south-east side of the Vicus Tuscus was founded to commemorate the apparition in the Forum of the Dioscuri announcing the victory of Aulus Postumus at Lake Regillus, 496 B.C., and was dedicated in 482 B.C. by the son of A. Postumus (Liv., ii. 20, 42; Dionys., vi. 13; Plut., *Coriol.*, 3; Ov., *Fast.*, i. 707). In 119 B.C. it was restored by the consul L. Metellus Dalmaticus (Ascon., *In Cic. Pro Scaur.*, 46) and finally rebuilt in the reign of Augustus by Tiberius and Drusus, 6 A.D. (Suet., *Tib.*, 20; Ov., *Fast.*, i. 705; Dion Cass., lv. 8, 27), to which period belong the three existing Corinthian columns and piece of entablature, all very delicate and graceful in detail, and of the finest workmanship, in Pentelic marble; the design is of pure Greek style. One point shows Roman timidity in the use of a lintel: the frieze is jointed so as to form a flat arch, quite needlessly, with the object of relieving the weight on the architrave. Its plan, hexastyle, with only eleven columns on the sides, is shown in Plate VII. and fig. 14. It had a lofty podium, lined with marble, and decorated with a heavy cornice and pilasters, one under each column. The podium is an interesting example of the enormous solidity of Roman buildings of the best period. Solid tufa walls, 8 feet thick, are built under the whole of the cella and the front row of columns, while the columns of the sides rest on spurs of similar walling, projecting at right angles from that under the cella; the part immediately under the columns is of travertine, and the spurs are united and strengthened laterally by massive flat arches, also of travertine. With the exception of a small chamber under the steps, entered from the Vicus Tuscus, the entire podium is filled up by a solid mass of concrete, made of broken tufa, pozzolana, and lime, the whole forming a lofty platform, about 22 feet high, solid as a rock, on which the columns and upper structure are erected. Small chambers formed in the concrete basement, such as the one in this temple, occur in many instances, *e.g.*, in the temples of Saturn, Divus Julius, and Concord. They were probably used as strong rooms, in which money and plate were deposited for safe keeping (see Juv., xiv. 260), a purpose for which Roman temples were frequently used. Two fragments of mosaic, with simple lozenge pattern in white marble and basalt, still exist in the cella of this temple. The level of the mosaic shows that it is of earlier date than the rebuilding of Tiberius, as it lies considerably below the level of the later floor. It has all the characteristics of early mosaic—very small tesseræ fitted with great accuracy, like the early mosaic in the Regia. The temple of Castor was often used as a meeting-place for the Senate, and its lofty podium formed a tribunal for orations.[4] Close by it was another tribunal, probably merely a wooden suggestus—called the Tribunal Aurelium (see Cic *In Pis.* 5, and *Pro Sext.*, 15).

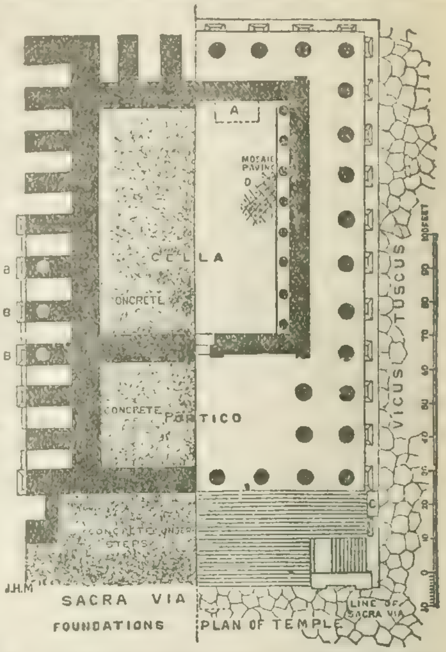

FIG. 14.—Plan of temple of Castor, half showing construction of podium. A. Pedestal of one of the two statues. B, B, B. Spurs of foundation wall, of travertine and tufa, under the three existing columns. C. Steps to small chamber in concrete core of podium. D. Existing piece of mosaic paving of earlier building.

The Fons Juturnæ (see Ov., *Fast.*, i. 705, and Dionys., vi. 13), at which the Dioscuri were fabled to have watered their horses, was beside their temple, and the circular travertine curb close by has been supposed to have belonged to this. Its form, however, makes it more probable that it was the plinth of a screen round the Puteal Scribonis or Libonis (Hor., *Ep.*, i. 19, 8, and *Sat.*, ii. 6, 35),—a circular marble structure like a well-mouth, ornamented with reliefs of lyres and garlands, used to enclose some spot struck by lightning or sacred from other causes. It is shown on a denarius of the gens Scribonia. The Sacra Via, in its course from the Regia towards the temple of Saturn, originally passed in front of the temple of Castor; but in late times its line was changed, and it is now covered at this point by rude paving of travertine and marble, probably not earlier than the 5th century. The ancient line is indicated by the Regia, shown on fig. 16.

Temple of Divus Julius. On the other side of the Sacra Via stand the scanty remains of the temple of Divus Julius, erected by Augustus. Though little beyond its concrete core is left, its plan can be fairly well made out from the voids in the concrete, which show the position of the tufa foundations under the walls and columns (as in the temple of Castor). The temple itself, a hexastyle prostyle building, with close pyknostyle intercolumniation (Vitr., iii. 2), stood on a lofty podium with a curved recess in the front between two flights of stairs (see Plate VII.). The wall which now fills up the recess is a late addition. It is possible that this very unusual plan was adopted in order that the recess might leave room for the preexisting altar (Appian, *Bell. Civ.*, ii. 148) or column (Suet., *J. Cæs.*, 85) erected by the Senate with the inscription PARENTI PATRIÆ. The podium, which projects in front of the temple itself, was adorned with beaks from the ships taken at Actium (Dion Cass., li. 19), and hence it was called the Rostra Julia, to distinguish it from the other rostra described above. Both were used for the funeral orations in honour of Augustus (Suet., *Aug.*, 100; see also Dion Cass., liv. 35). Besides the concrete core and the curved tufa wall of the recess, little now exists except a small bit of the mosaic of the cella floor and some fragments of the cornice and pediment, of fine Greek marble. This temple is represented on coins of Augustus and Hadrian.

The temple of Vesta, founded according to tradition by Numa,[5] stands at the southern angle of the Forum on the ancient line of the Sacra Via (Ov., *Trist.*, iii. 1, 28). No shrine in Rome was equal in sanctity to this little circular building, which contained the sacred fire and the relics on which the welfare and even the existence of Rome depended. The shrine was an "ædes sacra," not a "templum" in the strict sense of the word, which means a building so inaugurated that it could be used for meetings of the Senate. The original building was destroyed in 390 B.C. by the Gauls; it was burnt again in 241 B.C., again in the great fire of Nero's reign, and then in the reign of Commodus; after this it was rebuilt by

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[1] The whole building has unhappily been much falsified by needless restoration.

[2] A drawing of this pedestal, which is now lost, with MS. note by Ligorio, exists in *Cod. Vat.*, 3439, fol. 46. Propertius (*Eleg.*, iv. 2) gives an interesting account of Vortumnus, and in l. 50 mentions the derivation of the name Vicus Tuscus.

[3] The temple of Castor is shown on two fragments of the marble plan (see Plate VII.), and its position is also indicated by the passage in the *Mon. Ancyr.* quoted above.

[4] One of the mad acts of Caligula was to connect the temple of Castor with his palace by breaking a door through the back of the cella (Suet., *Cal.*, 22). Though dedicated to both the Dioscuri, the building was usually called the temple of Castor only (see Suet., *J. Cæs.*, 10).

[5] Another legend attributes its founding to Romulus

Severus, to whose age belong the fragments of columns, cornice, and other architectural features now lying around the ruined podium. These, with the help of representations of the temple on coins of Domitian,[1] and an ancient relief in the Uffizi (see Lanciani, *L'Atrio di Vesta*, 1884, pls. xix.-xxi.), are sufficient to make an accurate restoration (see Plate VII. and fig. 15). It consisted of a circular cella, surrounded by eighteen columns, with screens between them; the circular podium, about 10 feet high, still exists, mainly of concrete with some foundations of tufa blocks, which may belong to the original structure. In the time of Pliny (*H. N.*, xxxiv. 7) the tholus or dome over the cella—symbolizing the canopy of heaven (Ov., *Fast.*, vi. 276)—was covered with Syracusan bronze. Horace's mention (*Od.*, i. 2, 13) of the destruction of the temple by a Tiber flood caused the mistaken notion that the similar round temple still existing near the exit of the Cloaca Maxima was the Ædes Vestæ; but the flood of 1877 showed that the waters of the river could still reach this point in the Forum. Its position near the temple of Castor is mentioned by Martial (i. 71-73).[2]

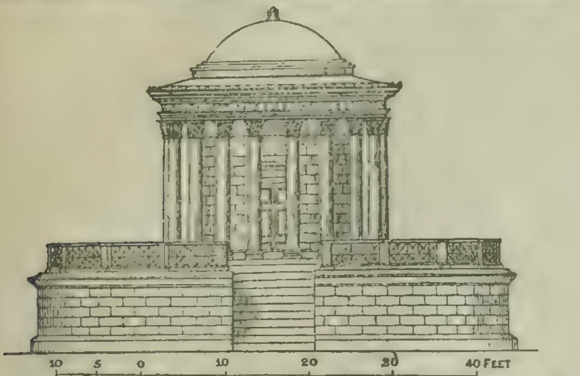

FIG. 15.—Temple of Vesta, as rebuilt by Severus conjecturally restored by Comm. Lanciani from existing remains.

The Regia (see fig. 16), or residence of the pontifex maximus, was on the Sacra Via, close by the temple of Vesta. It also was traditionally founded by Numa, and used as his dwelling-house; it was destroyed in 390 B.C. by the Gauls, and was again burnt in 210 B.C. (Liv., xxvi. 27), when the temple of Vesta narrowly escaped. Julius Cæsar, as pontifex maximus, resided here; and when Augustus succeeded to this office in 12 B.C. he gave the Regia to the vestals, having built himself a large house on the Palatine. When the Atrium Vestæ or house of the vestals was rebuilt on an enlarged scale the Regia was pulled down and its site partly occupied by the new atrium. Ovid (*Trist.*, iii. 1, 28) describes this end of the Forum thus—

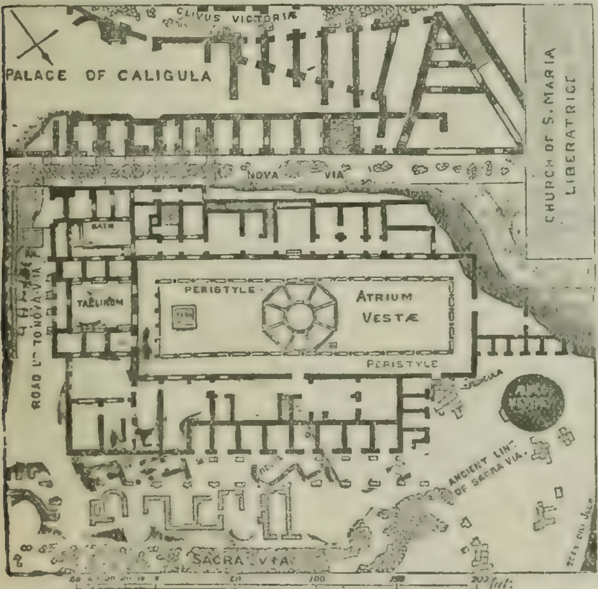

FIG. 16.—Plan showing the remains of the temple of Vesta, the Regia, and the house of the vestals, as rebuilt by Hadrian; excavated 1883-84.

> "Hæc est a sacris quæ via nomen habet,
> Hic locus est Vestæ, qui Pallada servat et ignem.
> Hic fuit antiqui Regia parva Numæ."

The excavations of the last few years have laid bare remains of this very interesting building, and show that it was a large house extending close up to the temple of Vesta,—ὁμότοιχος, as Dion Cassius (lvi. 27) says.[3] It was set at a quite different angle from the Atrium and other later buildings which were built over its foundations; this angle shows the original line of the Sacra Via, which in later times was diverted into a different direction. The existing remains are of several dates,—first, walls of soft tufa, part possibly of the earliest building; second, walls of hard tufa, of rather later date; and lastly, concrete walls faced with brick, decorated with painted stucco, and columns of travertine, also stuccoed and painted,[4] with a large quantity of fine mosaic of that early sort which has very small tesseræ put together with great accuracy. This last part probably belongs to the rebuilding by Domitius Calvinus in 35 B.C. (Dion Cass., xliii. 42). These valuable remains were preserved in spite of the erection of later buildings over them because the levels of the later floors were higher than those of the Regia, and thus covered and protected the mosaics and lower parts of the walls and columns (see fig. 16). Besides being a dwelling-house, the Regia contained a sacrarium, in which were preserved the sacred spears of Mars (Aul. Gell., iv. 6), and also the shrine of the Dea Ops Consiva, only entered by the vestals and the sacerdos publicus (Varro, *L. L.*, vi. 21).

Atrium Vestæ.

The Atrium Vestæ or house of the vestals, like the temple, was many times burnt and rebuilt; the existing building, which was excavated in 1883-84, is of the time of Hadrian, as is shown by the brick stamps. It consists of a large atrium or quadrangle with columns of cipollino. At one end is the tablinum, with three small rooms on each side of it,—probably for the six vestals. A bathroom, bakehouse, servants' offices, and some rooms lined with rich marbles extend along the south-west side. This extensive building is set against the side of the Palatine, which is cut away to admit the lower story. Thus the level of the first upper floor is nearly the same as that of the Nova Via, on which it faces, about 23 feet above the ground floor. The upper floor is in part well preserved; it contains a large suite of bath and other rooms, which were probably the sleeping apartments of the vestals. All the better rooms and the baths are lined with polished marbles, many of great beauty and rarity; the floors are mostly mosaic of tesselated work. The paving of the tablinum was a beautiful specimen of inlay in porphyry and marble. In many places alterations and clumsy patchings of the 4th and 5th centuries are apparent. A number of statues of the chief vestal, or virgo vestalis maxima, with inscribed pedestals, were found in the atrium, mostly of the 3d century, though a few are earlier; these are of especial interest as illustrating the sacerdotal dress of the vestals.[5] Nothing but the Nova Via separates the Atrium Vestæ from the palace of Caligula (see Plin., *Ep.*, vii. 19; Aul. Gell., i. 12), which extends over the site of the Lucus Vestæ,—"qui a Palatii radice in Novam Viam devexus est" (Cic., *De Div.*, i. 45). A curious octagonal structure in the middle of the atrium (see fig. 16) looks very much like a border for flower-beds; and it is possible that this miniature garden was made by the vestals when Caligula built over their extensive grove on the slopes of the Palatine. By the main entrance from the Forum stood a small ædicula,—a large pedestal at the angles of which were columns supporting an entablature.[6] It may have contained a statue of Vesta, there being none within the temple. It is of the time of Hadrian. The last of the vestals is mentioned by Zosimus (v. 38) as being alive in 394; but the Atrium continued to be partly inhabited for many centuries later.[7] In September 1884 a road was discovered leading up past the tablinum end of the Atrium from the Sacra Via to the Nova Via (see fig. 16). In about the 4th century this road appears to have been blocked up at the Nova Via end by a building which adjoined the Atrium Vestæ.

At the east corner of the Forum stood the arch of Q. Fabius Maximus, consul in 121 B.C., called Allobrogicus from his victory over the Allobroges (schol. on Cic., *In Verr.*, i. 7; Liv., *Ep.*, lvi.; Plin., *H.N.*, vii. 50). It marked the extreme limit of the Forum in this direction (Cic., *Pro Plan.*, 7, 17), as the rostra did at the other end. This arch was dug up and mostly destroyed in 1540-50, near the temple of Faustina; on one of the fragments then discovered was inscribed Q . FABIVS . Q . F . MAXSVMVS . AED . CVR . REST. About twenty-five other fragments were found in 1882.[1] The arch of Augustus, erected in 29 B.C., also stood near this point, but its exact site is uncertain. An inscribed block of its attic was found during the excavations of 1540-50.

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[1] The temple of Vesta is also shown on medals of Faustina senior, Lucilla, Crispina, and Julia Domna (see Froehner, *Médaillons de l'empire Romain*, Paris, 1878, pp. 76, 96, 148, 159). It very closely resembles the so-called tomb of St Luke at Ephesus, a Roman work of about the same date.

[2] See Lipsius, "De Vesta," in Grævius, *Thes. Ant. Rom.*, v.; Cancellieri, *Le sette Cose fatali di Roma*, 1812; Preuner, *Hestia-Vesta*, Tübingen, 1864; Jordan, *Vesta und die Laren*, Berlin, 1865; Maes, *Vesta e Vestali*, 1883.

[3] See a monograph by the present writer in *Archæologia* (read November 1884).

[4] The columns were crimson, the travertine rain-water gutter bright blue, and the inner walls had simple designs in panels of leaf ornament and wreaths.

[5] One of these, a noble figure of the time of Hadrian, is specially remarkable as being the only statue known on which the *suffibulum* is represented, a sort of hood, only worn by the vestal at the moment of offering sacrifice (see Festus, ed. Muller, p. 349; and Varro, *L. L.*, vi. 21). Many points of great interest occur in the inscriptions on the pedestals.

[6] The front and one side are now lying near; the former is inscribed SENATVS . POPVLVSQVE . ROMANVS . PECVNIA . PVBLICA . FACIENDAM . CVRAVIT.

[7] In the excavations of December 1883 a pot was found in the north corner containing 830 silver pennies of English kings of the 9th and 10th centuries,—Alfred the Great, Edward I., Athelstan, Edmund I., and others. A list of these is given by De Rossi in Lanciani's work, *L'Atrio di Vesta* (Rome, 1884). None are later than 946; and a bronze fibula inlaid with silver with the name of Pope Marinus II. (942-946) makes it seem probable that this hoard was concealed during his pontificate.

The temple of Faustina the elder stands at the east angle of the Forum, facing the later line of the Sacra Via. It is prostyle hexastyle, and has monolithic columns of cipollino and a rich entablature of Greek marble, with graceful reliefs of griffins and candelabra on the frieze.[2] The walls are of massive peperino, once lined with marble. On the front is inscribed DIVO . ANTONINO . ET . DIVAE . FAVSTINAE . EX . S . C. This temple, built by Antoninus Pius in memory of his wife, who died in 141, was after his death dedicated also to him, and the first line was then added (Capitolinus, *Ant. Pius*, 6). At an early period it was consecrated as the church of S. Lorenzo in Miranda, and a great part of its cella has been destroyed. The front is now excavated to the original level. This temple is shown on the reverse of several coins of Antoninus Pius; some have the legend DEDICATIO . AEDIS.

The space between the north-west end of the Forum and the Tabularium is occupied by a range of important buildings (see Plate VII.). The chief of these is the temple of Concord (see Festus, ed. Müller, p. 347) shown on a fragment of the marble plan, founded by Camillus in 367 B.C. (Plut., *Cam.*, 42), and rebuilt by the brothers Tiberius and Drusus out of the spoils gained in Germany; it was rededicated in 10 A.D. (Suet., *Tib.*, 20; Dion Cass., lv. 25). It is shown with unusual minuteness on the reverse of a first brass of Tiberius. It is probable that an earlier restoration was carried out by L. Opimius in 121 B.C. (Plut., *C. Gracch.*, 17; Appian, *Bell. Civ.*, i. 26). The existing remains[3] are of the rebuilding by Tiberius and Drusus, and show that it was unusual in plan, having a large cella much wider than its depth, and a very large projecting portico. Its construction is an interesting example of the Roman use of many different materials. The lower part of the walls was of massive tufa blocks, the upper part of the cella of travertine; and the inner low wall, which supported ranges of internal columns, was of mixed concrete, tufa, and travertine. The whole was lined with marble, white outside, and rich Oriental marbles inside (see fig. 5), which were also used for the pavement. The door-sill is made of enormous blocks of porta santa marble, in which a bronze caduceus (emblem of Concord) was inlaid. Between the internal columns of the cella stood rows of statues; and the temple also contained a large collection of pictures, engraved gems, gold and silver plate, and other works of art, mostly the work of ancient Greek artists (see Plin., *H.N.*, xxxiv. 19, xxxv. 36, 40, xxxvi. 67, xxxvii. 2). On the apex of the pediment was a group of three figures embracing; the tympanum was filled with sculpture; and statues were set in the open porch. Though now only the podium and the lower part of the cella wall exist, with foundations of the great flight of steps, many rich fragments both of the Corinthian entablature and of the internal caps and bases are preserved in the Capitol; and some of the marble lining is still *in situ*. The Einsiedeln MS.[4] gives part of the inscription of the front—S . P . Q . R . AEDEM . CONCORDIAE . VETVSTATE . COLLAPSAM . IN . MELIOREM . FACIEM . OPERE . ET . CVLTV . SPLENDIDIORE . RESTITVERVNT.[5] Another temple of Concord, built in 219 B.C., stood on the Capitoline Arx (Liv., xxii. 33, xxvi. 23); and a bronze ædicula of Concord in the Area Vulcani, which must have been close by the great temple. This was dedicated by Cn. Flavius, 305 B.C. (see Liv., ix. 46); according to Pliny (*H.N.*, xxxiii. 6) it stood "in Græcostasi, quæ tunc supra Comitium erat." Both these were probably only small shrines.

The temple of Vespasian stands close by that of Concord, abutting on the Tabularium in a similar way, and blocking up a doorway at the foot of a long flight of steps (see fig. 1). It consists of a nearly square cella with prostyle hexastyle portico of the Corinthian order; three of the columns are still standing, with their rich entablature, the frieze of which is sculptured with sacred instruments. The walls are of enormous blocks of travertine with strong iron clamps; the whole was lined with white Pentelic marble outside, and inside with coloured Oriental marbles. There was an internal range of columns, as in the temple of Concord. This temple was built by Domitian, *c.* 94 A.D., in honour of his father Vespasian. The inscription on the entablature, given in the Einsiedeln MS., records a restoration by Severus and Caracalla—DIVO . VESPASIANO . AVGVSTO . S . P . Q . R . IMPP . CAESS . SEVERVS . ET . ANTONINVS . PII . FELIC . AVGG . R[ESTITVER]VNT; part of the last word only now exists.[6]

In the narrow space between the temples of Concord and Vespasian (only about 7 feet in width) a small brick and concrete ædicula stands against the Tabularium. This has been wrongly called a shrine of Faustina, on the authority of a small inscribed pedestal found near it;[7] but there is clear constructional proof that it is contemporary with the temple of Vespasian, and is therefore of the time of Domitian.[8] It may possibly have been a shrine dedicated to Titus, whose name does not occur in the inscription of the adjoining temple, though the catalogue in the *Curiosum*, Reg. ix., mentions a dedication to both father and son.[9]

Portic
XII.
Deoru

The next building is the Porticus XII. Deorum Consentium, a large marble platform facing the Clivus Capitolinus, with a row of small rooms or shrines partly cut into the tufa rock of the hill behind. This conjunction of twelve deities was of Etruscan origin; they were six of each sex and were called Senatus Deorum (Varro, *L.L.*, viii. 70, and *De Re Rust.*, i. 1).[10] The columns are of cipollino with Corinthian caps; on the frieze is an inscription recording a restoration by Vettius Prætextatus, præfect of the city in 367 A.D. Under the marble platform is a row of seven small rooms, the brick facing of which is of the Flavian period, used as offices (schola) for scribes and præcones of the ædiles. It is usually called the Schola Xanthi from an inscription, now lost, recording its restoration by A. Fabius Xanthus and others, and the erection of seven silver statues of gods (Gruter, *Inscr.*, 170, 3).[11]

Arch
Sever

The arch of Severus stands by the rostra, across the road on the north-east side of the Forum; the remains of the ancient travertine curb show that originally the road went along a rather different line, and was probably altered to make room for this great arch. It was built in 203 A.D., after victories in Parthia, and was originally set up in honour of Severus and his two sons Caracalla (here called M. Aurelius Antoninus) and Geta. Caracalla, after murdering Geta, erased his name from all monuments to his honour in Rome. Representations of the arch on coins of Severus show that its attic was surmounted by a chariot of bronze drawn by six horses, in which stood Severus crowned by Victory; at the sides were statues of Caracalla and Geta, with an equestrian statue at each angle. The arch, except the base, which is of marble-lined travertine, is built of massive blocks of Pentelic marble, and has large crowded reliefs of victories in the East, showing much decadence from the best period of Roman art.

Centr
space
Forum

The central space of the Forum is paved with slabs of travertine, much patched at various dates; it appears to have been marked out into compartments with incised lines (see Plate VII.), the use of which is not known.[12] Numerous clamp-holes all over the paving show where statues and other ornaments once stood. The recorded number of these is very great, and they must once have thickly crowded a great part of the central area. Two short marble walls or plutei covered with reliefs, discovered in 1872, stand on the north side. Their use and original position are not known, as the rough travertine plinth on which they have been set is evidently of late date. Each of these marble screens has (on the inside) reliefs of a fat bull, boar, and ram, decked out with sacrificial wreaths and vittæ—the suovetaurilia. On the outside are scenes in the life of Trajan: one has the emperor seated on a suggestus instituting a charity for destitute children in 99 A.D.—a scene shown also in one of his first brasses—with the legend ALIM[ENTA] ITALIAE;[13] at the other end the emperor stands on the rostra, on which the two tiers of beaks are shown; he is addressing a crowd of citizens. The backgrounds of this and the other relief are of great topographical interest. In the first is shown the long line of arches of the Basilica Julia, with (on the left) what is probably the temple of Castor and the arch of Augustus. On the right are the statue of Marsyas and the sacred fig-tree (*ficus ruminalis*),[14] which stood on the Comitium. On the other slab the emperor is seated on the rostra (this part is broken), while in front a crowd of citizens are bringing tablets and piling them in a heap to be burnt. This records the remission by Trajan of some arrears of debt due to the imperial treasury (Spartian, 7). The background here represents again the Basilica Julia, with (on the right) the Ionic temple of Saturn and the Corinthian temple of Vespasian. Between them is an arch, which may be that of Tiberius. On the left the fig-tree and the statue of Marsyas are repeated. Other explanations of these reliefs have been given, but the above appears the most probable.[1] Towards the other end of the Forum are remains of a large concrete pedestal. This is usually called the base of the equestrian statue of Domitian (Statius, *Silv.*, i. 22), which stood in front of the Ædes Julii; but its brick facing shows that it is much later than Domitian's time, and, moreover, Domitian's statue was destroyed immediately after his death.

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[1] *Ann. Inst.*, 1859, p. 307; *Not. degli Scavi*, 1882, p. 225.

[2] This finely sculptured frieze is almost an exact copy of that on the temple of Apollo at Miletus.

[3] The size of the earlier and smaller temple is indicated by the rough blocks on the face of the wall of the Tabularium, close against which the temple stands. When the Tabularium was built it was not thought worth while to dress to a smooth face that part of its wall which was concealed by the then existing temple of Concord.

[4] The anonymous writer of this MS. appears to have visited Rome in the 8th century. The MS. is named after the monastery in which it is preserved.

[5] Little is known of the Basilica Opimia, which probably adjoined the earlier temple of Concord, and the existing building appears also to have occupied the site of the Senaculum (see Festus, ed. Muller, p. 347). For various exciting scenes which took place in the temple of Concord and on its steps, see Cic., *Phil.*, vii. 8; Sallust. *Bell. Cat.*

[6] See Piale, *Tempi di Vespasiano e Concordia*, 1821.

[7] This pedestal is now on the ground floor of the Capitoline Museum; its inscription is interesting, being a dedication to Faustina by a viator (messenger) of one of the quæstors of the Ærarium Saturni. Its discovery near this ædicula was probably accidental.

[8] Exactly that part of the marble plinth of the temple of Vespasian which was concealed by the ædicula is left rough, the moulding not being worked, showing that the little shrine is not an addition later than the temple.

[9] See Preller, *Regionen der Stadt Rom*, Reg. ix., and Uhlrichs, *Codex Topog. Romæ*, Reg. ix.

[10] Twelve gilt statues are mentioned by Varro.

[11] See Grifi, *Gli Consenti e loro Portico*, 1858.

[12] They may possibly have had something to do with the marshalling of the voters of the Comitia Tributa.

[13] Cohen, vol. ii. 303-305.

[14] Pliny (*H.N.*, xv. 20) mentions another fig-tree in the middle of the Forum which may possibly be the one here represented.

The seven cubical brick and concrete structures, once faced with marble, which line the Sacra Via, are not earlier than the time of Constantine.[2] They are probably the pedestals of honorary columns, such as those shown in the relief on Constantine's arch, mentioned above. The column erected in honour of the tyrant Phocas by Smaragdus in the eleventh year of his exarchate (608) is still standing. It is a fine marble Corinthian column, stolen from some earlier building; it stands on rude steps of marble and tufa. The name of Phocas is erased from the inscription; but the date shows that this monument was to his honour. Remains of other small marble structures are shown in Plate VII., but what they are is not known. In the 4th century a long brick and concrete building faced with marble was built along the whole south-east end of the Forum, probably a row of shops. They were destroyed by Comm. Rosa's order a few years ago. Countless fragments of other buildings, reliefs, and statues are strewn all over the Forum. Many of these are of great interest; pieces of large granite columns which probably stood on the seven pedestals mentioned above are lying in various places; some of these appear to have been decorated with bronze reliefs, the iron fastenings of which, run with lead, still exist.[3]

Palatine Hill or Palatium.

In addition to the walls of Roma Quadrata (see above), a few remains only now exist earlier in date than the later years of the republic; these are mostly grouped near the Scalæ Caci (see No. 11 in fig. 17) and consist of small cellæ and other structures of unknown use.[4] They are partly built of the soft tufa used in the wall of Romulus and partly of the hard tufa which resembles peperino. Various names, such as the "hut of Faustulus" and the "Auguratorium," have been given to these very ancient remains, but with little reason. One thing is certain, that the buildings were respected and preserved even under the empire and were probably regarded as sacred relics of the earliest times. Remains of more than one temple, probably of the early republican period, exist near this west angle of the Palatine; these had peristyles with Tuscan columns of tufa stuccoed and painted. The larger of these (see 14 in fig. 17) has been called conjecturally the temple of Jupiter Victor (Liv., x. 29; Ov., *Fast.*, iv. 621). It stands on a levelled platform of tufa rock, the lower part of which is excavated into quarry chambers, used in later times as water reservoirs. Two ancient well-shafts lined with tufa communicate with these subterranean hollows. Another extensive building of hard tufa of the republican period exists in the valley afterwards covered by the Flavian palace; part of this can be seen under the so-called Accademia (21 in fig. 17). Not far from the top of the Scalæ Caci are the massive remains of some large cella, nothing of which now exists except the concrete core made of alternate layers of tufa and peperino. It was probably once lined with marble. By it a noble colossal seated figure of a goddess was found, in Greek marble, well modelled, a work of the 1st century A.D. The head and arms are missing, but the figure is probably rightly called a statue of Cybele; and from it her name has been conjecturally given to this temple. Augustus in the *Monumentum Ancyranum* records **AEDEM. MATRIS. MAGNÆ. IN. PALATIO. FECI**; but it is more probable that his temple to Cybele formed part of the magnificent group of buildings in the area of Apollo (see below). Some interesting early architectural fragments are lying near this temple; they consist of drums and capitals of Corinthian columns, and part of the cornice of the pediment, cut in peperino, and thickly coated with hard white stucco to imitate marble. Between this and the temple (so called) of Jupiter Victor are extensive remains of a large sort of porticus, with tufa walls and travertine piers, also republican in date. The use and name of this building are unknown. The temple of Jupiter Stator, traditionally vowed by Romulus during his repulse by the Sabines (Liv., i. 12), stood near the Porta Mugionis, and therefore near the road leading up to the Palatine Sacra Via.[5] This has been identified with the ruined concrete podium (40 in fig. 17), the position of which suits the above indications; but the admixture of travertine, brick, and even marble with the tufa of the concrete shows that no trace here remains of any early building. On the tufa blocks of a shaft leading down to a large drain by the side of these remains are incised in large letters—

nple
upi-
Vic-

tue of
ele.

FILOCR ATE
DIOCLE

—possibly the names of Greek stone-masons (Diocles, Philocrates); the form of the letters shows that this inscription is as early as the 2d or even 3d century B.C.

Remains of extensive lines of buildings in early opus reticulatum exist on the upper slopes of the Palatine, all along the Velabrum side, and on the south-west side as far as the so-called Domus Gelotiana. These buildings are constructed on the ruins of the wall of Romulus, a great part of which has been cut away to make room for them; their base is at the foot of the ancient wall, on the shelf cut midway in the side of the hill; their top reached originally above the upper level of the summit. They are of various dates and cannot be identified with any known buildings. Part is apparently of the time of the emperor Tiberius, and no doubt belongs to the Domus Tiberiana mentioned by Suetonius (*Tib.*, 5; comp. Tac., *Hist.*, i. 27, and iii. 71); this palace covered a great part of the west corner of the hill. Of about the same date is a very interesting and well-preserved private house built wholly of opus reticulatum; it is usually called the house of Livia. It has a small atrium, out of which open the triclinium and the tablinum with a room (*ala*) on each side, all handsomely decorated with good paintings of mythological and domestic scenes, probably the work of Greek artists, as inscriptions in Greek occur,—*e.g.*, **ΕΡΜΗϹ**, under the figure of Hermes, in a picture representing his deliverance of Io from Argus.[6] The back part of this house was three stories high, and is divided into a great number of very small rooms, mostly bedrooms. The house is built in a sort of hole against the side of an elevation, so that the upper floor behind is level with an ancient paved road. The dampness caused by this is counteracted and kept off the paintings by a lining of flange-tiles over the external walls, under the stucco, thus forming an air-cavity all over the surface. From the back of the house, at the upper level, a long subterranean passage leads towards the Flavian palace, and then, turning at right angles and passing by the foundations of the so-called temple of Jupiter Victor, issues in the ancient tufa building mentioned above (20 in fig. 17). Another crypto-porticus starts near this house and communicates with the long semi-subterranean passage by which the palaces of Caligula and Domitian are connected (19 in fig. 17). It is ornamented with very beautiful stucco reliefs of cupids, beasts, and foliage, once painted and gilt. This private house is probably that of Germanicus, into which the soldiers who killed Caligula in the long crypto-porticus escaped, as described by Josephus (*Ant. Jud.*, xix. 1; see also Suet., *Cal.*, 58). Some inscribed lead pipes were found in this house; some pieces bear the inscription **IVLIAE. AVG.**, probably the daughter of Titus.

Domus Tiberi-ana.

House Livia.

The palace of Augustus and the Area Apollinis[7] occupied a great portion of the central part of the Palatine (see 47 and 48 in fig. 17); the splendour of its architecture and the countless works of art in gold, silver, ivory, bronze, and marble, mostly the production of the best Greek artists, which adorned this magnificent group of buildings must have made it the chief glory of this splendid city. It was approached from a road leading out of the Summa Sacra Via along the line of the present Via di S. Bonaventura; the entrance, probably the Arcus of Pliny (*H.N.*, xxxvi. 4, 10), led through lofty propylæa into a very extensive peristyle or porticus, with (at least) fifty-two fluted columns of Numidian giallo; the rest was of white Luna and Athenian marble. In the centre of this enclosure stood the great octostyle peripteral temple of Apollo Palatinus, so called to distinguish it from another temple of Apollo outside the Porta Carmentalis, remains of which exist under the Albergo di Catena near the Piazza Montanara. This temple was begun by Augustus in 36 B.C.,[1] after his Sicilian victory over Sextus Pompeius, and finished in 28 B.C.[2] A glowing account of the splendours of these buildings is given by Propertius (*El.*, ii. 3). Inside the cella were statues of Apollo between Latona and Diana by Scopas, Praxiteles, and Timotheus respectively (Plin., *H.N.*, xxxvi. 4); round the walls were statues of the nine Muses (Juv., vii. 37). The pediment had sculpture by Bupalus and Archermus of Chios (Plin., *H.N.*, xxxvi. 4), and on the apex was Apollo in a quadriga of gilt bronze. The double door was covered with ivory reliefs of the death of the Niobids and the defeat of the Gauls at Delphi. The Ancyra inscription records that Augustus sold eighty silver statues of himself and with the money "offered golden gifts" to this temple, dedicating them both in his own name and in the names of the original donors of the statues.[3] The Sibylline books were preserved under the statue of Apollo (Suet., *Aug.*, 31); and within the cella were vases, tripods, and statues of gold and silver, with a collection of engraved gems dedicated by Marcellus (see Plin., *H.N.*, xxxvii. 5). On each side of the porticus was a large library, one Latin and the other Greek;[4] and a third side of the great enclosure was occupied by a large hall where the Senate occasionally met (Tac., *Ann.*, ii. 37), in the centre

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[1] See Brizio, *Ann. Inst.*, 1872, p. 309; Henzen, *Bull. Inst.*, 1872, p. 81; and Jordan, *Marsyas auf dem Forum*, Berlin, 1883.

[2] It is probable that these occupy the line of the Tabernæ Veteres.

[3] *Authorities on the Forum.*—Nichols, *Roman Forum*, London, 1877 (very useful from its collection of passages in ancient authors); Jordan, *Capitol, Forum, &c.*, Berlin, 1881, and *Topographie Roms*, vol. i., 1878; Nibby, *Il Foro Romano*, 1819; Angelini and Fea, *Il Foro Romano*, 1837; Tocco, *Ripristinazione del Foro*, 1858; Ravioli and Montiroli, *Foro Romano*, 1859; Michelet, *Das Forum Romanum*, Berlin, 1877; Marucchi, *Il Foro Romano*, 1881; Dutert, *Le Forum Romain*, Paris, 1876 (very handsomely illustrated, but more fanciful than trustworthy); Canina, *Il Foro Romano*, 1845 (open to the same criticism as the work of Dutert, and wholly stultified by later discoveries). For inscriptions found in the Forum, see Jordan, "Sylloge Inscrip. Fori Rom.," in the *Ephem. Epigraph.*, iii. p. 248 *sq.* Some of the more recent excavations are described by Lanciani, "Scavi del Foro," in *Notizie degli Scavi* for 1882.

[4] Many masons' marks exist on the tufa blocks of the most primitive buildings near the Scalæ Caci (see fig. 10).

[5] Dionys., ii. 50; see also Plut., *Cic.*, 16; Ov., *Fast.*, vi. 793, and *Trist.*, iii. 127. Near this temple, and also near the Porta Mugonia, was the house of Tarquinius Priscus (Liv., i. 41; Sol., *Polyhist.*, i. 24). Owing to the strength of its position this temple was more than once selected during troubled times as a safe meeting-place for the Senate; it was here, as being a "locus munitissimus," that Cicero delivered his *First Catiline Oration* (see Cic., *In Cat.*, i. 1).

[6] See *Mon. Inst.*, xi., pls. xxii., xxiii.; Renier, *Les Peintures du Palatin*, Paris, 1870.

[7] See Lanciani's paper in *Bull. Comm. Arch. Roma*, iv., 1883.

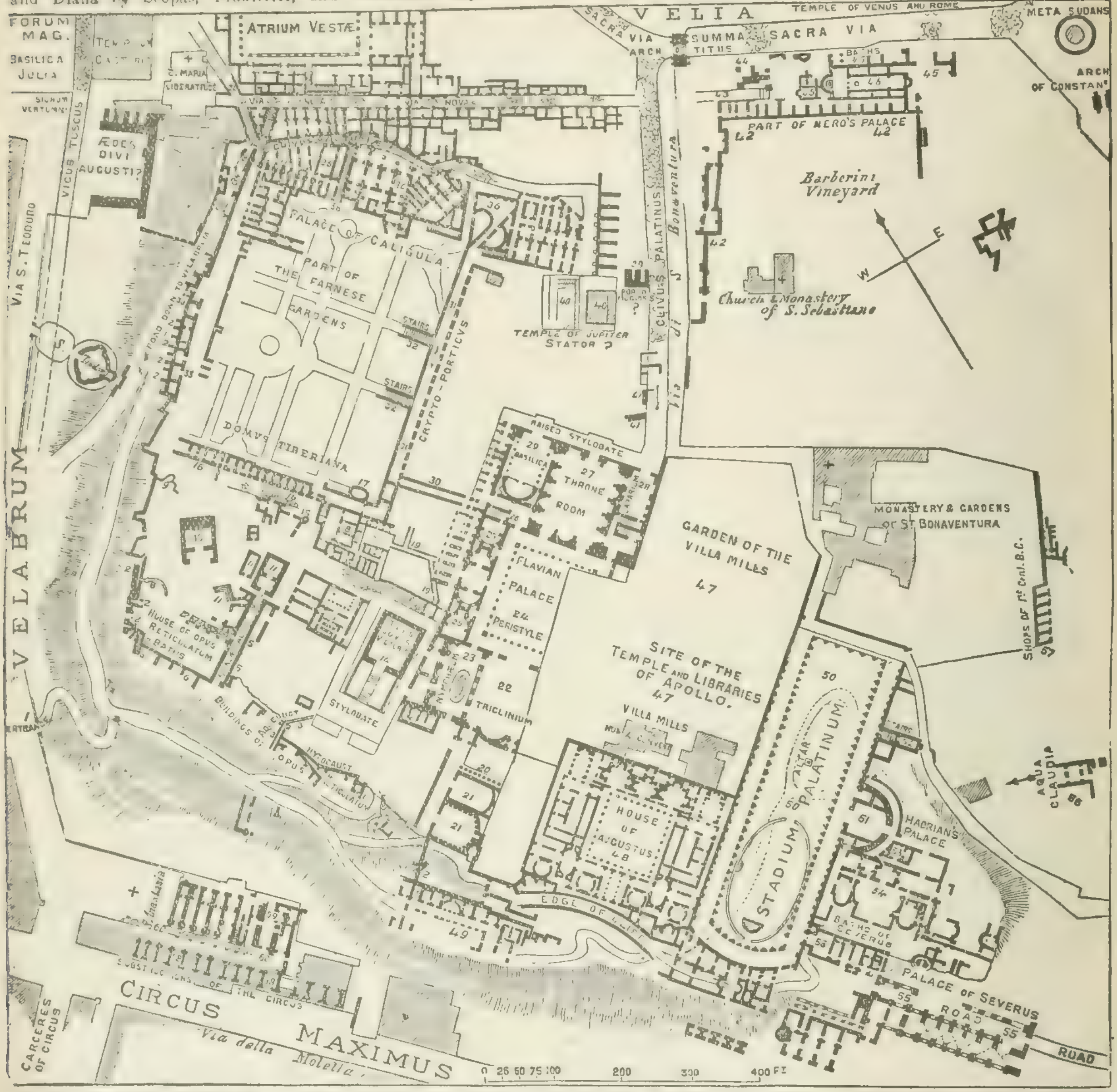

FIG. 17.—Plan of the Palatine Hill.—1. Present entrance. 2, 2. Remains of wall of Roma Quadrata. 3. Aqueduct. 4. Early buildings of opus reticulatum. 5 Scalæ Caci. 6. Buildings of mixed brick and opus reticulatum. 7. Altar to the unknown god, Sei Deo, Sei Deivæ, &c. 8. Reservoir cut in tufa rock. 9. Passage cut in the rock. 10. So-called temple of Cybele. 11 Very early structures of tufa. 12. Tufa arcade and paved road. 13. Building with travertine piers of later republican period. 14. So-called temple of Jupiter Victor. 15. Well communicating with subterranean rock-cut reservoirs. 16, 16. Small chambers and paved road, part of Tiberius's building. 17. Piscina. 18. House of Germanicus. 19, 19. Crypto-porticus. 20, 20. Early building of tufa buried and covered by Domitian's palace. 21. So-called academy and library—part of Domitian's palace. 22 Triclinium of Domitian's palace. 23. Nymphæum and piscina. 24. Peristyle. 25. Small rooms at side of peristyle. 26. Stairs down to crypto-porticus. 27. Throne-room. 28. Lararium. 29. Basilica. 30 Branch of crypto-porticus leading to Domitian's palace. 31. Crypto-porticus of Caligula. 32, 32. Stairs from crypto-porticus to higher level. 33, 33. Early buildings of opus reticulatum. 34, 34. Stairs from Forum to Porta Romanula. 35 and 38. Stairs to upper rooms of Caligula's palace. 36, 36. Substructures of Caligula's palace. 37. Caligula's bridge. 39. Porta Mugonis. 40. Temple of Jupiter Stator (so called). 41. Remains of wall of Roma Quadrata. 42, 42. Remains of Nero's palace. 43. Great concrete platform. 44. Remains of mediæval Turris Cartularia. 45, 45. Series of small bathrooms. 46. So-called basilica of 5th century. 47. Site of temple and libraries of Apollo. 48 Palace of Augustus (now destroyed). 49. Domus Gelotiana. 50. Stadium, with oval hall of Theodoric (?). 51. Exedra of Hadrian. 52. Stairs from stadium to higher level of hill. 53, 53. Remains of Hadrian's palace, partly covered by later palace of Severus. 54 Baths of Severus's palace. 55, 55. Lofty substructures of Severus's palace. 56. Aqua Claudia brought on Nero's aqueduct. 57. Shops of opus incertum. 58. Substructures of Circus Maximus. 59. Remains of early tufa building, and brick-faced structures of imperial times. 60, 60. Paved road skirting outside of Circus Maximus.

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[1] TEMPLVM . APOLLINIS . IN . SOLO . MAGNAM . PARTEM . EMPTO . FECI (*Mon. Ancyr.*).

[2] See Dion Cass., xlix. 15, lin. 1, and *C.I.L.*, i. p. 403.

[3] See also Suet., *Aug.*, 52, whose account is rather different.

[4] Schol. to Juv., i. 128, and Suet., *Aug.*, 29.

of which stood a bronze colossus of Augustus,[1] 50 feet high (Plin., *H.N.*, xxxiv. 18). Round the porticus, between the Numidian marble columns, were statues of the fifty Danaids, and opposite them their fifty bridegrooms on horseback (see schol. on Pers., ii. 56), many fragments of which have been found. In the centre before the steps of the temple stood an altar surrounded by four oxen, the work of Myron (Proper., *El.*, ii. 3, 7). Within the same area was a small temple of Vesta (*C.I.L.*, i. p. 392), dedicated on 28th April 12 B.C., when Augustus was elected pontifex maximus;[2] the sacred block or altar symbolically called Roma Quadrata, surrounded by a circular trench called the Mundus, was also in some part of this great group of buildings. On the side towards the Circus Maximus was the palace of Augustus, which was excavated in 1775, and drawings of which were published by Guattani.[3] A great part shown by him has since then been destroyed, and all is now concealed; the plan (48 in fig. 17) is taken from Guattani. The whole group is described by Ovid (*Trist.*, iii. 1). Augustus also rebuilt the temple of Victory,[4] which gave its name to the Clivus Victoriæ; this temple stood on the site of a prehistoric altar (Dionys., i. 32), and was more than once rebuilt,—*e.g.*, by L. Postumius, 294 B.C. (Liv., x. 33). In 193 B.C. an ædicula to Victory was built near it by Porcius Cato (Liv., xxxv. 9). Remains of the temple and a dedicatory inscription were found in 1725-28[5] not far from the church of S. Maria Liberatrice; the temple was of Parian marble, with Corinthian columns of Numidian giallo antico. The Area Apollinis and its group of buildings suffered in the fire of Nero, and were restored by Domitian. The whole was finally destroyed in the great fire of 363 (Ammian, xxiii. 3), but the Sibylline books were saved.

The palace of Caligula occupies the northern angle of the Palatine, and extends over the Clivus Victoriæ a long way towards the Clivus Palatinus (see fig. 17). This part of the Palatine was once occupied by the Lucus Vestæ, with the Sacellum Volupiæ and many fine private houses. Among these were the dwellings of Q. Lutatius Catulus, Q. Hortensius, Catiline, Scaurus, Crassus (Plin., *H.N.*, xxxvi. 3, 24), whose house was afterwards bought by Cicero,[6] and the house of Clodius, the view of which Cicero threatened to block out.[7] Many other wealthy Romans had houses on this part of the Palatine, so that the cost of the site for Caligula's enormous palace must have been very great. The part now existing is little more than the gigantic substructures built to raise the principal rooms to the level of the top of the hill. The lowest parts of these face the Nova Via, opposite the Atrium Vestæ, and many stories of small vaulted rooms built in mixed brick and opus reticulatum rise one above the other to the higher levels.[8] The palace extends over the Clivus Victoriæ, supported on lofty arches so as to leave the road unblocked; many travertine or marble stairs lead to the upper rooms, some starting from the Nova Via, others from the Clivus Victoriæ. Its enormous extent is referred to by Pliny (*H.N.*, xxxvi. 24). A large proportion of these substructures consist of dark rooms, some with no means of lighting, others with scanty borrowed light. Many small rooms and stairs scarcely 2 feet wide can only have been used by slaves. The ground floors on the Nova Via and the Clivus Victoriæ appear to have been shops, judging from their wide openings, with travertine sills, grooved for the wooden fronts with narrow doors, which Roman shops seem always to have had,—very like those now used in the East. The upper and principal rooms were once richly decorated with marble linings, columns, and mosaics; but little of these now remains. By the side of the Clivus Victoriæ still exists the start of the bridge by which Caligula joined the Capitolium to the Palatium (Suet., *Cal.*, 22); it is partly supported on corbelled arches, richly decorated with delicate stucco reliefs; the floor is of mosaic, and a piece of the open marble screen or balustrade is still *in situ*. The intermediate parts of Caligula's bridge were removed after his death, and the exit from the palace is blocked by a brick-faced wall, very little later in date than the palace itself. Near the bridge are some rooms very handsomely ornamented with a combination of coloured stucco reliefs and painting on the flat. The upper part of the palace, that above the Clivus Victoriæ, is faced wholly with brickwork, no opus reticulatum being used, as in the lower portions by the Nova Via. This possibly marks a difference of date, and the occurrence of brick stamps of the latter part of the 1st century A.D. in various parts of the palace shows that a large portion of it is later than the time of Caligula.

The next great addition to the buildings of the Palatine was the magnificent suite of state apartments built by Domitian, over a deep natural valley running across the hill (see fig. 17). The valley was filled up and the level of the new palace raised to a considerable height above the natural soil. Remains of a house, decorated with painting and rich marbles, exist under Domitian's peristyle, partly destroyed by the foundations of cast concrete which cut right through it. The floor of this house shows the original level, far below that of the Flavian palace. The south angle of this great building adjoins the palace of Augustus, and it is connected with the palace of Caligula by a branch subterranean passage leading into the earlier crypto-porticus. These two buildings continued to be used as the private apartments of the emperor, the Flavian block consisting only of state rooms; the words **AEDES PVBLICA** were inscribed upon it by Nerva to show its public character. It consists of a large open peristyle, with columns of Oriental marble, at one end of which is the grand triclinium with magnificent paving of opus sectile in red and green basalt and coloured marbles, a piece of which is well preserved; next to the triclinium, on to which it opens with large windows, is a nymphæum or room with marble-lined fountain and recesses for plants and statues. On the opposite side of the peristyle is a large throne-room, the walls of which were adorned with rows of pavonazetto and giallo columns and large marble niches, in which were colossal statues of porphyry and basalt; at one side of this is the basilica, with central nave and apse and narrow aisles, over which were galleries. The apse, in which was the emperor's throne, is screened off by open marble cancelli, a part of which still exists. It is of great interest as showing the origin of the Christian basilica; S. Agnese fuori le Mura is exactly similar in arrangement (see BASILICA, vol. iii. p. 417).[9] On the other side of the throne-room is the lararium, with altar and pedestal for a statue; next to this is the grand staircase, which led to the upper rooms, now destroyed. The whole building, both floor and walls, was covered with the richest Oriental marbles, including all the varieties mentioned on p. 808. Outside were colonnades or porticus,—on one side of cipollino, on the other of travertine, the latter stuccoed and painted. The magnificence of the whole, crowded with fine Greek sculpture and covered with polished marbles of the most brilliant colours, is difficult now to realize; a glowing description is given by Statius (*Silv.*, iv. 11, 18; see also Plut., *Poplic.*, 15, and Mart., viii. 36). Doors were arranged in the throne-room and basilica so that the emperor could slip out unobserved and reach by a staircase (30 in fig. 17) the crypto-porticus which communicates with Caligula's palace. The vault of this passage was covered with mosaic of mixed marble and glass, a few fragments of which still remain; its walls were lined with rich marbles; it was lighted by a series of windows in the springing of the vault. This, as well as the Flavian palace, appears to have suffered more than once from fire, and in many places important restorations of the time of Severus, and some as late as the 4th century, are evident. In 1720-26 extensive excavations were made here for the Farnese duke of Parma, and an immense quantity of statues and marble architectural fragments were discovered, many of which are now at Naples and elsewhere. Among them were sixteen beautiful fluted columns of pavonazetto and giallo, fragments of the porphyry statues, and an immense door-sill of Pentelic marble, now used for the high altar of the Pantheon; these all came from the throne-room. The excavations were carried on by Bianchini, who published a book on the subject.[10]

Domus Gelotiana

In the middle of the slopes of the Palatine, towards the Circus Maximus, are considerable remains of buildings set against the wall of Romulus and covering one of its projecting spurs. This series of rooms with a long Corinthian colonnade has been supposed to be part of the Domus Gelotiana, from which Caligula used to watch the races in the circus below (Suet., *Cal.*, 18). Little, however, of the existing remains is as early as the reign of Caligula, and the marble porticus apparently dates from the time of Severus. The rooms were partly marble-lined and partly decorated with painted stucco, on which are incised a number of interesting inscriptions and rude drawings. Here, in 1857, was found the celebrated (so-called) caricature of the Crucified Christ, now in the Museo Kircheriano, but which, more probably, has a Gnostic meaning.[11] The inscription CORINTHVS . EXIT DE . PEDAGOGIO suggests that this building was at one time used as a school, perhaps for the imperial slaves. A number of soldiers' names also occur, *e.g.*, HILARVS . MI . V . D . N. (Hilarus miles veteranus domini nostri); some are in mixed Latin and Greek characters, with many varieties of mis-spelling. After one pair of names is inscribed PEREG, showing that they belonged to the foreign corps called Peregrini, probably stationed here as guards to the imperial residences on the hill above. Most of these inscriptions appear to be as early as the 1st century A.D.[1] These interesting graffiti have in great part perished during the last few years, and soon none will remain.

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[1] The bronze head, now in the court of the Palazzo del Conservatori, may possibly have belonged to this colossus; it is much too small for that of Nero, to which it has generally been attributed; it seems, however, of inferior workmanship to that of the Augustan age.

[2] Ovid (*Fast.*, iv. 949) mentions this group as being divided among three gods, namely, Phœbus, Vesta, and Augustus (comp. *Metam.*, xv. 864). The plan of a circular temple drawn by Ligorio (*Cod. Ursin. Vat.*, 3439, fol. 25) probably represents this temple of Vesta as discovered in the 16th century; it is reproduced in *Bull. Comm. Arch. Roma*, 1883, pl. xvii.

[3] *Mon. Ant. ined. di Roma*, 1785, p. 56.

[4] This temple is shown on a rare bronze medallion of Gordianus III.; it is domed, and on the pediment is inscribed ΝΕΙΚΗ ΟΠΛΟΦΟΡΟΣ. See Grueber, *Roman Medallions*, pl. xlii., London, 1874.

[5] See Bianchini, *Pal. dei Cesari*, 1738, p. 236.

[6] Cic., *Pro Domo*, 43; Val. Max., vi. 3. 1; and see Becker, *Handb.*, i. p. 423.

[7] Cic., *De Harus.*, 15, 33.

[8] At this point the Palatine is cut away into four stages like gigantic steps; the lowest is the floor of the Atrium Vestæ, the second the Nova Via, the third the Clivus Victoriæ, and the top of the hill forms the fourth.

[9] The brick stamps on the tiles laid under the marble paving of the basilica have CN . DOMITI . AMANDI . VALEAT . QVI . FECIT.,—the last three words a common augury of good luck stamped on bricks or amphoræ; these date from a restoration after a fire in the time of Severus.

[10] *Pal. dei Cesari*, Verona, 1738; see Guattani, *Not. di Antich.*, 1798.

[11] See Kraus, *Das Spottcrucifix vom Palatin*, Freiburg, 1872, and Becker, *Das Spottcrucifix*, &c., Breslau, 1866.

The great stadium of the Palatine (see 50 in fig. 17) was begun by Domitian, mainly built by Hadrian, and much altered or restored by Severus. The greater part of the outer walls and the large exedra or apse at the side, with upper floor for the emperor's seat, are of the time of Hadrian, as is shown by the brick stamps, and the character of the brick facing, which much resembles that of the Flavian time (bricks 1½ inches and joints ½ inch thick).[2] The stadium is surrounded with a colonnade of engaged shafts, forming a sort of aisle with gallery over it. Except those at the curved end, which are of Hadrian's time, these piers are of the time of Severus, as are also all the flat piers along the outer wall,—one opposite each of those in the inner line. This shows either that the stadium must have been left by Hadrian in an unfinished state, or else that it suffered seriously from a fire or earthquake before the reign of Severus.

Hadrian's palace. In addition to the stadium, Hadrian built a number of very handsome rooms, forming a palace on the south-east side and at the south-west end of the stadium. These rooms were partly destroyed and partly hidden by the later palace of Severus, the foundations of which in many places cut through and render useless the highly decorated rooms of Hadrian (53 in fig. 17). The finest of these which is now visible is a room with a large window opening into the stadium near the south angle; it has intersecting barrel vaults, with deep coffers, richly ornamented in stucco. The oval structure shown in the plan (50 in fig. 17), with other still later additions, belongs to the 4th or 5th century, when the stadium was no longer used for races; some of the walls, of opus mixtum, which cut up and disfigure this noble building appear to be the work of Theodoric, *c.* 500.

Palace of Severus. The palace of Septimius Severus was very extensive and of enormous height; it extends not only all over the south angle of the Palatine but also a long way into the valley of the Circus Maximus and towards the Cœlian. This part (like Caligula's palace) is carried on very lofty arched substructures, so as to form a level, uniform with the top of the hill, on which the grand apartments stood. The whole height from the base of the Palatine to several stories above its summit must have been enormous. Little now remains of the highest stories, except part of a grand staircase which led to them. Extensive baths, all richly decorated with marble linings and mosaics in glass and marble, cover a great part of the top of the hill. These and other parts of the Palatine were supplied with water by an aqueduct built by Nero in continuation of the Claudian aqueduct, some arches of which still exist on the slope of the Palatine (56 in fig. 17; see Spart., *Sept. Sev.*, 24). The palace of Severus was restored and enlarged by Heliogabalus and Severus Alexander.[3] One of the main roads up to the Palatine passes under the arched substructures of Severus, and near this, at the foot of the hill, at the south angle, Septimius Severus built an outlying part of his palace, a building of great splendour dedicated to the Sun and Moon, called the Septizonium, probably from its seven stories or zonæ (see Jordan, *Bull. Inst.*, 1872, p. 145). It has been doubted whether it can really have been as much as seven stories high; but this is not improbable when we consider the enormous height of the rest of Severus's palace, reaching from the foot of the Palatine to far above its summit. Part of the Septizonium existed as late as the reign of Sixtus V. (1585-90), who destroyed it in order to use its marble decorations and columns in the new basilica of St Peter; drawings of it are given by Du Perac, *Vestigj di Roma*, 1575, and in other works of that century.[4]

The Velia and Germalus were two outlying spurs of the Palatine.[5] Owing to the great alterations that have been made in the contour of the hill it is now very difficult to identify these ancient districts (see *Ann. Inst.*, 1865, p. 347). The Germalus or Cermalus was probably on the side towards the Velabrum, while the Velia may be identified with that elevated ground between the Palatine and the Esquiline on which the temple of Venus and Rome and the arch of Titus now stand. It is evident that this was once much loftier and more abrupt than it is now; a great part of it was cut away when the level platform for the temple of Venus and Rome was formed. The foundations of part of Nero's palace along the road between this temple and the Esquiline are exposed for about 20 to 30 feet in height, showing a corresponding lowering of the level here, and the bare tufa rock, cut to a flat surface, is visible on the site of Hadrian's great temple; that the Velia was once much loftier is also indicated by the story of the removal of Valerius Publicola's dwelling.[6]

On the Velia and the adjoining Summa Sacra Via were two temples which Augustus rebuilt.[7] The "Ædes Larum" is probably the "Sacellum Larum" mentioned by Tacitus (*Ann.*, xii. 24) as one of the points in the line of the pomœrium of Roma Quadrata. The Sacra Via started at the Sacellum Streniæ, an unknown point on the Esquiline, probably near the baths of Titus (Varro, *L.L.*, v. 47), in the quarter called Cerolia. Thence it probably (in later times) passed round part of the Colosseum to the slope leading up to the arch of Titus on the Velia; this piece of its course is lined on one side by extensive baths, attributed to Heliogabalus (45 in fig. 17), and farther back, against the cliff of the Palatine, are remains of Nero's enormous palace (see 42 in fig. 17). From the arch of Titus or Summa Sacra Via the original line of the road has been altered (see Plate VII.); the angle at which the scanty remains of the Regia are set probably shows the early direction of the Sacra Via in passing on to the temple of Vesta. Its later course was more to the north-east, passing at a sharp angle from the arch of Titus to the front of Constantine's basilica, and on past the temple of Faustina. It is uncertain whether the continuation of this road to the arch of Severus was in later times called the Sacra Via or whether it rejoined its old line along the Basilica Julia by the cross-road in front of the Ædes Julii. Its original line past the temple of Vesta was completely built over in the 3d and 4th centuries, and clumsily-fitted pavements of marble and travertine occupy the place of the old basalt blocks.[8] **Nova Via.** The course of the Nova Via[9] (see figs. 16 and 17) along the palace of Caligula[10] was exposed in 1882-84. According to Varro (*L.L.*, vi. 59) it was a very old road. It led up from the Velabrum, probably winding along the slope of the Palatine, round the north angle under the church of S. Maria Liberatrice. The rest of its course, gently ascending towards the arch of Titus, is now exposed, as are also the stairs, possibly the Scalæ Anulariæ, which connected it with the Clivus Victoriæ at the Porta Romanula; a continuation of these stairs, still unexcavated, led down to the Forum.[11]

Velabrum. The extent of the once marshy Velabrum (Gk., *Fέλος*) is not known, though part of its site is indicated by the church of S. Giorgio in Velabro; Varro (*L.L.*, vi. 24) says, "extra urbem antiquam fuit, non longe a porta Romanula." It was a district full of shops (Plaut., *Capt.*, iii. 1, 29; Hor., *Sat.*, ii. 3, 229). The Vicus Tuscus on its course from the Forum to the Circus skirted the Velabrum (Dionys., v. 26), from which the goldsmiths' arch was an entrance into the Forum Boarium (comp. Dionys., i. 40).

Capitoline Hill.

The Capitoline Hill, once called Mons Saturnius (Varro, *L. L.*, v. 42), consists of two peaks, the Capitolium and the Arx,[12] with an intermediate valley (Asylum). The older name of the Capitolium was Mons Tarpeius (Varro, *L. L.*, v. 41). Livy (i. 10) mentions the founding of a shrine to Jupiter Feretrius on the Capitolium by Romulus;[13] **Temple of Jupite Capitolinus.** this summit was afterwards occupied by the great triple temple dedicated to Jupiter, Juno, and Minerva, a triad of deities worshipped under the names of Tinia, Thalna, and Menrva in every Etruscan city. This great temple was (Liv., i. 38, 53) founded by Tarquin I., built by his son Tarquin II., and dedicated by M. Horatius Pulvillus, consul suffectus in 509 B.C.[14] It was built in the Etruscan style, of peperino stuccoed and painted (Vitr., iii. 3), with wooden architraves, wide intercolumniations, and painted terra-cotta statues.[15] It was rebuilt many times; the original temple lasted till it was burnt in 83 B.C.; it was then refounded in marble by Sulla, with Corinthian columns stolen from the temple of Olympian Zeus in Athens (Plin., xxxvi. 5), and was completed and dedicated by Q. Lut. Catulus, whose name appeared on the front. Augustus, in spite of his having carried out part of the work, did not introduce his name by the side of that of Catulus. It was again burnt by the Vitellian rioters in 70 A.D., and rebuilt by Vespasian in 71.[16] Lastly, it was burnt in the three days' fire of Titus's reign[1] and rebuilt with columns of Pentelic marble by Domitian; the gilding alone of this last rebuilding is said to have cost 2½ millions sterling (Plut., *Publ.*, 15). There has been much controversy as to the site of this temple and that of Juno Moneta on the Arx; but there is an overwhelming mass of evidence to show that the Capitolium is the peak where the Palazzo Caffarelli stands, and that the church of Ara Cœli occupies the Arx. Livy (xxxv. 21) mentions the fall of a mass of rock from the Capitolium into the Vicus Jugarius, which passes close under the Caffarelli summit, and is not near the opposite peak. Moreover, extensive substructions of tufa and peperino have been exposed on the eastern peak, the form of which appears to fit this nearly square triple temple, and in 1875 a fragment of a fluted column was found, of such great size that it could only have belonged to the temple of Jupiter. Its actual limits have not been clearly made out, and therefore the truth of Dionysius's description (iv. 61) cannot be proved.[2] The temple is represented on many coins, both republican and imperial; these show that the central cella was that of Jupiter, that of Minerva on his right, and of Juno on his left. The door was covered with gold reliefs, which were stolen by Stilicho (c. 390; Zosim., v. 38), and the gilt bronze tiles (Plin., xxxiii. 18) on the roof were partly stripped off by Genseric in 455 (Procop., *De Bell. Vand.*, i. 5), and the rest by Pope Honorius I. in 630 (Marliano, *Topogr.*, ii. 1). Till 1348, when the steps up to Ara Cœli were built, there was no access to the Capitol from the back; hence the three ascents to it mentioned by Livy (iii. 7, v. 26-28) and Tacitus (*Hist.*, iii. 71-72) were all from the inside of the Servian circuit. Even on this inner side it was defended by a wall, the gates in which are called "Capitolii fores" by Tacitus. Part of the outer wall at the top of the tufa rock, which is cut into a smooth cliff, is visible from the modern Vicolo della Rupe Tarpeia; this cliff is traditionally called the Tarpeian rock, but that must have been on the other side towards the Forum, from whence it was visible, as is clearly stated by Dionysius (vii. 35, viii. 78).[3] Another piece of the ancient wall has recently been exposed, about half-way up the slope from the Forum to the Arx. It is built of soft yellow tufa blocks, five courses of which still remain in the existing fragment. The large temple of Juno Moneta ("the Adviser") on the Arx, built by Camillus in 384 B.C., was used as the mint; hence *moneta* = "money" (Liv., vi. 20).

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[1] See Henzen, in the *Bull. Inst.*, [illegible], p. 72, and 1867, p. 113.

[2] In parts of the outer wall brick stamps of the Flavian period appear, *e.g.*, **FLAVI . AVG . L . CLONI**—"[A brick] of Clonius, freedman of the Flavian Augustus."

[3] See Dion Cass., lxxii. 24; Lamprid., *Hist. Aug.: Sept. Sev.*, 19, 24; Id., *Sev. Alex.*, 24, 25; and Id., *Heliog.*, 3, 8, 24.

[4] See Jordan, *Die Kaiserpal. in Rom*, Berlin, 1871; Thon, *Pal. dei Cesari*, 1828; Lanciani, *Guida del Pal.*, 1873; *Ann. Inst.*, 1852, p. 324, and *Mon. Inst.*, v. pl. xxxvi.; Guattani, *Roma desc.*, 1805.

[5] "Huic (Palatio) Germalum et Velias conjunxerunt . . . 'Germalum' a germanis Romulo et Remo, quod ad ficum Ruminalem ibi inventi" (Varro, *L. L.*, v. 54). Varro's derivation of Velia from "vellera," the fleeces of the pasturing flocks, is obviously wrong.

[6] Liv., ii. 7; Cic., *Rep.*, ii. 31; see also Ascon., *Ad Cic. In Pis.*, 22.

[7] **AEDEM . LARVM . IN . SVMMA . SACRA . VIA . AEDEM . DEVM . PENATIVM . IN . VELIA . . . FECI** (*Mon. Ancyr.*).

[8] See Goettling, *De Sacra Via*, Jena, 1834, and Jordan, *Topographie der Stadt Rom*, Berlin, 1871 (in progress).

[9] See *Not. d. Scavi*, 1882, p. 234.

[10] See Solinus (i. 24) and Varro (Ap. Gell., xvi. 17), who mention its two ends "summa" and "infima" (comp. Liv., v. 32).

[11] See marble plan on Plate VII. and comp. Ov., *Fast.*, vi. 395.

[12] These two peaks are clearly distinguished by Livy and Strabo.

[13] This is the earliest temple mentioned in Roman history, though there was probably in Roma Quadrata the usual triply consecrated temple erected at the founding of the city. It was rebuilt by Augustus, as is recorded in the *Mon Ancyr.*

[14] See Plut., *Publ.*, 15; *C I. L.*, i. p. 487; Liv., ii. 8, iv. 51; Dionys., v. 35.

[15] Plin., xxxv. 45; see Tac., *Hist.*, iii. 72; Val. Max., v. 10.

[16] Suet., *Vit.*, 15, and *Ves.*, 8; comp. Tac., *Hist.*, iv. 53, and Dion Cass., lxvi. 17

A large number of other temples and smaller shrines stood on the Capitoline Hill, a word used broadly to include both the Capitolium and the Arx.[4] Among these were the temple of Honos and Virtus, built by Marius, and the temple of Fides, founded by Numa, and rebuilt during the First Punic War. Both these were large enough to hold meetings of the Senate. The temple of Jupiter Tonans[5] was built by Augustus (Suet., *Aug.*, 29), near the great temple of Jupiter. Other shrines existed to Venus Victrix, Ops, Jupiter Custos, and Concord—the last under the Arx (Liv., xxii. 33)—and many others, as well as a triumphal arch in honour of Nero, and a crowd of statues and other works of art (see Plin., *H.N.*, xxxiii. 4; xxxiv. 17, 18, 19; xxxv. 36, 45; xxxvi. 5, 8), so that the whole hill must have been a mass of architectural and artistic magnificence, the spoils of the whole Hellenic world.

The so-called Tabularium occupies the central part of the side towards the Forum; it is set on the tufa rock, which is cut away to receive its lower story. It derives its name from an inscription found there in the 15th century, quoted by Poggio (see Gruter, *Inscr.*, 170, 6); but that name was given to many buildings in Rome (Liv., iii. 55, xliii. 16), and there is no reason to suppose that this specially was known as *the* Tabularium (comp. Virg., *Geor.*, ii. 501). Catulus, who was also the dedicator of the great temple of Jupiter (Tac., *Hist.*, iii. 72; Dion Cass., xliii. 14), was consul in 78 B.C., but part of this building is probably much earlier in date. Its outer walls are of peperino, its inner ones of tufa or concrete; the Doric arcade has capitals and architrave of travertine.[6] A road paved with basalt passes through the building along this arcade, entered at one end from the Clivus Capitolinus, and at the other probably from the Gradus Monetæ, a flight of steps leading from the temple of Concord and the Forum up to the temple of Juno Moneta on the Arx (see Plate VII.). The entrance from the Clivus Capitolinus is by a wide flat arch of peperino most beautifully jointed; the other end wall has been mostly destroyed. The back of this building overlooked the Asylum or depression between the two peaks. From this higher level a long steep staircase of sixty-four steps descends towards the Forum; the doorway at the foot of these stairs has a flat arch, with a circular relieving arch over it; it was completely blocked up by the temple of Vespasian (see fig. 1). This was probably the door where the Vitellian rioters broke into the Capitolium (Tac., *Hist.*, iii. 71).[7] Great damage was done to this building by the additions of Boniface VIII. and Nicholas V., as well as by its being used as a salt store by which the walls were much corroded.[8]

The Imperial Fora.

The Forum Julium (see fig. 18), with its central temple of Venus Genitrix, was begun in 49 B.C. after the battle of Pharsalia by Julius and completed by Augustus.[9] Being built on a crowded site it was somewhat cramped, and the ground cost nearly a hundred million sesterces.[10] Part of its circuit wall, with remains of five arches, exists in the Via Marmorella; and behind is a row of small vaulted rooms, probably shops or offices.[11] The arches are flat, slightly cambered, with travertine springers and keys; the rest, with the circular relieving arch over, is of tufa; it was once lined with slabs of marble, the holes for which exist. Foundations of the circuit wall exist under the houses towards S. Adriano, but the whole plan has not been made out. Palladio (*Arch.*, iv. 31) describes excavations made here, and the discovery of remains of a fine temple, probably that of Venus Genitrix.[12]

Forum o Augustus.

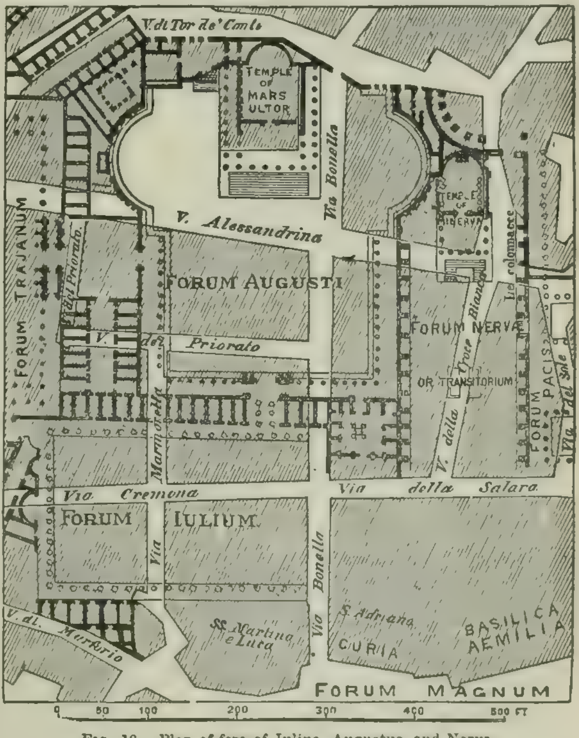

FIG. 18.—Plan of fora of Julius, Augustus, and Nerva.

The forum of Augustus (see fig. 18) adjoined that of Julius on its north-east side; it contains the temple of Mars Ultor, built to commemorate the vengeance taken on Cæsar's murderers at Philippi, 42 B.C. (Ov., *Fast.*, v. 575 *sq.*).[13] It was surrounded with a massive wall of peperino, nearly 100 feet high, with travertine string-courses and cornice; a large piece of this wall still exists, and is one of the most imposing relics of ancient Rome. Against it are remains of the temple of Mars, three columns of which, with their entablature and marble ceiling of the peristyle, are still standing; it is Corinthian in style, very richly decorated, and built of fine Luna marble. The cella is of peperino, lined with marble; and the lower part of the lofty circuit wall seems also to have been lined with marble on the inside of the forum. The large archway by the temple (Arco dei Pantani) is of travertine. Palladio (*Arch.*, iv.) and other writers of the 16th century give plans of the temple and circuit wall, showing much more than now exists. The temple, which was octastyle, with nine columns and a pilaster on the sides, occupied the centre, and on each side the circuit wall formed two large semicircular apses, decorated with tiers of niches for statues.[1]

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[1] Suet., *Dom.*, 5; Dion Cass., lxvi. 24.

[2] See *Bull. Comm. Arch.*, iii., 1875, p. 165; *Mon. Inst.*, v. pl. xxxvi., x. pl. xxx.a; Hirt, "Der Capit. Jupiter Tempel," in *Abhandl. der Berl. Akad.*, 1813; Niebuhr. *Röm. Gesch.*, i. 55-58; Bunsen, *Gesch.*, iii. 5-14; Becker, *Handb.*, i. p. 387. See also *Ann. Inst.*, 1851, p. 289, for a relief showing the sculpture in the pediment; the front of the temple is shown in one of the reliefs from the arch of M. Aurelius, now in the Capitoline Museum.

[3] See Dureau, *La roche Tarpienne*, Paris, 1816; a graceful account of the legend of Tarpeia is given by Propertius, *Eleg.*, iv. 4.

[4] A structure of great sanctity, dating from prehistoric Etruscan times, was the Auguraculum, an elevated platform upon the Arx, from which the signs in the heavens were observed by the augurs (see Festus, ed. Müller, p. 18). This was moved under the empire to the Palatine (see *Notitia*, &c.), probably by Augustus.

[5] What are probably its foundations have been found near the substructures of the great temple (*Bull. Comm. Arch. Rom.*, 1875, iii. p. 165 *sq.*). It is mentioned in the list of the *Mon. Ancyr.*

[6] The whole of the frieze and cornice is missing: it is usually supposed that there was once another story above this entablature, but there is no evidence of that except Poggio's statement.

[7] Mommsen (*Ann. Inst.*, 1858, p. 211) comes to the conclusion that this building is the Ærarium Saturni, but that seems hardly possible, as there is the clearest evidence that that ærarium was in or part of the temple of Saturn (see *ante*, p. 817).

[8] The Porta Pandana ("ever-open gate") was probably situated near the south-west angle of the Tabularium, where the road of the Clivus Capitolinus entered the circuit wall of the Capitoline Hill. See Righetti, *Descriz. del Campidoglio*, 1833; Azzurri, *Antico Tabulario*, 1839; Supham, *De Capitolio Romano*, 1866; and Jordan, *Ann. Inst.*, 1881.

[9] See *Mon. Ancyr.* (quoted at p. 817, note 13, above); Plin., *H.N.*, xxxv. 45, xxxvi. 24.

[10] Cic., *Ep. ad Att.*, iv. 16; Suet., *Cæs.*, 26.

[11] There is no foundation whatever for the theory that these chambers were part of the "Mamertine prison"; their form and position both make that impossible.

[12] See Dion Cass., xliii. 22; Appian, *Bell. Civ.*, ii. 102; Vitr., iii. 3; Plut., *Cæs.*, 60.

[13] The Ancyræan inscription records—IN . PRIVATO . SOLO . [EMP]TO . MARTIS . ULTORIS . TEMPLVM . FORVMQVE . AVGVSTVM . EX . [MANI]BIIS . FECI. See Suet., *Aug.*, 29, 56; Dion Cass., lvi. 27; Plin., *H.N.*,

The Forum Pacis, built by Vespasian, was farther to the south-east; the only existing piece, a massive and lofty wall of mixed tufa and peperino, with a travertine archway, is opposite the end of the basilica of Constantine. The arch opened into what was probably the Templum Sacræ Urbis, which contained a plan of the city of Rome. The original plan was probably burnt with the whole group of buildings in this forum in 191, in the reign of Commodus (Dion Cass., lxxii. 24); but a new plan engraved on marble was made, and the building restored in concrete and brick by Severus. The north-east end wall, with the clamps for fixing the marble plan, still exists, as does also the other (restored) end wall with its arched windows towards the forum (see fig. 19); one hundred and sixty-seven fragments of this plan were found *c.* 1560 at the foot of the wall to which they were fixed, and are now preserved in the Capitoline Museum; drawings of the seventy-four pieces now lost are preserved in the Vatican[2] (*Cod. Vat.*, 3439). The whole has been published in a valuable work by Professor Jordan, *Forma Urbis Romæ*, Berlin, 1875-82. The fragments which relate to the Forum Magnum are given on Plate VII. The circular building at the end facing on the Sacra Via is an addition built by Maxentius in honour of his deified son Romulus; like the other buildings of Maxentius, it was rededicated and inscribed with the name of his conqueror Constantine.[3] The original stone building of Vespasian was probably an archive and record office; the name Templum Sacræ Urbis is with much probability given to it by Jordan, partly on the authority of an inscription now in the Vatican (see *Forma Urbis Romæ*). The fine bronze doors at the entrance to the temple of Romulus are much earlier than the building itself, as are also the porphyry columns and very rich entablature which ornament this doorway. Pope Felix IV. (526-530) made the double building into the church of SS. Cosmo e Damiano, using the circular domed temple of Romulus as a porch.[4] The chief building of Vespasian's forum was the Templum Pacis,[5] dedicated in 75, one of the most magnificent in Rome, which contained a very large collection of works of art.

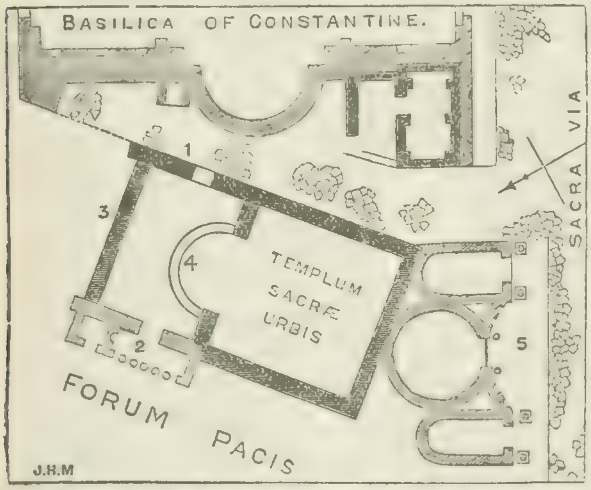

Fig. 19.—Group of buildings by the Forum Pacis. 1. Existing wall of peperino and tufa, with travertine doorway. 2. Do. and porch destroyed by Urban VIII. 3. Brick-faced wall of time of Severus against which the marble plan was fixed. 4. Apse built by Felix IV., when he converted the Templum Sacræ Urbis into the church of SS. Cosmo e Damiano. 5. Temple of Romulus, built by Maxentius, made by Felix IV. into the porch of his church.

The forum of Nerva (see fig. 18) occupied the narrow strip left between the fora of Augustus and Vespasian; being little more than a richly decorated street, it was called the Forum Transitorium or Forum Palladium, from the temple to Minerva which it contained. It was begun by Domitian, and dedicated by Nerva in 97 (see Suet., *Dom.*, 5; Mart., *Ep.*, i. 2, 8). Like the other imperial fora, it was surrounded by a peperino wall, not only lined with marble but also decorated with rows of Corinthian columns supporting a rich entablature with sculptured frieze. Two columns and part of this wall still exist; on the frieze are reliefs of weaving, fulling, and various arts which were under the protection of Minerva. A great part of the temple existed till the time of Paul V., who in 1606 destroyed it to use the columns elsewhere.[6] In the reign of Severus Alexander a series of colossal bronze statues, some equestrian, were set round this forum; they represented all the previous emperors who had been deified, and by each was a bronze column inscribed with his "res gestæ" (Lamprid., *Hist. Aug.* · *Sev. Alex.*, 28).

Forum o Trajan

The forum of Trajan with its adjacent buildings was the last and, at least in size, the most magnificent of all; it was in progress from 100 to 117. A great spur of hill, which connected the Capitoline with the Quirinal, was cut away to make a level site for this enormous group of buildings. It consisted (see fig. 20) of a large dipteral peristyle, with curved projections, lined with shops on the side. That against the slope of the Quirinal, three stories high, still partly exists. The main entrance was through a triumphal arch (Dion Cass., lxviii. 29), from which probably were taken most of the fine reliefs used by Constantine to decorate his arch. Aurei of Trajan show this arch and other parts of his forum.[7] The opposite

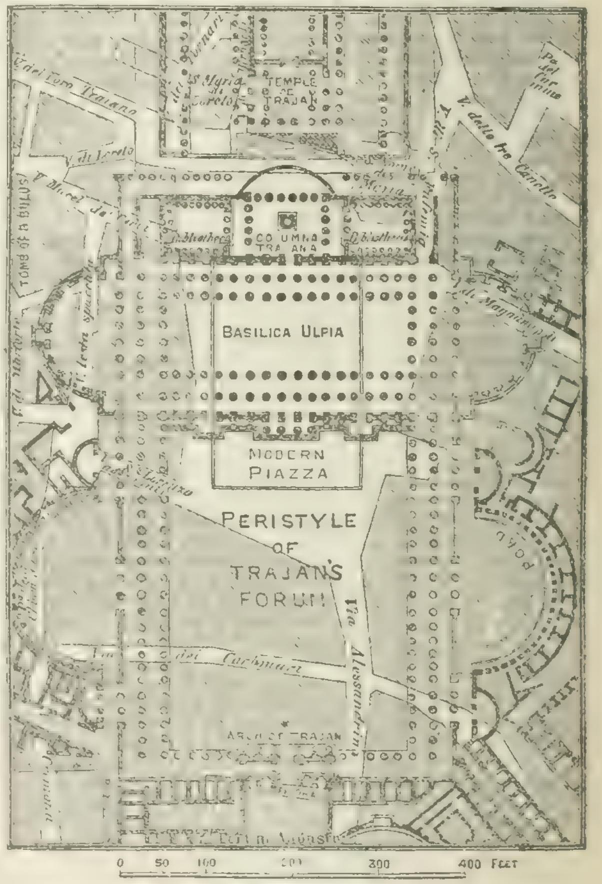

Fig. 20.—Forum of Trajan.

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xxxvi. 24, xxxv. 36, xxxiv. 19, viii. 73, where many fine Greek works of art are mentioned as being in the forum of Augustus.

[1] Those of Roman leaders and heroes, from Æneas and Romulus to Augustus. See Borsari, *Foro d'Augusto*, &c. (Lincei), 1884.

[2] An interesting description of this discovery is given by Vacca, writing in 1594 (printed in Nardini, *Roma Ant.*, ed. Nibby, 1818-20, vol. iv.); since then a few other fragments have been found. The scale is roughly 1 to 300, but appears to be not quite uniform.

[3] For accounts of this interesting group of buildings, see De Rossi, *Bull. Arch. Crist.*, 1867, p. 62; Tredelemburg, *Ann. Inst.*, 18[illegible], p. 66; and Lanciani, *Bull. Comm. Arch. Rom.*, 1882. Ligorio (in a 16th-century MS.; *Cod. Vat.*, 3439) and Du Perac (*Vestig.*) show much more than now exists.

[4] "Hic (Felix) fecit basilicam SS. Cosmæ et Damiani . . . in Via Sacra, juxta Templum Urbis Romæ" (Anastas. Bibl., *Vita S. Felicis IV.*),—important evidence in favour of Jordan's suggestion.

[5] Statues by Phidias and Lysippus existed in the Forum Pacis as late as the 6th century (Procop., *Bel. Goth.*, iv. 21).

[6] Drawings of it are given in Du Perac and by Palladio (*Arch.*, iv. 8).

[7] See Aul. Gell., xiii. 25, 2; and Amm. Marc., xvi. 10.

side was occupied by the Basilica Ulpia (Jordan, *For. Ur. Rom.*), part of which, with the column of Trajan, is now visible; none of the columns, which are of grey granite, are *in situ*, and the whole restoration is misleading. Part of the rich paving in Oriental marble is genuine. This basilica contained two large libraries (Dion Cass., lxviii. 16; Aul. Gell., xi. 17).

The Columna Cochlis (so called from its spiral stairs) is, including capital and base, 97 feet 9 inches high,[1] *i.e.*, 100 Roman feet; its pedestal has reliefs of trophies of Dacian arms, and winged Victories, with an inscription recording the enormous mass of hill which was removed to form the site (comp. Dion Cass., lxviii. 16). On the shaft are reliefs arranged spirally in twenty-three tiers, scenes of Trajan's victories, containing about 2500 figures. Trajan's ashes were buried in a gold urn under this column (Dion Cass., lxviii. 16); and on the summit was a colossal gilt bronze statue of the emperor, now replaced by a poor figure of St Peter, set there by Sixtus V.[2] Beyond the column stood the temple of Trajan completed by Hadrian; its foundations exist under the buildings at the north-east side of the modern piazza, and many of its granite columns have been found. This temple is shown on coins of Hadrian.[3] The architect of this magnificent group of buildings was Apollodorus of Damascus (Dion Cass., lxix. 4), who also designed many buildings in Rome during Hadrian's reign.[4] In addition to the five imperial fora, and the Forum Magnum, Olitorium, and Boarium, mentioned above, there were also smaller markets for pigs (Forum Suarium), bread (Forum Pistorium), and fish (Forum Piscarium), all of which, with some others, popularly but wrongly called fora, are given in the regionary catalogues.

Other Temples, &c.

Besides the temples mentioned in previous sections remains of many others still exist in Rome. The circular temple by the Tiber in the Forum Boarium, formerly thought to be that of Vesta, may be the temple of Hercules mentioned by Macrobius (*Saturn.*, iii. 6), Solinus (*Collect.*, i. 11), and Livy (x. 23). Its design is similar to that of the temple of Vesta in the Forum (fig. 15), and, except the entablature and upper part of the cella, which are gone, it is well preserved (see Piale, *Tempio di Vesta*, 1817). The neighbouring Ionic temple, popularly called of Fortuna Virilis, is of special interest from its early date, probably the end of the 2d century B.C. The complete absence of marble and the very sparing use of travertine, combined with the simple purity of its design, are all proofs of its great antiquity. It has a prostyle tetrastyle portico of travertine, and a short cella of tufa with engaged columns; the bases of these and of the angle columns are of travertine. The frieze has reliefs of ox skulls and garlands. The whole was originally stuccoed and painted so that the different stones used would not show. Fig. 21 gives the plan, showing the hard travertine used at the points of greatest pressure, while the main walls with the half columns are of the weaker and softer tufa. The dedication of this temple is doubtful; on the whole it appears most probable that it is the temple to Fortuna (without any affix) founded by Servius Tullius (Dionys., iv. 27) in the Forum Boarium, not the one to Τύχη Ἀνδρεία (Fors Fortuna?) mentioned as being by the river (comp. Plut., *De Fort. Rom.*, 5). Ten columns of what is probably the temple of Ceres, Liber, and Libera exist *in situ*, built up in the end and side walls of the church of S. Maria in Cosmedin. These have well sculptured composite capitals and wide intercolumniation,—probably a survival of the original design of this temple, which was Tuscan in style (Vitr., iii. 3, 5; Plin., *H.N.*, xxxv. 45). It was founded by Aulus Postumius, dictator in 497 B.C., and dedicated by Spurius Cassius, consul in 494 B.C. (Dionys., vi. 17, 94). In 31 B.C. it was burnt (Dion Cass., l. 10), and was rebuilt by Augustus and Tiberius (Tac., *Ann.*, ii. 49); but the existing columns belong to a still later restoration. The temple stands close to the carceres of the Circus Maximus, in the Forum Boarium. Within the walls of S. Niccolo in Carcere (see fig. 22) in the Forum Olitorium are preserved remains of the tufa cellæ and travertine columns of three small hexastyle peripteral temples, two Ionic and one Tuscan, set close side by side.[5] A fragment of the marble plan includes part of this group, as is indicated on fig. 22. Two of these temples were probably those to Spes and Juno Sospita (Liv., xxi. 62, xxxii. 30); the third may be that of Apollo Medicus (Liv., xl. 51), as suggested by Burn (*Rome and Campagna*, 1871, note i. p. 306). Near the Forum Olitorium, in the modern Ghetto, are extensive remains of the large group of buildings included in the Porticus Octaviæ, two of which, dedicated to Juno Regina and Jupiter Stator, with part of the enclosing porticus and the adjoining temple of Hercules Musarum, are shown on a fragment of the marble plan. The Porticus Octaviæ, a large rectangular space enclosed by a double line of columns, was built in honour of Octavia by her brother Augustus on the site of the Porticus Metelli, founded in 146 B.C. This must not be confounded with the neighbouring Porticus Octavia founded by Cn. Octavius, the conqueror of Perseus (Liv., xlv. 6, 42), in 168 B.C., and rebuilt under the same name by Augustus, as is recorded in the Ancyræan inscription. The whole group was one of the most magnificent in Rome, and contained a large number of works of art by Phidias and other Greek sculptors. The existing portico, which was the main entrance into the porticus, is a restoration of the time of Severus in 203. The church of S. Michele and the houses behind it conceal extensive remains of the porticus and its temples (see *Ann. Inst.*, 1868, p. 108; and Contigliozzi, *I Portici di Ottavia*, 1861).[6]

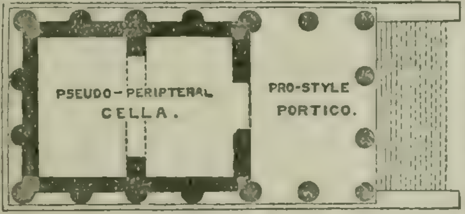

FIG. 21.—So-called temple of Fortuna Virilis. The black shows tufa; the shading travertine.

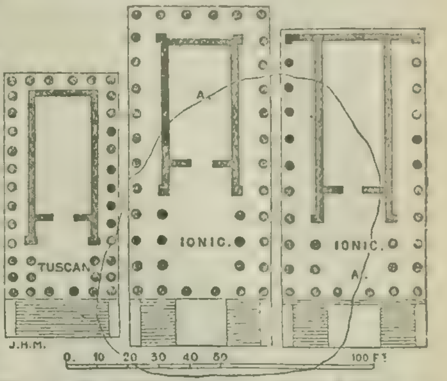

FIG. 22.—Plan of three temples on site of S. Niccolo in Carcere; the part within the line A, A is that shown on a fragment of the marble plan. The black shows what still exists.

Temple of Neptune.

Remains of a large peripteral Corinthian temple are built into the side of the "Dogana di Terra," near Monte Citorio. Eleven marble columns and their rich entablature are still *in situ*, with the corresponding part of the cella wall of peperino; in 1878 a piece of the end wall of the cella was discovered, and, under the houses near, part of a large peribolus wall, also of peperino, forming an enclosure with columns all round the temple nearly 330 feet square (see *Bull. Comm. Arch. Rom.*, vi., pl. iv., 1878). The dedication of this temple is not known; it has commonly been identified with the temple of Neptune (Dion Cass., lxvi. 24), built by Agrippa, and surrounded by the Porticus Argonautarum (Dion Cass., liii. 27; Mart. iii. 20, 11); but its details appear to be later than the reign of Augustus.[7] Another not improbable theory is that it was the temple of Hadrian, mentioned in the *Mirabilia* (Uhlrichs, *Codex Topogr.*, Wurtzburg, 1871, p. 107) as being near this spot.

The temple of Venus Felix and Roma Æterna on the Velia (see fig. 23) was the largest in Rome; it was pseudo-dipteral with ten Corinthian columns of Greek marble at the ends, and probably twenty at the sides; it had an outer colonnade round the peribolus of about 180 columns of polished granite and porphyry. Of these only a few fragments now exist; for several centuries the whole area of this building was used as a quarry, while the residue of the marble was burnt into lime on the spot in kilns built of broken fragments of the porphyry columns. A considerable part of the two cellæ with their apses, set back to back, still exists; in each apse was a colossal seated figure of the deity, and along the side walls of the cellæ were rows of porphyry columns and statues in niches. The vault is deeply coffered with stucco enrichments once painted and gilt. The roof was covered with tiles of gilt bronze, which were taken by Pope Honorius I. (625-638) to cover the basilica of St Peter's. These were stolen by the Saracens during their sack of the Leonine city in 846. The emperor Hadrian himself designed this magnificent temple, which was partially completed in 135; the design was criticized rather severely by the architect Apollodorus (Dion Cass., lxix. 4; Spart., *Hadr.*, 19).[1] The temple was probably finished by Antoninus Pius; it was partly burned in the reign of Maxentius, who began its restoration, which was carried on by Constantine (Amm. Marcell., xvi. 10). The existing remains of the two cellæ are mainly of Hadrian's time, but contain patches of the later restorations. Between the south angle of this temple and the arch of Constantine stand the remains of a fountain, usually known as the Meta Sudans. This was a tall conical structure in a large circular basin, all lined with marble. From its brick facing it appears to be a work of the Flavian period.

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[1] Its pedestal is inscribed, "Senatus Populusque Romanus Imp. Cæsari Divi Nervæ F. Nervæ Trajano Aug. Germ. Dacico Pontif. Maximo Trib. Pot. XVII. [*i.e.*, 114 A.D.] Imp. VI. P. P. ad declarandum quantæ altitudinis mons et locus tant(is operi)bus sit egestus." This cannot be taken literally, as the ridge which was cut away never approached 100 feet in height, but possibly means that the cliff of the Quirinal was cut back to a slope reaching to a point 100 feet high (see Brocchi, *Suolo di Roma*, p. 133; Becker, *Handb.*, note 737).

[2] See Fabretti, *Columna Trajana* (1683), who gives drawings of all the reliefs; also De Rossi, *Col. Traj. designata*. The reliefs, from their lofty position, are now difficult to see, but originally must have been very fairly visible from the galleries on the colonnades which once surrounded the column.

[3] See Aul. Gell., xi. 17, 1; Spart., *Hist. Aug.: Hadr.*, 19; and compare Pausanias (v. 12, 6; x. 5, 11), who mentions the gilt bronze roofs of Trajan's forum.

[4] See Fea, *Foro Trajano*, 1832; Richter, *Ristauro del Foro Trajano*, 1839; Bartoli, *Col. Trajana*, 1704; Pistolesi, *Col. Trajana*, 1846; Froehner, *La Colonne Trajane*, Paris, 1865.

[5] For drawings of them see *Ann. Inst.*, 1850, p. 347, and *Mon. Inst.*, v. 24; also Labacco, *Architettura*, 1557.

[6] The remains of the Porticus Octaviæ are now being more completely exposed by the demolition of the Ghetto.

[7] This, however, is not conclusive, as the temple of Neptune may have been completely rebuilt after the fire which injured it in 80.

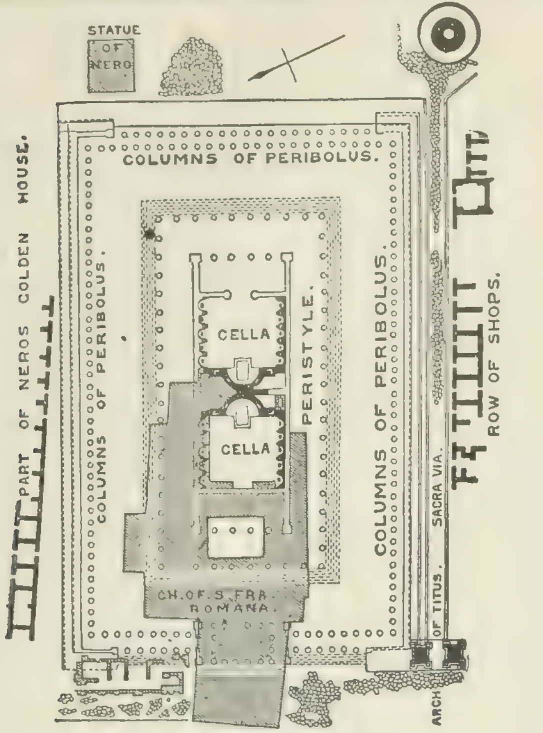

Fig. 23.—Temple of Venus and Rome.

Buildings on the Cœlian.

That part of the Cœlian Hill which is near the Colosseum is covered with very extensive remains,—a great peribolus of brick-faced concrete, apparently of Flavian date, and part of a massive travertine arcade, somewhat similar to that of the Colosseum; most of the latter has been removed for the sake of the stone, but a portion still exists under the monastery and campanile of SS. Giovanni e Paolo. What this extensive building was remains doubtful till further excavations are made. According to one theory it is the temple of Claudius, built by Vespasian (Suet., *Vesp.*, 9); but Bunsen's suggestion is much more probable (*Besch.*, iii. p. 476), that it was the house of Vectilius, bought and probably enlarged by Commodus (*Hist. Aug.: Comm.*, 16), and connected with the Colosseum by a subterranean passage. Such a passage actually exists, and has been partly cleared out.

The so-called temple of Minerva Medica on the eastern slope of the Esquiline (so named from a statue found in it) is probably part of some baths. It is a curiously planned building, with central decagonal domed hall, probably of the time of Gallienus 263-268 (see Canina, *Ind. Top.*, p. 161). Somewhat similar ruins beside the neighbouring basilica of S. Croce have been supposed to belong to a nymphæum of Severus Alexander, mentioned in the *Notitia*, Regio v., but are more probably part of the Sessorium, a court of justice on the Esquiline. The remains on the Quirinal in the Colonna gardens of massive marble entablatures richly sculptured were formerly thought to belong to Aurelian's great temple of the Sun, but it now appears certain that they belong to the very extensive thermæ of Constantine, part of the site of which is now occupied by the Quirinal palace and neighbouring buildings.[2]

The excavations of recent years have brought to light, and in many cases destroyed, a large number of domestic buildings; many of these are recorded in the *Notizie degli Scavi* and the *Bull. Comm. Arch. Rom.*, 1872-1876. The extensive cutting away of the Tiber bank for the new embankment exposed some very ornate houses near the Villa Farnesina, richly decorated with marble, fine wall-paintings, and stucco reliefs, equal in beauty to any works of the kind that have ever been found. Some of these were cut off the wall, and will be exhibited in a new museum about to be formed to contain all ancient works of art found in Rome; but the houses themselves have been destroyed. The laying out of the new Quirinal and Esquiline quarters also has exposed many fine buildings. One handsome villa, built over the Servian wall, may possibly be the house of Mæcenas. A very remarkable vaulted room, decorated with paintings of plants and landscapes, has been shown to be a greenhouse;[3] at one end is an apse with a series of step-like stages for flowers. This one room has been preserved, though the rest of the villa has been destroyed; it is on the road leading from S. Maria Maggiore to the Lateran. The walls are a very fine specimen of tufa opus reticulatum, unmixed with brick, evidently earlier than the Christian era. Among the numerous buildings discovered in the Horti Sallustiani near the Quirinal is a very fine house of the 1st century A.D., in concrete faced with brick and opus reticulatum. It has a central circular domed hall, with many rooms and staircases round it, rising several stories high. This house was set in the valley against a cliff of the Quirinal, so that the third floor is level with the upper part of the hill. It is nearly on the line of the Servian wall, which stood here at a higher level on the edge of the cliff. This is identified as the house of Sallust, which at his death became crown property, and was used as a residence by Nero (Tac., *Ann.*, xiii. 47) and other emperors till the 4th century.[4] In 1884, near the Porta S. Lorenzo, a long line of houses was discovered during the making of a new road. Some of these were of opus reticulatum of the 1st century B.C.; others had the finest kind of brick-facing, probably of the time of Nero; all had been richly decorated with marble linings and mosaics. The line of the street was parallel to that of the later Aurelian wall, which at this part was built against the back of this row of houses. At the same time, behind the line of houses, were uncovered fine peperino and tufa piers of the aqueduct rebuilt by Augustus, one arch of which forms the Porta S. Lorenzo. These interesting remains have all been completely destroyed. A fine house of the end of the 1st century A.D., with richly decorated walls, was exposed in June 1884 against the slope of the Quirinal, near the Palazzo Colonna; it was immediately destroyed to make room for new buildings.

Prætorian cam

The prætorian camp was first made permanent and surrounded with a strong wall by the emperor Tiberius (Suet., *Tib.*, 37). Owing to the camp being included in the line of the Aurelian wall a great part of it still exists; it is a very interesting specimen of early imperial brick-facing. The wall is only 12 to 14 feet high, and has thinly scattered battlements, at intervals of 20 feet. The north gate (*Porta Principalis Dextra*) is well preserved; it had a tower on each side, now greatly reduced in height, in which are small windows with arched heads moulded in one slab of terra-cotta. The brick-facing is very neat and regular,—the bricks being about 1½ inches thick, with ½-inch joints. On the inside of the wall are rows of small rooms for the guards. Part of the Porta Decumana also remains. This camp was dismantled by Constantine, who removed its inner walls; the outer ones were left because they formed part of the Aurelian circuit. The present wall is nearly three times the height of the original camp wall. The upper part was added when Aurelian included it in his general circuit wall round Rome. The superior neatness and beauty of Tiberius's brick-facing make it easy to distinguish where his work ends and that of the later emperors begins. Owing to the addition of the later wall it requires some care to trace the rows of battlements which belong to the camp.

Pantheo

The Pantheon is the most perfect among existing classical buildings in Rome (see fig. 24). It was built by Agrippa in 27 B.C., as is recorded on the frieze of the portico. What its original purpose was is not clear; on the one hand, it forms part of the great thermæ built by Agrippa, and in position and design closely resembles the great circular calidarium in the thermæ of Caracalla; on the other hand, it has no hypocaust or hot-air flues, and was certainly consecrated as a temple to Mars, Venus, and other supposed ancestors of Cæsar's family very soon after it was built (Dion Cass., liii. 27); it was used as the meeting-place of the Fratres Arvales before they began to meet in the temple of Concord (see Henzen, *Acta Frat. Arval.*, 1868, No. 71).[5] It had the name Pantheum apparently from the first; Pliny (*H.N.*, xxxvi. 4) men-lions the sculpture by the Athenian Diogenes which adorned it, and its capitals and dome covering of Syracusan bronze (xxxiv. 7); the ceiling of the portico too was of bronze, supported by massive tubular girders,[1] which remained till Urban VIII. melted them to make cannon for S. Angelo and the baldacchino of St Peter's; the bronze weighed 450,000 lb. The bronze tiles of the dome were stolen long before by Constans II., in 663, but on their way to Constantinople they were seized by the Saracens. The portico has eight columns on the front and three on the sides, all granite monoliths except the restored ones on the east side,—sixteen in all. The capitals are Corinthian, of white marble; the tympanum (ἀετός) of the pediment was filled with bronze reliefs of the battle of the gods and the giants.[2] The walls of the circular part, nearly 20 feet thick, are of solid tufa concrete, thinly faced with brick. The enormous dome, 142 feet 6 inches in span, is cast in concrete made of pumice-stone, pozzolana, and lime; being one solid mass, it covers the building like a shell, free from any lateral thrust at the haunches. Round the central opening or hypæthrum still remains a ring of enriched mouldings in gilt bronze, the only bit left of the bronze which once covered the whole dome. The lower story of the circular part and the walls of the projecting portico were covered with slabs of Greek marble; a great part of the latter still remains, enriched with Corinthian pilasters and bands of sculptured ornament. The two upper stories of the drum were covered outside with hard stucco of pounded marble. Inside the whole was lined with a great variety of rich Oriental marbles. This magnificent interior, divided into two orders by an entablature supported on columns and pilasters, has been much injured by alteration; but the materials are ancient, and the general effect is probably much the same as it was, not in the time of Agrippa, but after the restorations of Hadrian (Spart., *Hadr.*, 181) and Severus, when the magnificently coloured porphyries and Oriental marbles were so largely used.[3] About 608 the Pantheon was given by Phocas to Boniface IV., who consecrated it as the church of S. Maria ad Martyres. In 1881-82 the destruction of a row of houses behind the Pantheon exposed remains of a grand hall with richly sculptured entablature on Corinthian columns, part of the great thermæ of Agrippa, which extend beyond the Via della Ciambella (fig. 24). A great part of the thermæ appears from the brick stamps to belong to an extensive restoration in the reign of Hadrian, and bricks of his time are even said to have been found in the facing of the Pantheon itself.[4] (See BATHS, vol. iii. p. 434 *sq.*)

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[1] The existence of some chambers in the podium near the Colosseum and the great platform by which this temple is raised above the Sacra Via make it appear that the criticisms of Apollodorus were made before Hadrian's design was carried out, and that the emperor had the good sense to adopt the suggestions of his professional critic.

[2] See Palladio (*Terme dei Romani*, London, 1732), who gives the plan of this enormous building, now wholly hidden or destroyed.

[3] *Bull. Inst.*, 1875; see also *Bull. Comm. Arch.*, 1874, where drawings are given.

[4] During excavations made here in 1876 lead pipes were found inscribed with the name of the estate, the imperial owner (Severus Alexander), and the plumber who made them—HORTORVM . SALLVSTIAN . IMP . SEV . ALEXANDRI . AVG . NAEVIVS . MANES . FECIT.

[5] The demolition of the block of houses which was built against it at the back has exposed the point of junction between the Pantheon and the thermæ. It is now apparent that the Pantheon originally was an isolated building, and that the union of it and the thermæ was a later alteration.

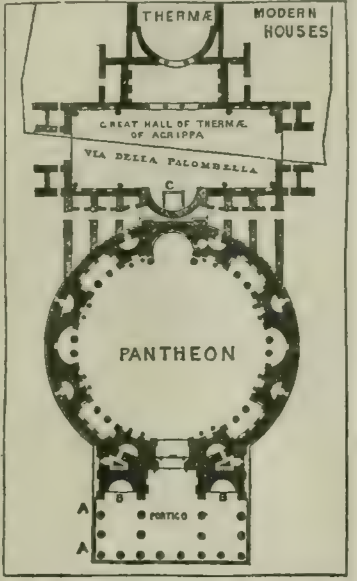

FIG. 24.—Plan of Pantheon and part of thermæ of Agrippa. A. Angle of portico rebuilt in 17th century. B, B. Niches which contained colossal statues of Augustus and Agrippa. C. Pedestal for statue, and apse added by Hadrian.

Close by the Pantheon is the church of S. Maria sopra Minerva, which stands (as its name records) on the site of a temple to Minerva Chalcidica, probably founded by the great Pompey *c.* 60 B.C.[5] Adjoining this were temples to Isis and Serapis, a cult which became very popular in Rome in the time of Hadrian; large quantities of sculpture, Egypto-Roman in style, have been found on this site at many different times.[6]

Several of the barracks (*excubitoria*) of the various cohorts of the vigiles or firemen have been discovered in various parts of Rome. The central depôt is buried under the Palazzo Savorelli; that of the second cohort is on the Esquiline, near the so-called temple of Minerva Medica; that of the third was found in 1873 near the baths of Diocletian (see *Bull. Comm. Arch. Rom.*, 1873). The most perfect is that of the 7th cohort near S. Crisogono in Trastevere, a handsome house of the 2d century, decorated with mosaic floors, wall-paintings, &c.[7]

The excavations made in exposing the ancient church of S. Clemente brought to light interesting remains of many different periods; drawings are given by Mullooly, *St Clement's Basilica*, 1869, and De Rossi, *Bull. Arch. Crist.*, 1870, pt. iv.

Many remains exist of the Golden House[8] of Nero, which show that this gorgeous palace covered an almost incredibly large space of ground, extending from the Palatine, over the Velia and the site of the temple of Venus and Rome, to the Esquiline, filling the great valley between the Cœlian and the Esquiline where the Colosseum stands, and reaching far over the Esquiline to the great reservoir now called the "Sette Sale." No other extravagances or cruelties of Nero appear to have offended the Roman people so much as the erection of this enormous palace, which must have blocked up many important roads and occupied the site of a whole populous quarter. It was no doubt partly to make restitution for this enormous theft of land that Vespasian and Titus destroyed the Golden House and built the Colosseum and public thermæ of Titus[9] on part of its site. Under the substructions of the latter building extensive remains of the Golden House still exist; and at one point, at a lower level still, pavements and foundations remain of one of the numerous houses destroyed by Nero to clear the site. The great bronze colossus of Nero, 120 feet high (Suet., *Nero*, 31), which stood in one of the porticus of the Golden House, was moved by Vespasian, with head and attributes altered to those of Apollo (Helios), on to the Velia; and it was moved again by Hadrian, when the temple of Rome was built, on to the base which still exists near the Colosseum. Several coins show this colossus by the side of the Colosseum.

Under the Palazzo Doria, the church of S. Maria in Via Lata, and other neighbouring buildings extensive remains exist of a great porticus, with long rows of travertine piers; this building appears to be represented on fragments of the marble plan with the words SAEPT . . . LIA. This is probably the Septa Julia, begun by Julius Cæsar, and completed by Agrippa in 27 B.C., as the voting place for the Comitia Centuriata, divided into compartments, one for each century. The building contained rostra, and was also used for gladiatorial shows. Under the later empire it became a bazaar and resort of slave-dealers.

That curiously planned building on the Esquiline, in the new Piazza Vit. Emmanuele, where the so-called trophies of Marius once were placed (see drawing by Du Perac in his *Vestigj*), is one of the numerous castella or reservoirs from which the water of the various aqueducts was distributed in the quarters they were meant to supply. This was built by Severus Alexander at the termination of his Alexandrine aqueduct, opened in 225 (see Lamprid., *Hist. Aug.: Sev. Alex.*, 25). The marble trophies are now set at the top of the Capitoline steps; their quarry mark shows them to be of the time of Domitian: it consists of the following inscription, now not visible, as it is cut on the under part—**IMP . DOM. AVG . GERM . PER . CHREZ . LIB . ⁎C≤.**[10]

Places of Amusement.

The Circus Maximus (see vol. v. p. 791) occupied the Vallis Murciæ[11] between the Palatine and the Aventine. Its first rows of seats, which were of wood, were made under Tarquin I. (Liv., i. 56; Dionys., iii. 68). It was restored in 327 and 174 B.C. (Liv., viii. 20; xli. 27). In the reign of Julius Cæsar it was rebuilt with (for the first time) lower seats of stone (Plin., *H.N.*, xxxvi. 24), the upper being still of wood (Suet., *Cæs.*, 39); Dionysius (iii. 68) describes it as it was after this rebuilding. It was further ornamented with marble by Augustus, Claudius, and other emperors. The wooden part was burnt in the great fire of Nero, and again under Domitian, by whom it was restored wholly in stone and marble, and lastly it was restored and enlarged by Constantine. In its later state it had a marble façade with three external tiers of arches with engaged columns, and (inside) sloping tiers of marble seats, supported on concrete raking vaults (Plin., *Paneg.*, 51). A great part of these vaults existed in the 16th century, and is shown by Du Perac. It held a quarter of a million spectators (Plin., *H.N.*,

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[1] Drawings of this interesting bronze work by Sallustio Peruzzi are preserved in the Uffizi at Florence.

[2] On the architrave is cut an inscription recording the restoration of the Pantheon by Severus in 202.

[3] The Pantheon still possesses its original doors between fluted pilasters, and over them an open screen, all of bronze. Other ancient bronze doors still exist in the temple of Romulus, the Lateran basilica, and in its baptistery, the latter taken from the thermæ of Caracalla.

[4] The plan of the whole group, including the Pantheon, is given by Palladio (*op. cit.*). The recent discoveries are given by Lanciani, *Not. d. Scavi*, 1882, p. 357, with a valuable plan. The one given by Canina is worthless. See also Maes, *Il Pantheon*, 1881; Geymuller, *Documents inédits sur les Thermes d'Agrippa*, Lausanne, 1883; Nispi-Landi, *Il Pantheon*, 1882; Adler, *Das Pantheon*, Berlin, 1871; and Hirt, *Das Pantheon*, Berlin, 1807.

[5] Part of the Serapeum is shown on a fragment of the marble plan; see Jordan, *For. Ur. Rom.*

[6] See Marucchi, "Le Scoperte dell' Iséo Campense," in *Bull. Comm. Arch. Rom.*, 1883, and *Ann. Inst.*, 1853; Fea, *Miscell.*, ccliv. 112.

[7] See De Rossi, "Vigili," in *Ann. Inst.*, 1858; Visconti, *Coorte VII. de' Vigili*, 1867.

[8] See Fea, *Casa Aurea*, 1832.

[9] See Romanis, *Terme di Tito*, 1822. It should be noted that the paintings said in this and other works to have belonged to the baths of Titus really decorated the Golden House, over which the baths were built. The substructures of Titus's building are absolutely without ornament, and were almost devoid of light.

[10] See Bruzza, in *Ann. Inst.*, 1870, and Lenormant, *Trophées de Marius*, Blois 1842. This once magnificent building, with the marble trophies in their place, is shown with much minuteness on a bronze medallion of Severus Alexander (see Froehner, *Médaillons de l'Empire*, Paris, 1878, p. 169).

[11] So called from a prehistoric altar to the Dea Murcia (Venus); Varro, *L.L.*, v. 154.

xxxvi. 24). The end with the carceres was near the church of S. Maria in Cosmedin.[1] Some of its substructures, with remains of very early tufa structures on the Palatine side, still exist below the church of S. Anastasia (see 58 in fig. 17). The obelisk now in the Piazza del Popolo was set on the spina by Augustus. The Circus Flaminius in the Campus Martius was built by the C. Flaminius Nepos killed at Thrasymene in 217 B.C.; remains of the structure were found in the 16th century under the Palazzo Mattei. In the Middle Ages its long open space was used as a rope-walk, hence the name of the church called S. Caterina dei Funari, which occupies part of its site.[2] The circus of Caligula and Nero was at the foot of the Vatican Hill (Plin., *H.N.*, xxxvi. 15). The modern sacristy of St Peter's stands over part of its site. The obelisk on its spina remained standing *in situ* till it was moved by Fontana[3] for Sixtus V. to its present site in the centre of the piazza. Another circus was built by Hadrian near his mausoleum; remains of it were found in 1743, but nothing is now visible (*Atti d. Pont. Accad.*, 1839). The great stadium, foundations of which exist under most of the houses of the Piazza Navona (Agonalis), and especially below S. Agnese, is probably that built by Domitian and restored by Severus Alexander. It was called from the latter emperor the Stadium Alexandrinum. That it was a stadium and not a circus is shown by the fact that its starting end is at right angles to the sides and not set diagonally, as was always the case with the carceres of a circus; nor is there any trace of foundations of a spina. The best preserved circus is that built by Maxentius in honour of his deified son Romulus, by the Via Appia, 2 miles outside the walls of Rome. It was attributed to Caracalla till 1825, when an inscription recording its true dedication was found.[4]

The first permanent naumachia was that constructed by Augustus between the foot of the Janiculan Hill and the Tiber; traces of it have recently been discovered near the church of S. Crisogono. The naumachia of Domitian was pulled down and the materials used to restore the Circus Maximus (Suet., *Dom.*, 5); its site is not known.

The first stone[5] theatre in Rome was that built by Pompey, 56-52 B.C.; it contained a temple to Venus Victrix, and in front of it was a great porticus called Hecatostylum from its hundred columns. This is shown on the marble plan.[6] Considerable remains of the foundations exist between the Via de' Chiavari, which follows the line of the scena, and the Via de' Giubbonari and Via del Paradiso. Adjoining this was the curia of Pompey, where Cæsar was murdered, after which it was burnt and the site decreed to be a "locus sceleratus." The colossal statue, popularly supposed to be that of Pompey at the feet of which Cæsar died,[7] now in the Palazzo Spada, was found in 1553 near the theatre. This theatre was restored by Augustus (*Mon. Ancyr.*); in the reign of Tiberius it was burnt and its rebuilding was completed by Caligula. The scena was again burnt in 80 A.D., and restored by Titus. According to Pliny (*H.N.*, xxxvi. 24), it held 40,000 spectators. In 1864 the colossal gilt bronze statue of Hercules, now in the Vatican, a work of the 3d century, was found near the site of the theatre of Pompey, carefully concealed underground. The theatre of Marcellus is much more perfect; complete foundations of the cunei exist under the Palazzo Savelli, and part of the external arcade is well preserved. This is built of travertine in two orders, Tuscan and Ionic, with delicate details, very superior to those of the Colosseum, the arcade of which is very similar to this in general design. This theatre was begun by J. Cæsar, and finished by Augustus in 13 B.C., who dedicated it in the name of his nephew Marcellus.[8] It was restored by Vespasian (Suet., *Vesp.*, 19). Livy (xl. 51) mentions an earlier theatre on the same spot, built by M. Æmilius Lepidus in 179 B.C. It stands partly in the Forum Olitorium, a large extent of the travertine paving of which was exposed in 1875 (*Bull. Com. Arch. Mun.*, iii. 1875). Foundations also of the theatre of Balbus exist under the Palazzo Cenci; and in the Via di S. Maria in Cacaberis, No. 23, there is a small portion of the external arcade of the porticus which belonged to this theatre; the lower story has travertine arches with engaged columns, and the upper has brick-faced pilasters. It was built by Cornelius Balbus in 13 B.C. (Suet., *Aug.*, 29; Dion Cass., liv. 25). An interesting account of the temporary theatre of Scaurus, erected in 58 B.C., is given by Pliny (*H.N.*, xxxvi. 2, 24). The same writer mentions an almost incredible building, which consisted of two wooden theatres made to revolve on pivots, so that the two together made an amphitheatre; this was erected by C. Curio in 50 B.C.

The first stone amphitheatre in Rome was that built by Statilius Taurus in the reign of Augustus. Its ruins are supposed to form the elevation called Monte Giordano, but none of it is visible. For the Colosseum see AMPHITHEATRE, vol. i. The Amphitheatrum Castrense is in the line of the wall of Aurelian near the Porta Asinaria; it is built of concrete, faced with neat brickwork, and was decorated with friezes and other ornaments in moulded terra-cotta. Its exterior had two tiers of arches between engaged Corinthian columns, all, even the foliage of the capitals, very neatly executed in terra-cotta. Only one piece with the upper order still exists on the outside of the Aurelian line. This amphitheatre is mentioned in the regionary catalogues under Regio v. It is supposed to have been erected for the amusement of the troops in the neighbouring camp, hence its name. From the character of the brick-facing the building appears to date from the early part of the 2d century.

Arches, Columns, Tombs, and Bridges.

The earliest triumphal arches were the two erected by L. Stertinius (196 B.C.) in the Forum Boarium and in the Circus Maximus, out of spoils gained in Spain.[9] In the later years of the empire there were nearly forty in Rome. The arch of Titus and Vespasian on the Summa Sacra Via was erected by Domitian to commemorate the conquest of Judæa by Titus in his father's reign. Reliefs inside the arch represent the triumphal procession—Titus in a chariot, and on the other side soldiers bearing the golden candlestick, trumpets, and table of prothesis, taken from the Jewish temple. The central part only of this monument is original; the sides were restored in 1823.[10] Another arch in honour of Titus had previously been built (80 A.D.) in the Circus Maximus; its inscription is given in the Einsiedeln MS. (Gruter, *Inscr.*, p. 244, No. 6). A plain travertine arch near the supposed palace of Commodus on the Cœlian is inscribed with the names of the consul Publius Corn. Dolabella (10 A.D.) and of the flamen martialis, C. Junius Silanus. In later times Nero's aqueduct was built over it. It may possibly have been an entrance into the Campus Martialis, an enclosure on the Cœlian sacred to Mars, which was used for games when the Campus Martius was flooded. The so-called arch of Drusus by the Porta Appia also carries the specus of an aqueduct,—that built by Caracalla to supply his great thermæ. Its coarse details show, however, that it is much later than the time of Drusus (Suet., *Claud.*, 1). It was usual to ornament specially the arch of an aqueduct that happened to cross a road, and this arch was probably built by Caracalla with the rest of his branch of the Aqua Marcia. Adjoining the church of S. Giorgio in Velabro a rich though coarsely decorated marble gateway with flat lintel still exists,—built, as its inscription records, in honour of Severus and his sons by the argentarii (bankers and silversmiths) and other merchants of the Forum Boarium in 204. It formed an entrance from the Forum Boarium into the Velabrum. The figure of Geta in the reliefs and his name have been erased by Caracalla; the sculpture is poor both in design and execution[11] (see *Bull. Inst.*, 1867, p. 217, and 1871, p. 233). Close by is a quadruple arch, set at the intersection of two roads, such as was called by the Romans an arch of Janus Quadrifons. Though partly built of earlier fragments, it is of the worst style of work; it cannot be earlier than the time of Constantine, and probably is of still later date. The finest existing arch is that by the Colosseum erected by Constantine. It owes, however, little of its beauty to that artistically degraded period. Not only most of its reliefs but its whole design and many of its architectural features were stolen from an earlier arch erected by Trajan as an entrance to his forum (see p. 826 above). The arch of Claudius, built in 43 to commemorate his supposed victories in Britain, stood across the Via Lata (modern Corso) between S. Francesco Saverio and the Palazzo Sciarra. Its exact position is shown in *Bull.*

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[1] Part of it is shown on a fragment of the marble plan (see Jordan, *For. Ur. Rom.*); it is represented on a bronze medallion of Gordian III., with an obelisk on the spina and three metæ at each end; in front are groups of gladiators wrestling and boxing (see Grueber, *Rom. Med.*, pl. xli., London, 1874).

[2] The 16th century discoveries recorded by Fulvio and Ligorio are quoted by Nardini, *Roma Ant.* (ed. Nibby, 1818-20), iii. p. 21.

[3] See his *Trasportazione dell' Obelisco Vat.*, 1590.

[4] Nibby, *Circo di Caracalla*, 1825; Canina, *Rom. Ant.*, i. p. 447, pl. cxxxvii; see also Panvinius, *De Lud. Circens.*, and Bianconi, *Descr. dei Circi*, 1789. An interesting relief showing a circus race, with the carceres, spina, and galleries for spectators, is illustrated in *Ann. Inst.*, 1870, pl. LM; and three of the same subject are preserved in the Sala della Biga in the Vatican; see also the Brescia diptych, Gori (*Thesaur. Vet. Dipt.*, Florence, 1759).

[5] A great prejudice existed in republican Rome against the introduction of the Greek custom of having permanent stone theatres. In 154 B.C., owing to the advice of Scipio Nasica, the senate demolished a half-finished stone theatre which had been begun by the censor C. Cassius Longinus. Even Pompey had to build a temple to Venus in the upper part of his theatre as a sort of excuse for having seats and steps of stone leading up to it (Tertull., *De Spec.*, 10).

[6] Plut., *Pomp.*, 52; Dion Cass., xxxix. 38; Tac., *Ann.*, xiv. 20.

[7] See Fea, *Rom. Ant.*, lxviii. 57, for an account of its discovery.

[8] Suet., *Aug.*, 29. See *Mon. Ancyr.*—"Theatrvm . ad aedem . Apollinis . in . solo magna . ex . parte . a . [privatis .]empto . feci . qvod . svb . nomine . M . Marcelli . generi . [mei] . esset." The temple of Apollo here named was one of the most ancient and highly venerated in Rome; it was dedicated to the Delphic Apollo in 428 B.C. by C. Julius (Liv., iv. 25); meetings of the senate were held in it; and it contained many fine works of art,—an ancient cedar wood statue of Apollo (Liv., xxvii. 37), and the celebrated statues of the slaughter of the Niobids by Praxiteles or Scopas (Plin., *H.N.*, xxxvi. 4), of which many ancient copies exist. One almost complete set is in the Uffizi at Florence; one figure of one of the daughters in the Vatican may be an original.

[9] Liv., xxxiii. 27, see also xxxvii. 3.

[10] This arch is the earliest known example of the so-called Composite order, a modification of Corinthian in which the capitals combine Ionic volutes with Corinthian acanthus leaves; in other respects it follows the Corinthian order.

[11] The second half of the 2d century was a time of extraordinarily rapid decline in art. The relief of Antinous in the Villa Albani and other portraits of him made in the reign of Hadrian (117-138) are among the most beautiful existing specimens of Roman or Græco-Roman sculpture; while after the accession of Severus in 193 no sculpture of any real artistic merit seems to have been produced.

Comm. Arch. Rom., vi., pl. iv. Its remains were removed in the middle of the 16th century,[1] and nothing now is left but half its inscription, preserved in the garden of the Barberini palace, and two of its reliefs in the porch of the Villa Borghese. It is shown on both aurei and denarii of Claudius, with an attic inscribed DE BRITANNIS, and surmounted by a quadriga and trophies. The arch of Marcus Aurelius, also destroyed in the 16th century, spanned the modern Corso farther north, where the Via Lata had become the Via Flaminia.[2] Many of its fine reliefs are preserved in the Capitoline Museum. The central part of the once triple arch of Gallienus still exists on the Esquiline; it stands against the ancient Porta Esquilina of the Servian wall. It is built of travertine, is simple in design, with coarse details, and has a long inscription on its attic. The two side arches and pediment over the centre existed in the 16th century, and are shown in the Mantuan oil-painting of Rome,[3] and in several antiquarian works of the 16th century. The inscription records that it was erected in 262 in honour of Gallienus and his wife Salonina by M. Aurelius Victor, præfect of the city.[4]

Columns. The column of Antoninus Pius was a monolith of red granite, erected after his death by his adopted sons M. Aurelius and L. Verus. One fragment of it is preserved in the Vatican with an interesting quarry inscription, recording that it was cut in the ninth year of Trajan's reign, under the supervision of Dioscurus and the architect Aristides. The rest of its fragments were used by Pius VI. to repair the obelisk of Monte Citorio, set up by Augustus in the Campus Martius as the gnomon of a sun-dial (Plin., *H.N.*, xxxvi. 15). The marble pedestal of the Antonine column is now in the Vatican; it has reliefs of the apotheosis of Faustina and Antoninus Pius, and processions of soldiers. This and the column of M. Aurelius were both surmounted by colossal portrait statues of gilt bronze. The column of M. Aurelius is very similar in size and design to that of Trajan. Its spiral reliefs represent victories in Germany from 167 to 179, arranged in twenty tiers. Like the column of Trajan, it is exactly 100 Roman feet high, without the pedestal. The pedestal was originally much higher than at present, but is now partly buried; it is shown by Gamucci, Du Perac, and other 16th-century writers. This column stood in front of a temple to M. Aurelius, and within a great peribolus, forming a forum similar to that of Trajan, though much smaller; the remains of this temple probably form the elevation now called Monte Citorio.[5]

For the catacombs see that article (vol. v. p. 206); for obelisks[6] see ARCHITECTURE (vol. ii. p. 390) and EGYPT (vol. vii. pp. 768, 778).

Tombs. The recent discovery of a cemetery of prehistoric (Etruscan) date is mentioned above, p. 812. Few tombs exist of the Roman period earlier than the 1st century B.C.,—probably owing to the great extension of the city beyond the Servian limits, which thus obliterated the earlier burial places. The tomb of the Cornelian Scipios is the most important of early date which still exists. It is excavated in the tufa rock at the side of the Via Appia, outside the Porta Capena. Interments of the Scipio family went on here for about 400 years, additional chambers and passages being excavated from time to time. The peperino sarcophagus of Cornelius Lucius Scipio Barbatus (Liv., x. 12, 13), consul in 298 B.C., is now in the Vatican; its inscription, in rude Saturnian verse, is perhaps the most important existing specimen of early Latin epigraphy. Many other inscribed slabs were found in the 17th century, covering the "loculi" in which lay the bodies of later members of the family. Those now existing in the tomb are modern copies, with blundered inscriptions. All are given by Mommsen (*C.I.L.*, i. p. 11 *sq.*). This burial-place of the Scipios is unlike those of other families, owing to the gens Cornelia keeping up the early custom of interment without burning; thus stone sarcophagi or loculi (rock-cut recesses) were required instead of mere pigeon-holes to hold the cinerary urns. The tomb of Bibulus, a few yards outside the Porta Ratumena, and remains of two recently discovered during the destruction of the Aurelian towers at the Porta Salara, date from about the middle of the 1st century B.C., as does also the curious tomb of the baker Eurysaces outside the Porta Maggiore. In 1863 an interesting tomb of the Sempronia gens was discovered on the Quirinal, below the royal palace, near the site of the Porta Sanqualis. It is of travertine, with a rich entablature and frieze sculptured with the Greek honeysuckle ornament (see *Bull. Comm. Arch. Rom.*, iv.). This also is of the last years of the republic.[7]

The mausoleum of Augustus, built 28 B.C., stands in the north part of the Campus Martius, between the Tiber and the Via Flaminia. It is a massive cylindrical structure of concrete, faced with opus reticulatum; over that it was lined with marble slabs; inside were a series of radiating chambers, in plan like a wheel. On the top was a great mound of earth, planted with trees and flowers (Tac., *Ann.*, iii. 9). As late as the 16th century its external form remained unaltered.[8] Only the bare core exists now, with its fine opus reticulatum, best seen in the court of the Palazzo Valdambrini. The inside is concealed by modern seats, being used now as a circus (Teatro Correa). The sepulchral inscription in honour of Augustus, engraved on two bronze columns at the entrance, is preserved to us by its copy at Ancyra. It records an almost incredible amount of building: in addition to the long list of buildings mentioned by name Augustus says, DVO ET . OCTAGINTA TEMPLA . DEVM . IN . VRBE . CONSVL . SEXTVM . . REFECI.[9] The first burial in the mausoleum of Augustus was that of Marcellus, 22 B.C., and it continued to be the imperial tomb till the death of Nerva, 98 A.D., after whose interment there was no more room. It was sacked by Alaric in 409, and in the 12th century was made into a fortress by the Colonna family, and suffered much from constant party struggles.

The mausoleum of Hadrian, begun in 135 as a substitute for that built by Augustus, was a large circular building on a square podium; its walls, of enormous thickness, are of concrete faced with blocks of peperino, the whole being lined with Parian marble and surrounded by a colonnade with rows of statues,—a work of the greatest magnificence. The bronze pine-cone, now in the Vatican, was (according to Vacca) found near the mausoleum, and probably surmounted its conical dome. The splendour of the whole is described by Procopius (*B. G.*, i. 22), who mentions its siege by the Goths, when the defenders hurled the statues on to the heads of the enemy. In the 6th century it was made into a papal castle called S. Angelus inter Nubes, and all through the Middle Ages it suffered much from constant attacks. The interior chambers are still well preserved, but its outside has been so often wrecked and refaced that little of the original masonry is visible.

Sepulchral pyramids. Several of the grander sepulchral monuments of Rome were built in the form of pyramids. One of these still exists, included in the Aurelian wall, by the Porta Ostiensis. It is a pyramid of concrete, 118 feet high, faced with blocks of white marble, and contains a small chamber decorated with painted stucco. An inscription in large letters on the marble facing records that it was built as a tomb for C. Cestius, a prætor, tribune of the people, and septemvir of the epulones (officials who supervised banquets in honour of the gods)—an office founded in 196 B.C. (Liv., xxxiii. 42). It was erected, according to Cestius's will, by his executors, in the space of 330 days. It dates from the time of Augustus[10] (see Falconieri, in Nardini, *Roma Antica*, iv. p. 1, ed. 1818-20). Another similar pyramid, popularly known as the tomb of Romulus, stood between the mausoleum of Hadrian and the basilica of St Peter. It was destroyed in the 15th century during the rebuilding of the long bridge which connects the former building with the Vatican.

Bridges. The earliest bridge was a wooden drawbridge called the Pons Sublicius from the piles (*sublicæ*) on which it was built. The river being an important part of the defence of Rome from the Aventine to the Porta Fluminalis (see plan of Servian wall, fig. 8), no permanent bridges were made till the Romans were strong enough not to fear attacks from without. The Pons Sublicius appears to have been of wood even in the imperial period.[1] Its exact site is doubtful, but some existing foundations near the foot of the Aventine, near the Marmoratum, may have been the supports of its wooden piers. The first stone bridge was completed in 142 B.C., when the conquest of Etruria and the defeat of Hannibal had put an end to fears of invasion; it was called the Pons Æmilius, after the pontifex maximus[2] M. Æmilius Lepidus, its founder. It was also called Pons Lapideus to distinguish it from the wooden Sublician bridge. The modern Ponte Rotto is on the site of this; but the existing three arches are mediæval. An ancient basalt-paved road still exists, leading to the bridge from the Forum Boarium. The Pons Fabricius unites the city and the island (Insula Tiberina); Livy (ii. 5) gives the fable of the formation of this island from the Tarquin corn, cut from the Campus Martius and thrown into the river. The bridge derived its name from L. Fabricius, a curator viarum in 62 B.C.; its inscription, twice repeated, is L. FABRICIVS . C . F . CVR . VIAR . FACIVNDVM . COERAVIT. Like the other existing bridges, it is built of great blocks of peperino and tufa, with a massive facing of travertine on both sides. Corbels to support centering were built in near the springing of the arches, so that they could be repaired or even rebuilt without a scaffolding erected in the river-bed. The well-preserved Pons Cestius, probably named after L. Cestius, præfectus urbi in 46 B.C., unites the island and the Janiculan side; on the marble parapet is a long inscription recording its restoration in 370 by Gratian, Valentinian, and Valens. The next bridge, Ponte Sisto, is probably on the site of an ancient bridge called in the *Notitia* Pons Aurelius. Marliano gives an inscription (now lost) which recorded its restoration in the time of Hadrian. The Pons Ælius was built in 135 by Hadrian to connect his mausoleum with the Campus Martius; it is still well preserved, and is now called the Ponte S. Angelo (see Dante, *Infer.*, xviii. 28-33). Its inscription, now lost, is given in the Einsiedeln MS.—IMP . CAESAR . DIVI . TRAIANI . PARTHICI . FILIVS . DIVI . NERVAE . NEPOS . TRAIANVS . HADRIANVS . AVG . PONT . MAX . TRIB . POT . XVIIII . COS . III . P . P . FECIT. The Pons Ælius is shown on coins of Hadrian. A little below it are the foundations of another bridge, probably the Pons Neronianus of the *Mirabilia*, called also Vaticanus, built probably by Nero as a way to his Vatican circus and the Horti Agrippinæ.[3]

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[1] See Vacca, ap. Fea, *Misc.*, p. 67.

[2] The destruction in 1879 of the Aurelian towers flanking the Porta del Popolo brought to light the fact that this gate is exactly on the site of the ancient Porta Flaminia, and not to one side of it, as was formerly believed on the evidence of a vague passage in Procopius (*Bell. Goth.*, i. 23). Thus it appears probable that the northern part of the Corso follows the line of the Via Flaminia, as the southern portion does that of the Via Lata.

[3] Reproduced by De Rossi in his valuable *Piante di Roma Anteriori al Sec. XVI.*, 1879.

[4] See Bellori, *Veteres Arcus*, 1690, showing some now destroyed; and Fea, *Archi Trionf.*, 1832.

[5] See *Ann. Inst.*, 1852, p. 338: and *Mon. Inst.*, v., pl. xl. See also Fabris, *Piedestallo d. Col. Anton.*, 1846; Bartoli, *Col. M. Aurelii*, 1704; Chausse, *Col. ritrovata nel Campo Marzo*, Naples, 1704; Pellegrini, *Colonne ed Obelischi*, 1881.

[6] In 1882 a small Egyptian obelisk of red granite was found buried near the Pantheon; it now lies in the Piazza del Collegio Romano; a translation of its hieroglyphs is given in *Bull. Comm. Arch. Rom.*, 1883. At the same time a very curious granite column was discovered of Egypto-Roman work, the lower part adorned with figures in relief.

[7] See A. F. Gori, *Columb. Libert. et Serv. Liviæ*, 1727; Bianchini, *Camera . . . Sepolcrali*, 1727; Campana, *Sepolcri Romani*, 1840, Fortunati, *Scavi lungo la Via Latina*, 1859; Brizio, *Pitture e Sepolcri sull' Esquilino*, 1876; Secchi, *Sepolcro di una Famiglia Greca*, 1843; Visconti, *Sepolcro di Q. Sulpicio Massimo*, 1871; Stevenson, *Cimitero di Zotico, Via Labicana*, 1876.

[8] See Du Perac's *Vestigj*, which shows the garden on the top.

[9] The other greatest building period after the reign of Augustus appears to have been that of Severus and his son Caracalla; the following list of buildings, built or restored between 196 and 211, will give some notion of this:—Marcian aqueduct restored and lengthened to the Thermæ Severianæ in 196, pædagogium puerorum a capite Africæ in 198; temple of Cybele on the Palatine in 200, rebuilt; Claudian and Anio Novus aqueducts restored in 201; theatre of Pompey, Pantheon, thermæ of Agrippa, Amphitheatrum Castrense and prætorian camp, all restored in 202; Septizonium and great palace on the Palatine, and arches in the Forum Magnum and Forum Boarium built, Stadium Palatinum, Porticus Octaviæ, and Forum Pacis restored, all in 203. In various years before 211: temple of Vespasian, of Fortuna Muliebris, schola scribarum, balneæ near the Porta Septimiana, horti of Geta, a porticus with res gestæ Divi Severi, the Antonine aqueduct, and (212-215) the great thermæ of Caracalla. The great fire of 191 was one of the causes of these extensive works (see Lanciani, *Bull. Comm. Arch. Rom.*, 1882).

[10] Near the tomb of Cestius is that extraordinary mound of potsherds called Monte Testaccio. These are mostly fragments of large amphoræ, not piled up at random, but carefully stacked, with apertures at intervals for ventilation. Many theories have been advanced to account for this enormous mass of broken pottery; but by far the most probable explanation is that the broken earthenware of Rome was collected and stored here for use in the making of the stucco called opus signinum (Vitr., viii. 6, 14), with which the specus or channels of aqueducts were lined, and also the concrete in which marble and mosaic pavings were bedded (nucleus). This latter is the opus testaceum of Vitruvius (vii. 1, 5); and the universal use of pounded earthenware for floors and aqueducts must have used up immense quantities of broken pots and bricks (testæ tunsæ). A good account of the potsherds of Monte Testaccio and their stamps is given in *Ann. Inst.*, 1878, p. 118.

Regiones of Augustus.

Augustan regiones. In spite of the extensive growth of the city under the republic no addition was made to the four regiones of Servius till the reign of Augustus, who divided the city and its suburbs into fourteen regiones, the first six of which embraced the original four of Servius. The lists in the *Notitia* and *Curiosum* are the chief aids in determining the limits of each, which in many cases cannot be done with any exactness (see Preller, *Die Regionen der Stadt Rom*, 1846, and Uhlrichs, *Codex Topograph.*, Würzburg, 1871). Each regio was divided into vici or parishes, each of which formed a religious body, with its ædicula larium, and had magistri vicorum, the lowest in rank of the Roman magistracy. The smallest regio (No. II.) contained seven vici, the largest (No. XIV.) seventy-eight. The list is as follows:—

I. or *Porta Capena*, extended to the Aurelian Porta Appia.

II. or *Cœlimontana*, the Cœlian Hill.

III. or *Isis et Serapis*, included the valley of the Colosseum and the adjoining part of the Esquiline.

IV. or *Templum Pacis et Sacra Via*, included the Velia, most of the Subura, the fora of Nerva and Vespasian, the Sacra Via, and also buildings along the north-east side of the Forum Magnum.

V. or *Esquilina*, north part of the Esquiline and the Viminal.

VI. or *Alta Semita*, the Quirinal as far as the prætorian camp.

VII. or *Via Lata*, the valley bounded on the west by the Via Lata, and by the neighbouring hills on the east.

VIII. or *Forum Romanum*, also included the fora of Julius, Augustus, and Trajan, and the whole Capitoline Hill.

IX. or *Circus Flaminius*, between the Tiber, the Capitol, and the Via Lata.

X. or *Palatium*, the Palatine Hill.

XI. or *Circus Maximus*, the valley between the Palatine and the Aventine, with the Velabrum and Forum Boarium.

XII. or *Piscina Publica*, between the Cœlian and the Aventine, and beyond the Via Appia, including the site of Caracalla's thermæ.

XIII. or *Aventinus*, the hill, and the bank of the Tiber below it.

XIV. or *Transtiberina*, the whole district across the river and the Tiber Island.[4]

The walls of Aurelian (see Plates VI. and VIII.), more than 12 miles in circuit, were mainly built to enclose the regiones of Augustus, the greater part of which were then thickly inhabited. This enormous work was begun in 271, to defend Rome against sudden attacks of the Germans and other northern races when the great armies of Rome were fighting in distant countries.[5] After the death of Aurelian the walls were completed by Probus in 280, and about a century later they were restored and strengthened by the addition of gate-towers under Arcadius and Honorius (395-425), in place of the earlier gateways of Aurelian; this is recorded by existing inscriptions on several of the gates.[6] At many periods these walls suffered much from the attacks of the Goths (Procop., *Bell. Goth.*, iii. 22, 24), and were restored successively by Theodoric (about 500), by Belisarius (about 560), and by various popes during the 8th and 9th centuries, and in fact all through the Middle Ages. A great part of the Aurelian wall still exists in a more or less perfect state; but it has wholly vanished where it skirted the river, and a great part of its trans-Tiberine course is gone. The most perfect piece is that in the gardens of the Villa Ludovisi. Other well-preserved pieces are by the Porta Appia, and between the Lateran and the Amphitheatrum Castrense. The wall, of concrete, has the usual brick-facing and is about 12 feet thick, with a guards' passage formed in its thickness. Fig. 25 shows its plan: on the inside the passage has tall open arches, which look like those of an aqueduct, and at regular intervals of about 45 feet massive square towers are built, projecting on the outside of the wall, in three stories, the top story rising above the top of the wall. The height of the wall varies according to the contour of the ground; in parts it was about 60 feet high outside and 40 inside. Necessaria, supported on two travertine corbels, projected from the top of the wall on the outside beside most of the towers. The Einsiedeln MS. gives a description of the complete circuit, counting all the gates, fourteen in number, as follows:—

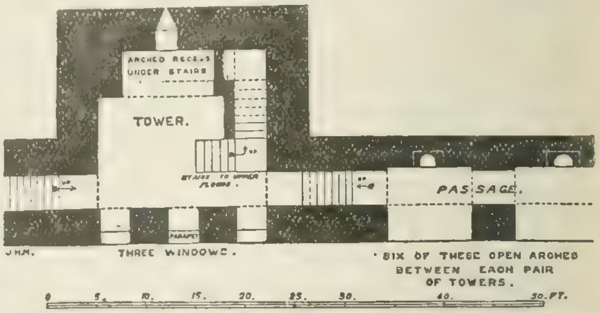

FIG. 25.—Aurelian's wall; plan showing one of the towers and the passage in thickness of wall.

Porta S. Petri (destroyed); P. Flaminia (in use); P. Pinciana (closed); P. Salaria (destroyed in 1870); P. Nomentana (closed); P. Tiburtina (in use, now called P. S. Lorenzo); P. Prænestina (in use, now Porta Maggiore); P. Asinaria (closed); P. Metrovia (closed); P. Latina (closed); P. Appia (in use, now called P. S. Sebastiano); P. Ostiensis (in use, now P. S. Paolo). On the Janiculan side, P. Portensis (destroyed); P. Aurelia (in use). One gate, known as the P. Chiusa, is omitted in this list, owing to its being blocked up in the time of the Einsiedeln writer. Its ancient name is not known.

These existing gates are mostly of the time of Honorius; each is flanked by a projecting tower, and some are double, with a second pair of towers inside. Several have grooves for a portcullis (*cataracta*) in the outer arch. The handsomest gate is the P. Appia, with two massive outer towers, three stages high, the upper semicircular in plan. Many of the gates of Honorius have Christian symbols or inscriptions. The general design of all these gates is much the same,—a central archway, with a row of windows over it and two flanking towers, some square, others semicircular in plan. In many of the gates older materials are used, blocks of tufa, travertine, or marble. The doors themselves swung on pivots, the bottom ones let into a hole in the threshold, the upper into projecting corbels.

At many points along the line of the Aurelian wall older buildings form part of the circuit,—near the Porta Asinaria a large piece of the Domus Laterana, a house of the 3d century which gave its name to the Lateran basilica, and a little farther on, by S. Croce in Gerusalemme, the Amphitheatrum Castrense; the latter, of about the end of the 1st century A.D., has two tiers of arches and engaged columns of moulded brick on the outside. Between the P. Prænestina and the P. Tiburtina comes a large castellum of the Aqua Tepula. The Prætorian Camp forms a great projection near the P. Nomentana. Lastly, the angle near the Porta Flaminia, at the

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[1] See Varro, *L. L.*, v. 83; Ov., *Fast.*, v. 622; Tac., *Hist.*, i. 86.

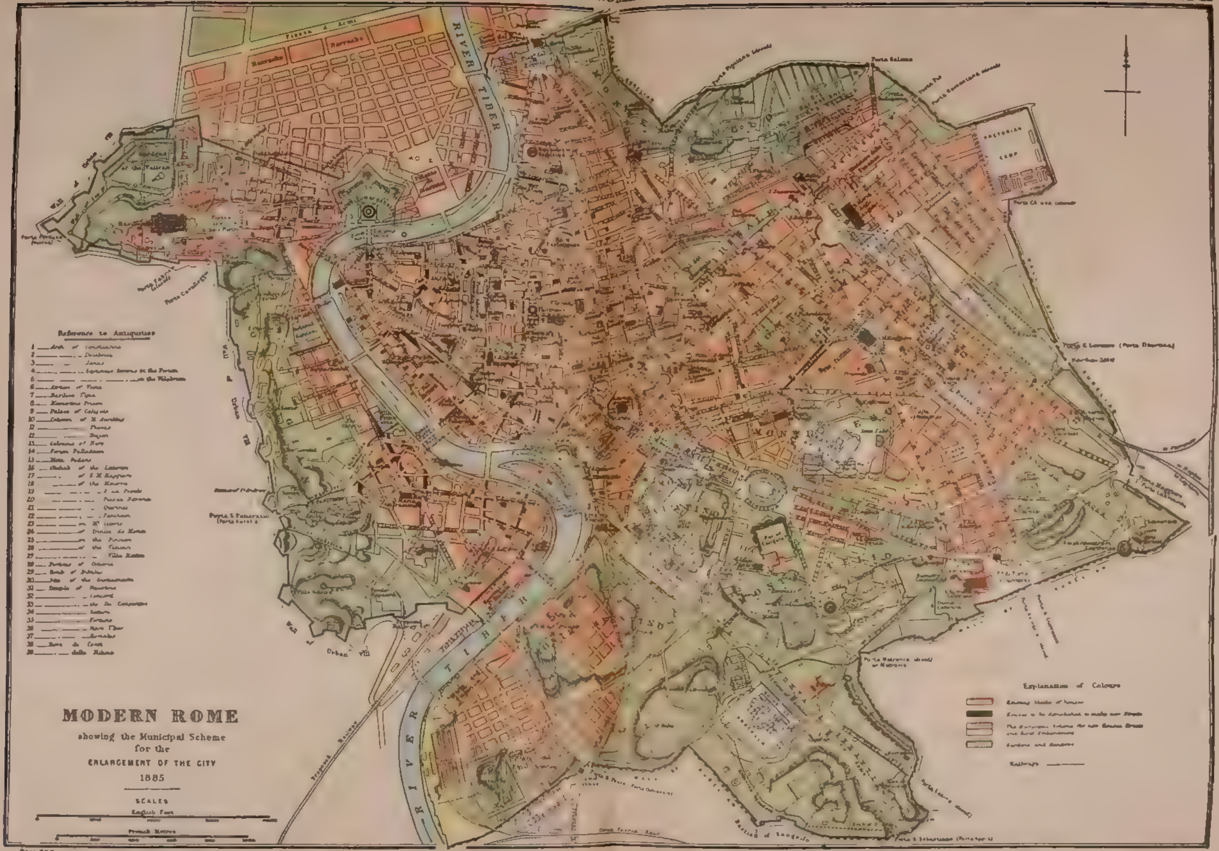
[2] The bridges were specially under the care of the pontifex maximus, at least till the later years of the republic (Varro, *L. L.*, v. 83).

[3] See Piale, "Antic. Ponti," in *Atti d. Pont. Accad.*, 1831; and Becker, *De Muris et Portis*, Leipsic, 1842.

[4] See Jordan, *For. Urb. Rom.*, Berlin, 1875. Besides the works of Preller, Jordan, and Uhlrichs, the regionary catalogues of buildings are given by Nardini, *Rom. Ant.*, ed. Nibby, 1818-20, the whole of which valuable work is arranged in accordance with these lists.

[5] Vopiscus, *Aurel.*, 21, 39; Zosimus, i. 37, 49; Eutrop., ix. 15.

[6] The inscriptions run thus—S . P . Q . R . IMPP . CAESS . D . D . INVICTISSIMIS . PRINCIPIBVS . ARCADIO . ET HONORIO . VICTORIBVS . AC . TRIVMPHATORIBVS . SEMPER . AVGG . OB . INSTAVRATOS . VRBIS . AETERNAE . MVROS . PORTAS . AC . TVRRES . EGESTIS . IMMENSIS . RVDERIBVS. . . .—the rest refers to honorary statues erected to commemorate this work.



MODERN ROME

showing the Municipal Scheme
for the
ENLARGEMENT OF THE CITY
1885

foot of the Pincian Hill, is formed by remains of a lofty and enormously massive building, faced with fine opus reticulatum of the 1st century B.C. Owing to the sinking of the foundation this is very much out of the perpendicular, and was known as the "murus tortus" at a very early time.[1] What this once important building was is uncertain. It has been supposed to belong to the tomb of the Domitii (Suet., *Dom.*, 2), but on scanty grounds. Two archways which form gates in the Aurelian wall are of much earlier date. The Porta Maggiore consists of a grand triple arch of the Claudian aqueduct built in travertine. The P. S. Lorenzo is a single travertine arch, built by Augustus where the aqueduct carrying the Aqua Marcia, Tepula, and Julia crossed the Via Tiburtina. The inner gateway, built of massive travertine blocks by Honorius, was pulled down by Pius IX. in 1868 for the sake of the material.[2]

Literature.—Probably no archæological subject has so copious a literature as that dealing with the topography of Rome; much of this, however, has been rendered obsolete by subsequent discoveries. The reader who wishes to study the subject in a fairly concise form will find the following books the most useful.[3] Nardini, *Roma Antica*, ed. Nibby, 1818-20; Nibby, *Antichità di Roma*, 1830, and *Roma nell' Anno 1838*, 1839; Becker, *Handbuch der römischen Alterthumer*, Leipsic, 1843 (of special value from its numerous references to classical authors); Reber, *Die Ruinen Roms*, Leipsic, 1863; Bunsen and others, *Beschreibung der Stadt Rom*, Stuttgart, 1829-42, and the abridgment of this work by Platner and Uhlrichs, 1844; Von Reumont, *Geschichte der Stadt Rom*, Berlin, 1867-70; Jordan, *Topographie der Stadt Rom*, Berlin, 1871 (in progress, a work of great value); Burn, *Rome and the Campagna*, London, 1870 (by far the best work in English, both from its illustrations and very able text); Dyer, *The City of Rome*, London, new ed., 1883 (a compact work, useful for reference). The very large and magnificently illustrated works by Canina must be used with great caution; they contain imaginative restorations rather than accurate representations of what really exists; even those drawings which profess to give the existing remains are rendered of little value by their numerous inaccuracies. The chief of Canina's works are *Indicazione di Roma Antica*, 1830; *Esposizione topografica*, 1842; *Edifizj di Roma Antica*, 1848-56; *Foro Romano*, 1845; and *Architettura Antica*, 1834-44.

The student who wishes to enter into the subject in detail and form independent opinions will have an enormous mass of literature to wade through. (1) First, of course, come various classical authors, frequently cited above; the *Monumentum Ancyranum*, ed. Mommsen, Berlin, 1883, and other ancient inscriptions. (2) Second in importance come various documents of the decadence and early Middle Ages:—the *Notitia* and *Curiosum Urbis Romæ*, printed by Preller in his *Regionen der Stadt Rom*, Jena, 1846; the *Mirabilia Romæ*, ed. Parthey, Berlin, 1869; *Graphia Aureæ Urbis*, ed. Ozanam in *Documents inédits*, Paris, 1850; *Catalogus Viennensis Imp. Rom.*, published by Eccard; *Descriptio Regionum Romæ*, Einsiedeln MS., ed. Haenel in *Archiv für Philologie*, v. 115, Berlin, 1837; *Ordo Romanus*, ed. Fea in *Dissertazioni*, &c., 1830; the *Codex Topog. Urbis Romæ*, ed. Uhlrichs, Würzburg 1871 (contains these and extracts from other mediæval sources); Paulus Diaconus, *Excerpta ex Lib. Pomp. Festi*, ed. Müller, Leipsic, 1839; Anastasius Bibliothecarius, *De Vitis Rom. Pont.*, ed. Branchini, 1718. The various commentators on Virgil known under the general name of *Servius* give many valuable notes on Roman topography; an excellent edition of these is being produced by Thilo and Hagen, Leipsic, 1881-85. (3) Thirdly we have a large number of works, mostly illustrated, produced from the 15th to the 18th century, the value of which is frequently very great from the fact that they describe a large number of ancient monuments which no longer exist. Some of these, especially those earliest in date, exist only in MS. in the libraries of the Vatican, the Uffizi, Milan, and elsewhere; a very valuable MS. of Ligorio (16th century) is preserved in the Bodleian at Oxford. Among these MSS. are drawings of ancient buildings by Raphael, Bramante, Bramantino, Baldassare, Sallustio Peruzzi, Andrea Sansovino, Palladio, and in fact by nearly all the great architects of the 16th century.

Works of 15th and 16th Centuries.—Biondo, *Roma Ristaurata*, Venice, 1543 (MS. of 1431-39); Poggio, *De Fortunæ Varietate* (MS. of about 1440), Basel, 1538; Bramantino, *Rovine di Roma* (MS., 1503-13, in Bibl. Ambros., Milan), ed. by Mongeri, Milan, 1875; Albertini, *Opusc. de Mirab. Urbis Romæ*, 1509; Pomp. Leto, *De Vetustate Urbis*, 1523; And. Fulvius, *Antiquaria Urbis*, Venice, 1527; Calvus, *Antiquæ Urbis Romæ Simulachrum*, 1532; Marlianus, *Urbis Romæ Topog.*, 1544; Palladio, *L'Architettura*, Venice, 1542, and *Le Terme dei Romani*, printed first in London, 1732; Serlio, *Architettura*, Venice, 1545, bk. iii.; L. Fauno, *Antichità di Roma*, 1548; Labacco, *Architettura ed Antichità*, 1557; L. Mauro, *Antichità di Roma*, Venice, 1558; Ligorio, *Effigies Antiq. Romæ*, 1561; Gamucci, *Antichità di Roma*, Venice, 1565; Dosius, *Urbis Romæ Ædificia*, 1569; Du Perac, *Vestigj di Roma*, 1575; Fabricius, *Romæ Antiq.*, 1587; Vacca, *Varie Antichità*, 1594, printed in Nardini, ed. Nibby, in *Roma Antica*, vol. iv., 1818-20; Müntz, *Un Plan de Rome au XVme Siècle* (Soc. Nat. des Antiquaires), Paris, April 1880. *17th Century.*—Crechi, *Antichità di Roma*, 1601; Laurus, *Antiq. Urbis Splendor*, 1612; Maggius, *Ædificia et Ruinæ Romæ*, 1618; Felini, *Alma Città di Roma*, 1625; Scamozzi, *L'Antichità di Roma*, 1632; Franzini, *Roma Ant. e Mod.*, 1653; Desgodetz, *Édifices Antiques de Rome*, 1682; Ciampini, *Vetera Monumenta*, 1690; Bartoli, *Admiranda Rom. Vestigia*, 1693; De Rubeis, *Romæ Magnif. Monum.*, 1699. *18th Century.*—Pinarole, *Antichità di Roma*, 1709, and *Vestigi di Roma*, 1744; Donatus, *Roma Vetus*, 1725; Bianchini, *Pal. dei Cesari*, 1738. The magnificent etchings by Piranesi are of great value; the copperplates (in a much damaged state) still exist, and are worked by the Calcografia Camerale. They are grouped in folio vols. entitled *La Magnificenza dei Romani*, 1761-64; *L'Antichità Romana*, 1756; and other works. See further Bellori, *Ichnographia Vet. Romæ*, 1764; Venuti, *Vet. Monumenta*, 1778, and *Descriz. Topog. di Roma*, 1824; Guattani, *Monum. Antiq. ined.*, 1784-89, and *Roma descritta*, 1805. *19th Century.*—Many articles of great value occur in the following periodicals—*Annali*, *Bullettino*, and *Monumenti dell' Instituto di Corris. Archæo. di Roma*, 1829 (in progress); *Atti dell' Accad. Rom. di Arch.*, 1821; *Atti della R. Accad. dei Lincei* (in progress); *Bullettino della Commissione Arch. Mun. di Roma*, 1872 (in progress); *Notizie degli Scavi*, 1876 (in progress). See also Valadier, *Le più insigni Fabbriche di Roma*, 1810-26; Rossini, *Antichità di Roma*, 1817, large plates; Fea, *Ragionamento* and other works, 1821-33; Taylor and Cresy, *Archit. Antiq. of Rome*, London, 1821; Romanis, *Vestigie di Rom. Ant.*, 1832; Gell, *Topography of Rome*, London, 1834; Donovan, *Rome Ancient and Modern*, 1842; Becker, *Die romische Topographie*, Leipsic, 1844; Zestermann, *De Basilicis*, Brussels, 1847; Braun, *Die Ruinen und Museen Roms*, Berlin, 1854; Ampère, *Histoire Romaine*, Paris, 1862-64; Zinzow, *Das älteste Rom*, Pyritz, 1866; Parker, *Photographs illustrating the Arch. of Rome*, Oxford, 1867; Friedländer, *Sittengeschichte Roms*, Leipsic, 1869, and *Darstellungen aus der Sittengesch. Roms*, Leipsic, 1881; Wey, *Description de Rome*, Paris, 1871; Gsell-Fels, *Römische Ausgrabungen*, Hildburghausen, 1870; Jordan, *Forma Urbis Romæ*, Berlin, 1875, with supplement of 1883, and *Novæ Quæstiones Topog.*, Königsberg, 1868; Lanciani, *I Commentarii di Frontino*, 1880, and *Dissertazioni Archæo.*, 1876-85; De Rossi, *Note di Topog. Rom.*, 1882; Duruy, *Histoire des Romains*, Paris, 1878-84, well illustrated; J. H. Middleton, *Ancient Rome in 1885* (A. & C. Black, Edinburgh), 1885. MAPS.—Nolli's map of ancient Rome, 1748, is largely followed by Canina in his large map in many plates, 1850; Moltke, *Carta Topog. di Roma*, Berlin, 1852; Rieu, *Rom. Vet. Ychnographia*, Lyons, 1863; good maps of ancient and modern Rome together are contained in the guides of Gsell-Fels, Baedeker, and Murray; an excellent map of ancient Rome is given by Burn, *Rome and the Campagna*, London, 1870.

CHRISTIAN ROME.

1. *From the 4th to the 12th Century.*

The era of church building in Rome may be said to begin with the reign of Constantine and the peace of the church. Before then Christian worship was conducted with various degrees of secrecy either in private houses or in the CATACOMBS (*q.v.*), according as the reigning emperor viewed the sect with tolerance or dislike. The type of church which in the beginning of the 4th century was adopted with certain modifications from the pagan basilica, though varying much in size, had little or no variety in its general form and arrangement. One fixed model was strictly adhered to for many centuries, and, in spite of numberless alterations and additions, can be traced in nearly all the ancient churches of Rome.

Fig. 26 shows a typical example, omitting all later changes.[4] The plan is that of the lower church of S. Clemente, built in the 4th century, probably in the reign of Constantine; an existing inscription records its restoration by S. Siricius (384-398). The fittings, altar, choir-screen, &c., are not now *in situ*, but were moved into the upper church when that was built, between 1100 and 1118. They were then rather carelessly put together, and the proper positions of the gospel and the epistle ambo reversed. The figure shows these fittings replaced in the ancient church as they originally stood; they are rather later than the building itself, being made under Pope John, probably the second of that name (532-535); his monogram is sculptured on the marble slabs which form the low walls of the choir. In the 13th century ornaments of mosaic inlay were added on these 6th-century screens by one of the Cosmati. The baldacchino which now exists in the upper church is of *c.* 1100, but two of the columns of a much older canopy are preserved by being used in the construction of a fine 15th-century tomb near the high altar. These have richly carved caps of semi-classical style, and, as well as the high altar, have an inscription recording their gift to the church by the priest Mercurius in the pontificate of Hormisdas (514-523). The paintings of the 9th century, and even earlier, which cover the walls of the lower church are among the most important existing specimens of early Christian art.[5]

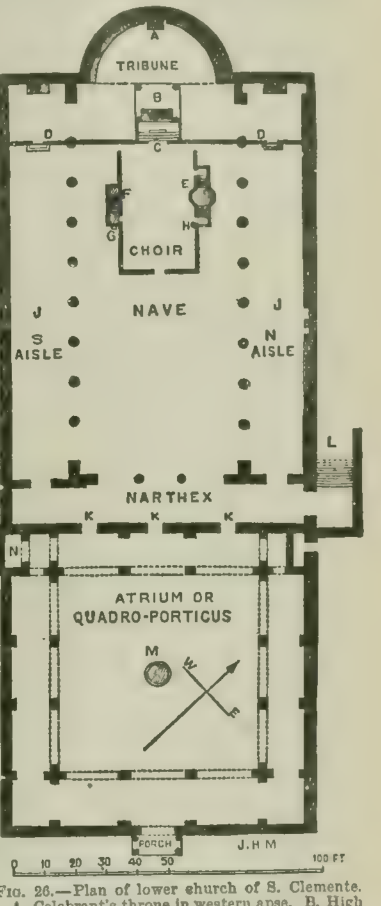


FIG. 26.—Plan of lower church of S. Clemente. A. Celebrant's throne in western apse. B. High altar and baldacchino. C. Stairs down to confessio. D, D. Side doors in screen. E. Gospel ambo. F. Epistle ambo. G. Lectern. H. Paschal candlestick. J, J. Aisles. K. Doors at east end. L. Stairs to upper church. M. Fountain of ablution. N. Campanile.

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[1] Procop., *Bell. Goth.*, i. 23.

[2] See Becker, *De Rom. Muris et Portis*, Leipsic, 1842; Nibby and Gell, *Le Mura di Roma*, 1820; Quarenghi, *Le Mura di Roma*, 1880; Burn, *Rome and the Campagna*, 1870, with other general works mentioned above.

[3] In the list given above all books are printed in Rome unless otherwise described.

[4] The plan of the upper church of S. Clemente is shown under BASILICA, fig. 13, vol. iii. p. 417; other plans of early basilicas are given in the same article.

[5] See Mullooly, *S. Clement and his Basilica*, Rome, 1869; De Rossi, in *Bull. Arch. Crist.*, 1863, 1865, 1867, especially 1870, pt. iv.

The typical church was a simple rectangular building, with or without aisles, having a large apse at the west end, and at the east three doors opening from a cloister-like atrium;[1] when space was limited three sides of the atrium were omitted, leaving only a long pillared narthex or porch which extended along the whole width of the nave. The apse or presbyterium, which was raised above the nave, contained a central marble throne for the celebrant and a long bench for the rest of the clergy. The high altar stood a little forward from the apse; and over it was a square canopy or baldacchino supported on four marble columns; each of the four arches of the canopy had a curtain, which was drawn close during the consecration of the elements; at other times these curtains were twisted round the four columns of the baldacchino. The celebrant stood with his back to the apse, looking eastwards towards the people over the altar.[2] The high altar stood over the tomb of some saint or confessor, hence called the "confessio"; this was so arranged as to be at least partly visible, and usually was reached by a few steps descending from the nave. In later times the confessio became frequently a spacious crypt containing a small altar of its own. At this point cancelli or marble screens ran across the whole width of the church, both nave and aisles; and hence the part thus railed off was called the "chancel." The choir occupied most of the western half of the nave, and was raised one step above it; it was completely surrounded by a low marble wall or screen, along two sides of which a marble bench was fixed. On the right[3] was the gospel ambo, its marble book-rest usually distinguished by a sculptured eagle, and beside it the tall paschal candlestick. On the left was the epistle ambo.[4] The font was frequently an ancient marble or porphyry bath, as in the Lateran baptistery and that of S. Maria Maggiore; but in early times an ordinary parish church had no font; baptisms were only performed in one or two of the great basilicas, and then in a separate building, usually octagonal in shape. In the centre of the open atrium stood a fountain for ablutions performed before entering the church, as in an Oriental mosque.

Con-struction. The walls of these early churches were mostly built of concrete, faced with brick, left structurally quite plain, and decorated only with painted stucco or glass mosaics,—especially (internally) in the apse and on the face of its arch, and (externally) on the east or entrance wall, the top of which was often built in an overhanging curve to keep off the rain. The windows were plain, with semicircular arches, and were filled with pierced marble screens, or in some cases with slabs of translucent alabaster; the latter was the case at S. Lorenzo fuori le Mura, and examples of the former still exist in the very early church formed in the rooms of some thermæ on the Esquiline (possibly those of Trajan), below the 6th-century church of S. Martino ai Monti. Almost the only bit of external architectural ornament was the eaves cornice, frequently (as at the last-named church) formed of marble cornices stolen from earlier classical buildings. Internally the nâve columns, with their capitals and bases, were usually taken from some classical building, and some churches are perfect museums of fine sculptured caps and rich marble shafts of every material and design.[5] At first the nave had no arches, the columns supporting a horizontal entablature, as at S. Clemente, S. Maria Maggiore, and S. Maria in Trastevere, but afterwards, in order to widen the intercolumniation, simple round arches of narrow span were introduced, thus requiring fewer columns. The roof was of the simple tie-beam and kingpost construction, left open, but decorated with painting or metal plates. The floor was paved either with coarse mosaic of large tesseræ (as at S. Pudentiana) or with slabs of marble stripped from ancient buildings. A later development of this plan added a small apse containing an altar at the end of each aisle, as in S. Maria in Cosmedin and S. Pietro in Vincoli.[6]

Circular churches. The type of church above described was used as a model for by far the majority of early churches not only in Rome but also in England, France, Germany, and other Western countries. Another form was, however, occasionally used in Rome, which appears to have been derived from the round temple of pagan times. This is a circular building usually domed and surrounded with one or more rings of pillared aisles. To this class belong the combined church and mausoleum of Costanza (see fig. 27) and that of SS. Marcellinus and Petrus, both built by Constantine, the former to hold the tomb of his daughters Constantia and Helena, the latter that of his mother Helena. The latter is on the Via Labicana, about 2 miles outside Rome; it is a circular domed building, now known as the Torre Pignattara, from the *pignatte* or amphoræ built into the concrete dome to lighten it. The mausoleum of S. Costanza, close by S. Agnese fuori, is also domed, with circular aisle, or rather ambulatory, the vault of the latter decorated with mosaic or classical style (see Mosaic, vol. xvi. p. 852). The red porphyry sarcophagi, sculptured richly with reliefs, from these mausolea are now in the Vatican. On a much larger scale is the church of S. Stefano Rotondo on the Cœlian, built by Pope Simplicius (468-483), with a double ring of pillared aisles, the outer one of which was pulled down and a new enclosure wall built by Nicholas V. Other round churches are S. Teodoro (by the Vicus Tuscus), of the 8th century, and S. Bernardo, which is one of the domed halls of Diocletian's thermæ, consecrated as a church in 1598.

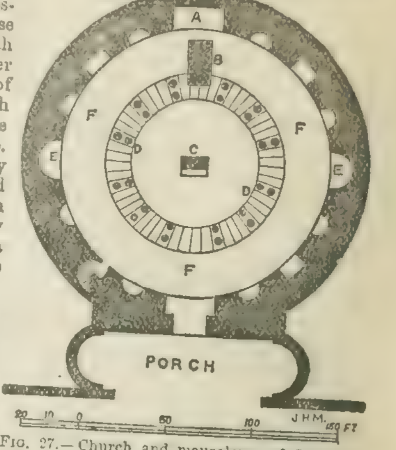

Fig. 27.—Church and mausoleum of Costanza. A. Recess for altar. B. Porphyry slab in floor where the tomb stood. C. Modern altar. D, D. Slabs of white marble, part of ancient paving. E, E. Recesses with mosaics. F, F. Ambulatory with mosaic vault.

Space will not allow any individual description of the very numerous and important churches in Rome which are built on the above-described plan. The principal examples are these:[7]—S. Pudentiana, traditionally the oldest in Rome, rebuilt by Adrian I. (772-795); S. Sabina, 5th century; S. Vitale, 5th century, founded by Innocent I. (402-417); S. Martino ai Monti, 500; S. Balbina, 6th century; church of Ara Cœli, founded in 6th century as S. Maria in Capitolio; S. Giorgio in Velabro, rebuilt by Leo II. (682-683); S. Cesareo, 8th century; S. Maria in Via Lata, built by Sergius I. (687-701); S. Crisogono, rebuilt in 731 by Gregory III.; S. Maria in Cosmedin and S. Giovanni ad Portam Latinam, both rebuilt *c.* 772 by Adrian I.; S. Maria in Domnica, rebuilt by Paschal I. (817-824), who also rebuilt S. Cecilia in Trastevere *c.* 821 and S. Prassede in 822; S. Marco, rebuilt by Gregory IV. in 833; S. Maria Nuova, founded by Nicholas I. (858-867), now called S. Francesca Romana; S. Anastasia, founded in the 4th, rebuilt in the 10th century; S. Bartolomeo in Isola and the church of the Quattro Santi Incoronati, built by Paschal II. about 1113; and S. Maria in Trastevere, rebuilt by Innocent II. in 1139.[8]

Though the apses and classical columns of the naves in these churches were built at the dates indicated, yet in many cases it is difficult to trace the existence of the ancient walls; the alterations and additions of many centuries have frequently almost wholly concealed the original structure. With the exception of S. Clemente, the early choir, placed as shown in fig. 26, has invariably been destroyed; the side walls have often been broken through by the addition of rows of chapels; and the whole church, both within and without, has been overlaid with the most incongruous architectural features in stucco or stone. The open roof is usually concealed either by a wooden panelled ceiling or by a stucco vault. The throne[9] and marble benches in the apse have usually given place to more modern wooden fittings, to suit the later position of the choir, which has always been transferred from the nave to the apse. In many cases the mosaics of the apse and the columns of the nave are the only visible remains of the once simple and stately original church.[10]

2. *From 1200 to 1450; and the Papal Palaces.*

The 10th and 11th centuries in Rome were extraordinarily barren in the production of all branches of the fine arts, even that of architecture; and it was not till the end of the 12th that any important revival began. The 13th century was, however, one of great artistic activity, when an immense number of beautiful works, especially in marble enriched with mosaic, were produced in Rome. This revival, though on different lines, was very similar to the rather later one which took place at Pisa (see Pisano), and, like that, was mainly due to the great artistic talents of one family,—the

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[1] The complete atrium or quadro-porticus now very rarely exists; the churches of S. Prassede and S. Cecilia in Trastevere still have it in a modernized form, and so has the church of the Quattro Santi Incoronati, which also possesses the triforium galleries, like those of S. Agnese fuori.

[2] The custom (adopted some centuries later) of the celebrant standing between the altar and the people necessitated a reversal of orientation, and the high altar was then placed at the east end.

[3] "Right" and "left" are here used of one facing the high altar.

[4] An analogous arrangement of the coro (choir) in most of the Spanish cathedrals, in which it occupies a great part of the nave.

[5] S. Lorenzo and S. Agnese fuori, S. Maria in Trastevere, Ara Cœli, and numberless other churches are very rich in this respect.

[6] G. G. Scott (*Church Architecture*, London, 1881) gives a valuable account of the arrangements of early churches; see also Hübsch, *Altchristlichen Kirchen*, Carlsruhe, 1862. The three apses are common in Eastern churches.

[7] For the early church of SS. Cosmo e Damiano, see above, fig. 19.

[8] This list does not include the great basilicas of Rome, for which see Basilica, vol. iii. p. 412.

[9] Some of these marble thrones which still exist are very interesting relics of Hellenic art, much resembling the existing seats in the theatre of Dionysius at Athens, whence probably some of those in Rome were brought in classical times. Examples of these Greek thrones exist at S. Pietro in Vincoli, S. Stefano Rotondo, and in the Lateran cloister.

[10] See Nesbitt, "Churches in Rome earlier than 1150," in *Archæologia*, vol. xl., 1866.

Cosmati,[1] seven members of which, for four generations, were skilful architects, sculptors, and mosaicists.

The following are the names and dates known from existing inscriptions :—

Lorenzo (born in the second half of the 12th centw
|
Jacopo (dated works 1205 and 1210).
|
Cosimo (,, ,, 1210-35).
|

Luca	Jacopo	Adeodato	Giovanni
(1231 and 1235).	(1231-1293).	(1294).	(1296 and 1303).

Their principal works in Rome are :—ambones of S. Maria in Ara Cœli (Lorenzo) ; door of S. Saba, 1205, and door with mosaics of S. Tommaso in Formis (Jacopo) ; chapel of the Sancta Sanctorum, by the Lateran (Cosimo) ; pavement of S. Jacopo alla Lungara, and (probably) the magnificent episcopal throne and choir-screen in S. Lorenzo fuori le Mura, of 1254 (Jacopo the younger) ;[2] baldacchino of the Lateran and of S. Maria in Cosmedin, *c.* 1294 (Adeodato) ; tombs in S. Maria sopra Minerva (*c.* 1296), in S. Maria Maggiore, and in S. Balbina (Giovanni). A large number of other works by members and pupils of the same family, but unsigned, exist in Rome. These are mainly altars and baldacchini, choir-screens, paschal candlesticks, ambones, tombs, and the like, all enriched with sculpture and glass mosaic of great brilliance and decorative effect.

Besides the more mechanical sort of work, such as mosaic patterns and architectural decoration, they also produced mosaic pictures and sculpture of very high merit, especially the recumbent effigies, with angels standing at the head and foot, in the tombs of Ara Cœli, S. Maria Maggiore, and elsewhere. One of their finest works is in S. Cesareo ; this is a marble altar richly decorated with mosaic in sculptured panels, and (below) two angels drawing back a curtain (all in marble) so as to expose the open grating of the confessio. The magnificent cloisters of S. Paolo fuori le Mura, built about 1285 by Giovanni, the youngest of the Cosmati, are one of the most beautiful works of this school. The baldacchino of the same basilica is a signed work of the Florentine Arnolfo del Cambio, 1285, "cum suo socio Petro," probably a pupil of the Cosmati. Other works of Arnolfo, such as the Braye tomb at ORVIETO (*q.v.*), show an intimate artistic alliance between him and the Cosmati. The equally magnificent cloisters of the Lateran, of about the same date, are very similar in design ; both these triumphs of the sculptor-architect's and mosaicist's work have slender marble columns, twisted or straight, richly inlaid with bands of glass mosaic in delicate and brilliant patterns. The shrine of the Confessor at Westminster is a work of this school, executed about 1268 (see MOSAIC). The general style of works of the Cosmati school is Gothic in its main lines, especially in the elaborate altar-canopies, with their pierced geometrical tracery. In detail, however, they differ widely from the purer Gothic of northern countries. The richness of effect which the English or French architect obtained by elaborate and carefully worked mouldings was produced in Italy by the beauty of polished marbles and jewel-like mosaics,—the details being mostly rather coarse and often carelessly executed.

Campanili

Chiefly to the 13th century belong the large number of beautiful campanili, which are the most conspicuous relics of the mediæval period in Rome. The finest of these are attached to the churches of S. Maria Nuova, SS. Giovanni e Paolo, and S. Maria Maggiore. Others belong to the basilicas of S. Lorenzo fuori and S. Croce in Gerusalemme, and to S. Giorgio in Velabro, S. Maria in Cosmedin, S. Alessio, S. Giovanni ad Portam Latinam, S. Cecilia, S. Crisogono, and S. Pudentiana. They occupy various positions with regard to the church, being all later additions ; that of SS. Giovanni e Paolo stands at some distance from it. In design they are very similar, consisting of many stages, divided by brick and marble cornices ; in the upper stories are from two to four windows on each side, with round arches supported on slender marble columns. They are decorated with brilliantly coloured *ciotole* or disks of earthenware, enamelled and painted in green or turquoise blue, among the earliest existing specimens of the so-called majolica (see POTTERY, vol. xix. p. 624 *sq.*). Sometimes disks or crosses made of red or green porphyry are inlaid in the walls. In most cases on one face of the top story is a projecting canopied niche, which once contained a statue or mosaic picture. The walls are built of fine neat brickwork. One campanile (that of S. Maria Maggiore), the largest and once the handsomest of all, has string-courses of enamelled and coloured terra-cotta. The slender columns of the windows have often proved insufficient to support the weight, and so many of the arches are built up.[3]

Though but little used for churches, the Gothic style, in its modified Italian form, was almost universally employed for domestic architecture in Rome during the 13th and 14th centuries. Tufa or brick was used for the main walls, the lowest story being often supported on an arcade of pointed arches and marble columns. The windows were usually formed of large marble slabs with trefoil-shaped heads or cusped arches. As a rule the upper stories projected slightly over the lower wall, and were supported on small ornamental machicolations. The top story frequently had an open loggia, with rows of pointed arches. When vaulting was used it also was of the pointed form, usually in simple quadripartite bays, with slightly moulded groin-ribs. The finest existing specimen of this style is the palace built about 1300 by Boniface VIII. (Gaetano family), enclosing the tomb of Cecilia Metella on the Via Appia, with a graceful little chapel within the precincts of the castle. This building is very worthy of study ; the remaining part is well preserved. Many houses of this period, though generally much injured by alterations, still exist in Rome. They are mostly in out-of-the-way alleys, and, not being mentioned in any books, are seldom examined. The Ghetto and the quarter near the Ponte Rotto contain many of these interesting buildings, as well as some of the most crowded parts of the Trastevere district ; all are rapidly disappearing under the wholesale destruction of old streets now in progress. Among those which may possibly escape for a while is the 13th-century house where Giulio Romano lived, near the Palazzo di Venezia, and the Albergo del Orso, at the end of the Via di Tordinona, of the same period, which was an inn in the 16th century and is one still ; this has remains of a fine upper loggia, with rich cornices in moulded terra-cotta ; the lowest story has pointed vaulting resting on many pillars. Another graceful but less stately house exists, though sadly mutilated, opposite the entrance to the atrium of S. Cecilia in Trastevere.[5] Very few now remain of the once numerous lofty towers built by the turbulent Roman barons for purposes of defence. The finest, the Torre della Milizia on the Viminal, was built in the 13th century by the sons of Petrus Alexius ; of about the same date is the Torre dei Conti, near the forum of Augustus, built by Marchione of Arezzo ; both these were once much higher than they are now ; they are very simple and noble in design, with massive walls faced with neat brickwork, much resembling that of the 2d century.

Lateran palace

Till the 14th century the Lateran was the usual residence of the pope ; this was once a very extensive building, covering four times its present area. The original house is said to have belonged to the senator Plautius Lateranus in the reign of Nero ; but the existing part on the line of the Aurelian wall is of the 3d century. This house, which had become the property of the emperors, was given by Constantine as a residence for S. Sylvester ; it was very much enlarged at many periods during the next ten centuries ; in 1308 a great part was burnt, and in 1586 the ancient palace was completely destroyed by Sixtus V., and the present palace built by Domenico Fontana. The Cappella Sancta Sanctorum (see list of Cosmati works) is the only relic of the older palace.[6] The present palace has never been used as a papal residence ; in the 18th century it was an orphan asylum, and is now a museum of classical sculpture and early Christian remains.

The Vatican.

The Vatican palace also appears to have originated in a house which existed in the time of Constantine. This was rebuilt by Innocent III. (*c.* 1200) and enlarged by Nicholas III. (1277-80). It did not, however, become the fixed residence of the popes till after the return from Avignon in 1377. In 1415 John XXIII. connected the Vatican and the castle of S. Angelo by a covered passage carried on arches. But little of the existing palace is older than the 15th century ; Nicholas V. in 1447 began its reconstruction on a magnificent scale, and this was carried on by Sixtus IV. (Sistine chapel), Alexander VI. (Appartamenti Borgia), Julius II. and Leo X. (Bramante's cortile and paintings by Raphael), and Paul III. (Sala Regia and Cappella Paolina by Antonio da Sangallo). Sixtus V. and his successors built the lofty part of the palace on the east of Bramante's cortile. The Scala Regia was built by Bernini for Urban VIII., the Museo Pio-Clementino under Clement XIV. and Pius VI., the Braccio Nuovo under Pius VII., and lastly the grand stairs up to the cortile were added by Pius IX.

The Quirinal palace, now occupied by the king of Italy, is devoid of architectural merit. It stands on the highest part of the hill, on the site of part of the baths of Constantine. This palace was begun in 1574, under Gregory XIII., by Flaminio Ponzio, and was completed by Fontana and Maderna under subsequent popes.

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[1] An excellent account of the Cosmati is given by Boito, *Architettura del Medio Evo*, Milan, 1880, pp. 117-182.

[2] The chief signed works of Jacopo and his brother Luca are at Anagni and Subiaco.

[3] See De Montault, *Les Cloches de Rome*, Arras, 1874.

[4] For many centuries wall-facing of small tufa stones was used, *e.g.*, in the mediæval part of the Capitol ; this was called "opera saracenesca" from its supposed adoption from the Saracens ; it is largely employed in the walls and towers of the Leonine city, built by Leo IV. (848-852) to defend the Vatican basilica and palace against the inroads of the Moslem invaders. The greater part of this wall is now destroyed and built over, but a long piece with massive circular towers well preserved exists in the gardens of the Vatican.

[5] The house of Crescentius, popularly called the "house of Rienzi," near the Ponte Rotto, is perhaps the sole relic of the domestic architecture of an earlier period,—the 11th century. Its architectural decorations are an extraordinary mixture of marble fragments of the most miscellaneous sort, all taken from classical buildings ; it has a long but somewhat unintelligible inscription over the doorway.

[6] The great mosaic in the adjacent apse is a modern copy of that which once decorated the triclinium of Leo III. (795-816).

The only important church in Rome which is wholly Gothic in style is S. Maria sopra Minerva, the chief church of the Dominican order. This was not the work of a Roman architect, but was designed by two Dominican friars from Florence—Fra Ristoro and Fra Sisto—about 1289, who were also the architects of their own church of S. Maria Novella. It much resembles the contemporary churches of the same order in Florence, having wide-spanned pointed arches on clustered piers and simple quadripartite vaulting. Its details resemble the early French in character.[1] It contains a large number of fine tombs; among them that of Durandus, bishop of Mende (the author of the celebrated *Rationale divinorum officiorum*), by Giovanni Cosmas, *c.* 1300, and the tomb of Fra Angelico, the great Dominican painter, who died in Rome, 1455. The most elaborate specimen of ecclesiastical Gothic in Rome is that part of S. Maria in Ara Cœli which was rebuilt about 1300, probably by one of the Cosmati, namely, the south aisle and transept. For at least two centuries after the death of Giovanni Cosmas no native Roman appears to have excelled in any branch of the fine arts. The sculptured effigy and reredos of Cardinal Alençon in S. Maria in Trastevere, executed about 1400 by a certain Paulus Romanus, is a fair example of the decadence which took place during this period; the effigy is a very clumsy and feeble copy of the fine recumbent figures of the Cosmati.

3. *Florentine Period, c. 1450-1550.*

The long period of almost complete artistic inactivity in Rome was broken in the 15th century by the introduction of a number of foreign artists, chiefly Florentines, who during this and the succeeding century enriched Rome with an immense number of magnificent works of art. The dawn of this brilliant epoch may be said to have begun with the arrival of Fra Angelico (see FIESOLE) in 1447, invited by Nicholas V. to paint the walls of his small private chapel in the Vatican dedicated to S. Lorenzo.

Mino da Fiesole.

To Mino da Fiesole (see MINO DI GIOVANNI, vol. xvi. p. 477), who spent several years in Rome between 1470 and 1484, and other Florentine sculptors are due almost all the very beautiful sculptured tombs which were made for a large number of the Roman churches during the last thirty years of the 15th century, as well as many altar frontals, reredoses, tabernacles, and the like. Though varied in details, most of these tombs are designed after one type, that employed by Mino in his fine monuments in the Badia at Florence. A life-sized recumbent effigy lies on a richly ornamented sarcophagus, over which is an arched canopy decorated with reliefs; the piers which support this (usually) have statuettes in two or more tiers. For grace and refined beauty no type of sepulchral monument has ever equalled this Florentine design. The peaceful attitude and calm face of the effigy are frequently of the most perfect beauty, and the minute statuettes and reliefs are finished with ivory-like delicacy. Though the influence of Mino, very strongly marked, may be traced in all these numerous works (there are in Rome more than a hundred tombs of this class), yet a very small proportion can be actually by his hand. Mino created and trained a large school of sculptor-pupils in Rome, some of whom appear almost to have equalled their master in skill; and it is to them that most of these works must be referred. A very long list of churches containing sculpture of this class might be given; perhaps the richest are S. Maria in Monserrato (the cloisters) and S. Maria del Popolo.[2]

The architecture no less than the sculpture of the latter part of the 15th century was mainly the work of Florentines, especially of Baccio Pintelli, who partly rebuilt S. Maria del Popolo, S. Agostino,[3] and S. Cosimato in Trastevere. He also was the architect of S. Pietro in Montorio, erected in 1500 for Ferdinand and Isabella of Spain, and probably designed the Sistine chapel for Sixtus IV. in 1473. Other buildings were carried out by another Florentine, Giuliano da Majano (see Ferrerio, *Palazzi di Roma*, 1825). The Palazzo di Venezia, begun for Cardinal Barbo, afterwards Paul II., about 1455, a very massive and stately building of mediæval character, was designed by Francesco di Borgo San Sepolcro.

During the latter part of the 15th and the first few years of the succeeding century Rome was enriched with a number of buildings by BRAMANTE (*q.v.*), one of the greatest architects the world has ever seen. With the most consummate skill, he combined the delicacy of detail and the graceful lightness of the Gothic style with the measured stateliness and rhythmical proportions of classic architecture. Though he invariably used the round arch and took his mouldings from antique sources, his beautiful cloisters and loggie are Gothic in their general conception. Moreover, he never committed the prevalent blunder of the 16th century, which was a fruitless attempt to obtain magnificence by mere size in a building, without multiplying its parts. His principal works in Rome are the magnificent Palazzo della Cancelleria, built for Cardinal Riario in 1495, with its stately church of S. Lorenzo in Damaso; the so-called Palazzo di Bramante in the Governo Vecchio, built in 1500; and the Palazzo Giraud, near St Peter's, once the residence of Cardinal Wolsey, built in 1506. He also built the cortile of S. Damaso in the Vatican, the toy-like tempietto in the cloister of S. Pietro in Montorio, and the cloisters of S. Maria della Pace, 1504.[4] In 1503 Bramante was appointed architect to St Peter's, and made complete designs for it, with a plan in the form of a Greek cross. The piers and arches of the central dome were the only parts completed at the time of his death in 1514, and subsequent architects did not carry out his design. For St Peter's, see ARCHITECTURE, vol. ii. p. 438 and plates XXII., XXIII.; also BASILICA, vol. iii. p. 415 *sq.*

Baldassare PERUZZI (*q.v.*) of Siena was one of the most talented architects of the first part of the 16th century; the Villa Farnesina and the Palazzo Vidoni (usually attributed to Raphael) are from his designs.[5] His later works bear traces of that decadence in taste which so soon began, owing mainly to the rapidly growing love for the dull magnificence of the pseudo-classic style. This falling off in architectural taste was due to MICHELANGELO (*q.v.*) more than to any other one man. His cortile of the Farnese palace, though a work of much stately beauty, was one of the first stages towards that lifeless scholasticism and blind following of antique forms which were the destruction of architecture as a real living art, and in the succeeding century produced so much that is almost brutal in its coarseness and neglect of all true canons of proportion and scale. During the earlier stage, however, of this decadence and throughout the 16th century a large number of fine palaces and churches were built in and near Rome by various able artists, such as the Villa Madama by Raphael, part of the Palazzo Farnese by Antonio da Sangallo the younger, S. Giovanni de' Fiorentini by Jac. Sansovino, and many others.[6]

4. *Modern Period.*

Period of degradation.

Under Vignola (1507-1573), Carlo Maderna (1556-1639), Bernini (1598-1680), Carlo Fontana (1634-1714), and others architectural beauty in Rome steadily declined, till the prevalent style became a mere caricature of classical forms, twisted and contorted into every possible incongruous and ridiculous shape, void of all sense of harmony of proportion and unredeemed by any grace or even decency of detail. Clumsy weightiness and extravagance of outline, with the frequent introduction of the most ungraceful curves, are the main characteristics of this unhappy period, which, unfortunately, was one of great activity in building. The degraded taste of the 17th and 18th centuries could see no beauty in the stately simplicity of the early basilicas, in the delicate grace and rich ornament of the Cosmati period, or even in the refined harmonious beauty of the Renaissance.[7] Every church in Rome is more or less disfigured inside with extravagant stucco pilasters and reliefs, transfiguring the whole interior, while outside many have clumsy façades stuck on without the slightest reference to the structures they are meant to decorate. The Lateran basilica is one of the most conspicuous instances of this sad treatment of a grand old building; and the hideous façades which disfigure the fine churches of S. Marcello and S. Maria in Via Lata (both in the Corso) are typical examples of the degradation into which architecture had sunk in its latest stages. In the present century taste has somewhat improved. Since 1870, when Rome became the capital, an immense amount of building has been carried out, mostly innocent in design, though dull and lifeless. The modern architects of Rome possess the rare merit of acknowledging their own artistic incapacity, and the more important recent buildings have been copies, fairly faithful in design though not in material, of fine palaces of the best 15th and 16th century architects. The Cassa di Risparmio in the Corso and some large houses in the new quarter across the Tiber are good copies of the Strozzi and other Florentine palaces; the Hotel Bristol is from a fine palace at Venice; and Bramante's Palazzo Giraud has been imitated in a new house near the Piazza Nicosia. Unfortunately stucco is mainly used for the exteriors of these otherwise handsome buildings, a material which, however, lasts fairly well in the mild climate of Rome. The growing rage for the Parisian style of building, with wide straight boulevards, is rapidly destroying all the picturesqueness of the city; and these broad streets, from their want of shade, are not suited to an almost constantly sunny climate.

Nineteenth century buildings.

The chief architectural work of the 19th century has been the rebuilding of the nave of the great basilica of S. Paolo fuori le Mura, burnt in 1823, in a style of great splendour, though somewhat cold in effect. Its columns are enormous monoliths of grey granite from the Alps; the confessio and transepts are lined with rosso and verde antico from the recently rediscovered quarries in Greece, and with Egyptian alabaster. The reconsecration of this magnificent edifice took place in 1854, after thirty years had been spent in the rebuilding; the east façade, with its new gaudy mosaics, and the atrium are not yet complete.[1] Another great work still in progress is the extension of the sanctuary of the Lateran basilica, which unhappily has involved the destruction of the ancient apse and its ambulatory, the only part of the church which had escaped complete disfigurement. The priceless mosaics of the apse (1290), among the most beautiful in Rome, have been refixed in the new apse, but of course in a sadly modernized and restored form.[2] Some large blocks of Government offices on the Esquiline Hill are the most important in size among the recent constructions. They have little architectural merit either in design, materials, or solidity of workmanship.

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[1] The absence of a triforium is one of the chief reasons why the large Gothic churches of Italy are so inferior in effect to the cathedrals of France and England.

[2] It would be easy to double the list given in Perkins's valuable *Handbook of Ital. Sculpt.*, London, 1883, p. 417. Drawings of many of these are published by Tosi, *Monumenti Sacri*, &c., 1843.

[3] These two churches were the first in Rome built with domes after the classical period.

[4] The upper story of the latter is varied by having horizontal lintels instead of arches on the columns.

[5] There appears now to be some doubt whether the Farnesina may not have been designed by Raphael; an original sketch by Peruzzi's own hand of the Palazzo Vidoni is preserved in the Uffizi.

[6] A valuable account of Raphael's architectural works is given by Geymüller, *Raffaello come Architetto*, Milan, 1882. Drawings of many of the finest palaces of Rome are given by Percier and Fontaine, *Édifices modernes à Rome*, Paris, 1798; and especially in the fine work by Létarouilly, *Édifices de Rome moderne*, Brussels, 1856-66.

[7] Even the frescos of the chief earlier artists were not spared; those by Pinturicchio in the 3d chapel (south) of S. Maria del Popolo were covered by wretched stucco ornaments, only removed in 1850; and numberless works of art by Giotto and other early painters were wilfully destroyed.

The Vatican contains the largest collection in the world of Græco-Roman and Roman sculpture, with a few specimens of true Hellenic art. It is also very rich in Greek vases and in objects from Etruscan tombs; this latter division is called the Museo Gregoriano. There is also an Egyptian museum. In the great library are preserved a number of early glass chalices[3] and other rare objects from the catacombs, as well as many fine specimens of later Christian art,—church plate and jewels. The picture gallery, though not as large as some of the private collections in Rome, contains few inferior pictures. The Lateran palace, still, like the Vatican, in the possession of the pope, contains a fine collection of classical sculpture, but is most remarkable as a museum of Christian antiquities. The two Capitoline museums are very rich in classical sculpture, bronzes, coins, pottery, and the contents of early Etruscan and Latin tombs. A large hall has lately been added, and is filled with sculpture found on the Esquiline since 1870. The picture gallery contains a few masterpieces and a large number of inferior works. A new museum is now (1886) being formed in the great cloister of S. Maria degli Angeli to hold the numerous fine examples of classical painting and sculpture found along the Tiber during the excavations for the new embankment, and in other places in Rome. The university of Rome possesses fine collections of minerals, fossils, and other geological specimens, and examples of ancient marbles used in the buildings of Rome. A new Museo Artistico has recently been formed in a monastery in the Capo le Case, to contain mediæval works of art; it will probably be rapidly increased. The Museo Kircheriano is in some respects unique of its kind. It contains an unrivalled collection of prehistoric objects found in Italy and its islands, in stone, bronze, iron, and pottery. The collection of æs grave is the finest yet made; and the museum also contains a large quantity of interesting classical antiquities of various kinds. Another branch is the Ethnological Museum, as yet of no great importance. Unfortunately all these museums are badly adapted for purposes of study, being neither well arranged nor catalogued.

Private collections of pictures;

Among the private collections of pictures the Borghese is quite unrivalled. The next in importance is that in the Doria palace, which, however, like most Italian collections, contains a large proportion of very inferior works. The Corsini picture gallery, lately bought by the municipality of Rome, is chiefly rich in the works of the Bolognese and other third-rate painters. The Barberini and Sciarra-Colonna palaces contain a few fine paintings; those in the latter collection are now arranged in the owner's private apartments, and are not visible to the public.

of sculpture.

The largest private collection of sculpture is that of the Villa Albani, which, among a large mass of inferior Roman sculpture, contains a few gems of Greek art. The original Albani collection was stolen and brought to Paris by Napoleon I., and was there dispersed; one relief, the celebrated Antinous, is the only piece of sculpture from the original collection which was sent back from Paris. The owner of this is now Prince Torlonia, who also possesses a very large collection of classical sculpture formed by himself; it contains several very fine works, but unfortunately the greater number are much injured and falsified by restorations. The casino in the Borghese gardens possesses a great quantity of sculpture, mostly third-rate Roman works. The small collection of the Villa Ludovisi[4] contains a few works of Greek sculpture of the highest importance, of which the chief are the Pergamean group of the suicide of the Gaulish chief, a relief of Medusa's head, and a male terminal figure. Many other palaces, such as that of the Colonna family, contain less important collections of sculpture and painting.

For an account of the chief public libraries, see LIBRARIES, vol. xiv. pp. 529-530, 548.

Population, Climate, &c.[5]—In the sixteen years which have elapsed since Rome became the capital of Italy (1870-1886) the population has largely increased, chiefly owing to the introduction of a great number of Government officials with their families from Northern Italy. Under the last papal census the number of inhabitants was 216,000; in 1881 it had increased to 276,463. Education of the working classes has much improved in these years, and there are now nearly 170 parochial schools. The streets are remarkable for their cleanliness, and are mostly well paved with hard lava and well lighted with gas. For municipal purposes Rome is still divided into the fourteen mediæval "rioni"; these, though corresponding in number with the fourteen regiones of Augustus, include very different areas. The climate is mild and sunny, in winter averaging 10° Fahr. above the temperature of London; but the variation between day and night is very great. The coldest months are December and February (average temp. 47°); the hottest are July and August (average 75°). The rainfall is slight, averaging $16\frac{7}{10}$th inches annually, and the rainy days are few proportionally. On the whole Rome is a healthy city, in spite of some malaria, usually confined to its more open parts.[6] The neighbouring Campagna is in parts almost uninhabitable during the summer from this cause; but the malaria is much checked by the planting of eucalyptus trees, which grow rapidly in and about the city. A very remarkable instance of this is the Trappist monastery of the Tre Fontane, about 4 miles from Rome on the Ostian road, which a few years ago was quite uninhabitable in the summer, while since a number of these trees have been planted the monks reside there with impunity throughout the year. Though almost free from typhus, there is a good deal of enteric fever in Rome, partly owing to the very unwholesome arrangement of the drainage in each house, though the general system of sewerage is good. That this disease is not more prevalent is probably owing to the magnificent water-supply,[7] which flows in a constant service, thus doing away with the necessity of cisterns. The average annual deaths are 5750.

Works on Christian Rome.—CHURCHES.—*16th and 17th Century Books*: Panvinius, *De Præcipuis Basilicis*, 1570; De Albericis, *Hist. S. Virginis de Populo*, 1599; De Angelis, *Bas. S. Mariæ Major.*, 1621; Severano, *Le Sette Chiese di Roma*, 1630; Landucci, *S. Maria del Popolo*, 1646; Rasponi, *De Basil. Lateran.*, 1656 Torrigio, *Sacre Grotte Vaticane*, 1675, Fontana, *Tempio Vaticano*, 1694; Bonannus, *Tem. Vatic. Historia*, 1696. *18th Century*: Crescimbeni, *S. Maria in Cosmedin* (1715), *S. Giovanni a Porta Latina* (1716), and *Bas. di S. Anastasia* (1722); Boromino, *La Chiesa e Fabbrica d. Sapienza*, 1726; Casimiro Romano, *S. Maria in Ara Cœli*, 1736; Fonseca, *Bas. S. Laurentii in Damaso*, 1745; Erra, *S. Maria in Campitelli*, 1750; Besozzi, *S. Croce in Gerus.*, 1750; Cancellieri, *Basilica Vaticana*, 1786; F. di San Pietro, *S. Giorgio in Velabro*, 1791. *19th Century*: Paulinus, *Basil. S. Pancratii*, 1803; Nicolai, *Bas. di S. Paolo*, 1815, and *De Vatican. Bas.*, 1817; Nibby, *Forma degli Antichi Tempj Cristiani*, 1825; Dionysius, *Vat. Basil. Crypt. Mon.*, 1828-40; Bunsen, Guttensohn, and Knapp, *Basiliken des Christ. Roms*, Munich, 1842; Canina, *Arch. dei Tempj Cristiani*, 1843-46; Fontana, *Migliori Chiese di Roma* (1855), *Bas. di S. Paolo* (1878), and *Musaici delle Chiese di Roma* (1870); Valentini, fine monographs on the *Basilicas of the Vatican, the Lateran*, and *S. Maria Maggiore*, 1832-45; Gori, *Bas. di S. Lorenzo*, 1862; Hübsch, *Alt-christlichen Kirchen*, Carlsruhe, 1862; De Montault, *Les Souterrains de S. Pierre*, Paris, 1866; Burckhardt, *De Origine Basilicarum Christianarum*, 1875; De Fleury, *Le Latran*, Paris, 1877; De Lorbac, *S. Pierre de Rome*, 1879; Geymüller, *Les Projets Primitifs pour la Bas. de S. Pierre*, Paris, 1875-80 (gives a valuable series of facsimiles of the designs made by Bramante, Raphael, Fra Giocondo, Sangallo, and others); Létarouilly, *Le Vatican et la Basilica de S. Pierre*, ed. Simit, Paris, 1882; Debleser, *Rome et ses Monuments*, 1882 (especially useful to the Catholic traveller for its information about church ceremonies and other religious matters). GENERAL WORKS.—Pistolesi, *Il Vaticano*, 1829-38; Nibby, *Roma Moderna*, 1839; Marchi, *Mon. dell' Arte Crist. primitiva*, 1844; Massimo, *La Torre Anguillara in Trastevere*, 1847; Létarouilly, *Édifices de Rome Moderne*, Brussels, 1856-66; Gregorovius, *Geschichte . . . Roms im Mittelalter*, Stuttgart, 1859-72, and *Die Grabmäler der Päpste*, Leipsic, 1857 (both these valuable works have been translated into Italian); Garrucci, *Mon. del Mus. Lateran.*, 1861, and *Storia dell' Arte Cristiana*, Prato, 1872-80; De Rossi, *Roma Sotterranea*, 1864-80, and *Musaici e Pavimenti delle Chiese di Roma* (in progress), and (edited by him) *Bull. di Archæo. Cristiana*, 1863 (in progress), also *Inscriptiones Christianæ Urbis Romæ*, 1861 (in progress); Gerbet, *Rome Chrétienne*, Paris, 1866; Pellegrini, *Edifici de' Bassi Tempi*, 1870; Rio, *L'Art Chrétien*, Paris, 1861, and *Épilogue à l'Art Chrétien*, 1872; Dohme, *Kunst und Kunstler Italiens*, Leipsic, 1878; Wey, *Description de Rome* (well illustrated), 1871. *Inscriptions.*—Forcella, *Inscrizioni nelle Chiese di Roma*, 1869-84; Galetti, *Inscriptiones Rom. Infimi Ævi*, 1760. A number of mediæval wall-paintings in Rome, such as those in the Vatican library and in S. Martino ai Monti, though worthless as works of art, are very valuable for their representations of buildings now destroyed or altered. The great oil-painting, now in the museum at Mantua, which gives a bird's-eye view of Rome as it was in the 16th century, is published in the valuable work by De Rossi, *Piante di Roma anteriori al Sec. XVI.*, 1879, which contains also other early plans and drawings of the city. MUSEUMS AND SCULPTURE.—Pistolesi, *Il Vaticano*, 1829-38; Visconti, *Mus. Chiaramonti* and *Pio-Clementino*, and *Museo Gregoriano*, 1803-43; Wolff, *Bildwerke des Vaticans, &c.*, Berlin, 1870; E. Q. Visconti, *Sculture della Villa Borghese*, 1796, and *Scult. del Pal. Giustiniani*, 1811; Winckelmann, *Opere*, best edition by Fea, Prato, 1830; Vitale, *Marmi nel Pal. Torlonia*, n.d.; Benndorf, *Die Bildwerke des Lateran. Mus.*, Leipsic, 1867; Schreiber, *Antike Bildwerke der Villa Ludovisi*, Leipsic, 1880; Bottari, *Museo Capitolino*, Milan, 1821-22; Matz and Von Duhn, *Antike Bildwerke in Rom*, Leipsic, 1881; De Montault, *Musées et Galeries de Rome*, 1880; Bernoulli, *Römische Ikonographie*, Stuttgart, 1881. (J. H. M.)

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[1] Fea, *La Basilica Ostiense*, 1826-33.

[2] For the interesting discoveries made in excavating for the new apse, see *Ann. Inst.*, 1877, p. 332.

[3] See Garrucci, *Vetri Ornati in Oro*, 1858.

[4] The beautiful gardens of the Villa Ludovisi are now (1886) being destroyed and built over, and the fate of the sculpture gallery is as yet undecided.

[5] See Taussig, *The Roman Climate, Health, and Disease*, 1870. The *Monografia di Roma* (1878) contains valuable articles on the population, climate, health, and public institutions of Rome.

[6] See Balestra, *L'Igiene di Roma*, 1880; Vitelleschi and others, *Atti della Giunta per la Inchiesta Agraria*, vol. xi., 1884 (see also their map showing the malarious districts, 1883); Tournon, *Études Statistiques sur Rome*, Paris, 1831.

[7] The numberless fountains and jets of water which abound in the streets of Rome are one of its chief beauties; these are all fed with pure hill water brought in aqueducts or pipes, and flow in apparently undiminished volume during the dry months of summer. The Trevi fountain (Aqua Virgo) and the Fontana Paolina on the Janiculum are the grandest of these; see Falda, *Le Fontane di Roma*, 1691.

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Plate VI. is a Plan of Ancient Rome; Plate VII. shows the Forum and its Surroundings; Plate VIII. is the Modern City; and Plate IX. is a Map of the Empire in the Third Century of our Era.

ROME, a city of the United States, the capital of Oneida county, New York, 110 miles by rail west-north-west of Albany, occupies a level site at the head of Mohawk valley, near the watershed between the Atlantic and the western lakes. It is an important railway junction, lies on the line of the Erie Canal, and is the terminus of the Black River Canal. Besides being the centre of a great cheese-making district, Rome has large railroad shops, rolling-mills, and lumber-yards. The population was 11,000 in 1870 and 12,194 in 1880.

ROMFORD, an old market-town of Essex, is situated on the small river Rom, and on the Great Eastern Railway about 12 miles east-north-east of London. The ancient church of St Edward the Confessor was replaced in 1850 by a structure in the Late Decorated style. The large brewery of Inde, Coope, & Co. is situated in the town, and there are extensive market gardens in the neighbourhood. A grant of a market was obtained in 1247, and this is still of importance as regards both cattle and corn. The population of the urban sanitary district (area 1159 acres) in 1871 was 6512, and in 1881 it was 7176.

ROMILLY, SIR SAMUEL (1757–1818), the great legal reformer who first attempted to relax the barbarity of the English penal code, was the second son of Peter Romilly, a watchmaker and jeweller in London, whose father had emigrated from Montpellier after the revocation of the edict of Nantes, and who had married a Miss Garnault, a Huguenot refugee like himself, but of a far wealthier family. Samuel Romilly was born in Frith Street, Soho, on 1st March 1757, and was named after Sir Samuel Fludyer, M.P. for the city of London and alderman, who was in partnership with two of his uncles. He served for a time in his father's shop; but his education was not neglected, and he became a good classical scholar and particularly conversant with French literature. A legacy of £2000 from one of his mother's relations led to his being articled to a solicitor and clerk in Chancery with the idea of qualifying himself to purchase the office of one of the six clerks in Chancery. In 1778, however, he determined to go to the bar, and entered himself at Gray's Inn. He went to Geneva in 1781, where he made the acquaintance of the chief democratic leaders, including Étienne Dumont. Called to the bar in 1783, he went the midland circuit, but was chiefly occupied with Chancery practice. On the publication of Madan's *Thoughts on Executive Justice*, advocating the increase of capital punishments, he at once wrote and published in 1786 *Observations* on Madan's book. Of more general interest is his intimacy with the great Mirabeau, to whom he was introduced in 1784 (see MIRABEAU). Mirabeau saw him daily for a long time and introduced him to Lord Lansdowne, who highly appreciated him, and, when Mirabeau became a political leader, it was to Romilly that he applied for an account of the procedure used in the English House of Commons. He visited Paris in 1789, and studied the course of the Revolution there; and in 1790 he published his *Thoughts on the Probable Influence of the Late Revolution in France upon Great Britain*, a work of great power. His practice at the Chancery bar continued largely to increase, and in 1800 he was made a K.C. In 1798 he married the daughter of Francis Garbett of Knill Court, Herefordshire; and in 1805 he was appointed chancellor of the county palatine of Durham. His great abilities were thoroughly recognized by the Whig party, to which he attached himself; and in 1806, on the accession of the ministry of "All the Talents" to office, he was offered the post of solicitor-general, although he had never sat in the House of Commons. He accepted the office, and was knighted and brought into parliament for Queenborough. He went out of office with the Government, but remained in the House of Commons, sitting successively for Horsham, Wareham, and Arundel. It was now that Sir Samuel Romilly commenced the greatest labour of his life, his attempt to reform the criminal law of England, which was at once cruel and illogical. By statute law innumerable offences were punished by death, but, as such wholesale executions would be impossible, the larger number of those convicted and sentenced to death at every assizes were respited, after having heard the sentence of death solemnly passed upon them. This led to many acts of injustice, as the lives of the convicts depended on the caprice of the judges, while at the same time it made the whole system of punishments and of the criminal law ridiculous. Romilly saw this, and in 1808 he managed to repeal the statute 8 Eliz. c. 4, which made it a capital offence to steal from the person. This success, however, raised opposition, and in the following year three bills repealing equally sanguinary statutes were thrown out by the House of Lords under the influence of Lord Ellenborough. Year after year the same influence prevailed, and Romilly saw his bills rejected; but his patient efforts and his eloquence ensured victory eventually for his cause by opening the eyes of Englishmen to the barbarity of their criminal law. The only success he had was in securing the repeal, in 1812, of the statute 39 Eliz. c. 17, making it a capital offence for a soldier or a mariner to beg without a pass from a magistrate or his commanding officer. Sir Samuel Romilly's efforts made his name famous not only in England but all over Europe, and on 4th July 1818 he had the honour of being returned at the head of the poll for the city of Westminster. He did not long survive his triumph. On the 29th of October 1818 Lady Romilly died in the Isle of Wight. Her husband's grief was intense, and he committed suicide in a fit of temporary insanity on the 2d November. No man of his time was more loved than Sir Samuel Romilly; his singularly sweet nature, his upright manliness, his eloquence, and his great efforts on behalf of humanity secured him permanent fame. His second son John rivalled his reputation as a lawyer, and after being appointed master of the rolls in 1851, an office which he held for twenty-two years, was raised to the peerage as Lord Romilly in 1866.

See the *Memoirs of the Life of Sir Samuel Romilly written by himself, with a selection from his Correspondence, edited by his Sons*, 3 vols., 1840; and *The Speeches of Sir Samuel Romilly in the House of Commons*, 2 vols., 1820.

ROMNEY, George (1734–1802), historical and portrait painter, was born at Dalton-le-Furness, Lancashire, on December 26, 1734. His father was a builder and cabinetmaker of the place, and the son, having manifested a turn for mechanics, was instructed in the latter craft, showing considerable dexterity with his fingers, executing carvings of figures in wood, and constructing a violin, which he spent much time in playing. He was also busy with his pencil; and, some of his sketches of the neighbouring rustics having attracted the attention of his father, he was at length induced to apprentice the boy, at the age of nineteen, to an itinerant painter of portraits and domestic subjects named Steele, an artist who had studied in Paris under Vanloo; but the erratic habits of his instructor prevented Romney from making great progress in his art. In 1756 he impulsively married a young woman who had nursed him through a fever, and started as a portrait painter on his own account, travelling through the northern counties, executing likenesses at a couple of guineas, and producing a series of some twenty figure compositions, which were exhibited in Kendal, and afterwards disposed of by means of a lottery.

Having, at the age of twenty-seven, saved about £100, he left a portion of the sum with his wife and family, and started to seek his fortune in London, never returning, except for two brief visits, till he came, a broken-down and aged man, to die. In London he rapidly rose into popular favour. His Death of General Wolfe was judged worthy of the second prize at the Society of Arts, but a word from Reynolds in praise of Mortimer's Edward the Confessor led to the premium being awarded to that painter, while Romney had to content himself with a donation of £50, an incident which led to the subsequent coldness between him and the president which prevented him from exhibiting at the Academy or presenting himself for its honours.

In 1764 he paid a brief visit to Paris, where he was befriended by Joseph Vernet; and his portrait of Sir Joseph Yates, painted on his return, bears distinct traces of his study of the works of Rubens then in the Luxembourg Gallery. In 1766 he became a member of the Incorporated Society of Artists, and three years later he seems to have studied in their schools. Soon he was in the full tide of prosperity. He removed to Great Newport Street, near the residence of Sir Joshua, whose fame in portraiture he began to rival in such works as Sir George and Lady Warren, and Mrs Yates as the Tragic Muse; and his professional income rose to £1200 a year.

But he was seized with a longing to study in Italy; and in the beginning of 1773 he started for Rome in company with Ozias Humphrey the miniature painter. On his arrival he separated himself from his fellow traveller and his countrymen, and devoted himself to solitary study, raising a scaffold to examine the paintings in the Vatican, and giving much time to work from the undraped model, of which his painting of a Wood Nymph was a fine and graceful result. At Parma he concentrated himself upon the productions of Correggio, which powerfully fascinated him, and greatly influenced his practice.

In 1775 Romney returned to London, establishing himself in Cavendish Square, and resuming his extensive and lucrative employment as a portrait-painter, which in 1785, according to the estimate of his pupil Robinson, yielded him an income of over £3600. The admiration of the town was divided between him and Reynolds. "There are two factions in art," said Lord Thurlow, "and I am of the Romney faction,"—and the remark, and the rivalry which it implied, caused much annoyance to Sir Joshua, who was accustomed to refer contemptuously to the younger painter as "the man in Cavendish Square." After his return from Italy Romney formed two friendships which powerfully influenced his life. He became acquainted with Hayley, his future biographer, then in the zenith of his little-merited popularity as a poet. His influence on the painter seems to have been far from salutary. Weak himself, he flattered the weaknesses of Romney, encouraged his excessive and morbid sensibility, disturbed him with amateurish fancies and suggestions, and tempted him to expend on slight rapid sketches, and ill-considered, seldom-completed paintings of ideal and poetical subjects, talents which would have found fitter exercise in the steady pursuit of portraiture. About 1783 Romney was introduced to Emma Hart, afterwards celebrated as Lady Hamilton, and she became the model from whom he worked incessantly. Her bewitching face smiles from innumerable canvases; he painted her as a Magdalene and as a Joan of Arc, as a Circe, a Bacchante, a Cassandra, and he has himself confessed that she was the inspirer of what was most beautiful in his art. But her fascinations seem to have been too much for the more than middle-aged painter, and they had their own share in aggravating that nervous restlessness and instability, inherent in his nature, which finally ruined both health and mind.

In 1786 Alderman Boydell started his great scheme of the Shakespeare Gallery,—it would appear at the suggestion of Romney. The painter at least entered heartily into the plan, and contributed his scene from the *Tempest*, and his Infant Shakespeare attended by the Passions, the latter characterized by the Redgraves as one of the best of his subject pictures. Gradually he began to withdraw from portrait-painting, to limit the hours devoted to sitters, and to turn his thoughts to mighty schemes of the ideal subjects which he would execute. Already, in 1792, he had painted Milton and his Daughters, which was followed by Newton making Experiments with the Prism. He was to paint the Seven Ages, Visions of Adam with the Angel, "six other subjects from Milton—three where Satan is the hero, and three from Adam and Eve,—perhaps six of each." Having planned and erected a large studio in Hampstead, he removed thither in 1797, with the fine collection of casts from the antique which his friend Flaxman had gathered for him in Italy. But his health was now irremediably shattered, and the man was near his end. In the summer of 1799, suffering from great weakness of body and the profoundest depression of mind, he returned to the north, to Kendal, where his deserted but faithful and long-suffering wife received and tended him. He died November 15, 1802.

The art of Romney, and especially his figure subjects, suffered greatly from the waywardness and instability of the painter's disposition, from his want of fixed purpose and sustained energy. He lacked the steadfast perseverance needful to the accomplishment of a great picture. His imagination was no "constant angel ever by his side"; it flashed and flickered fitfully upon him, like April sunshine. His fancy would be captivated by a subject, which was presently embodied in a sketch, but the toil of elaborating it into the finished completeness of a painting too frequently overtaxed his powers; he became embarrassed by technical difficulties which, through defective early training, he was unable to surmount, and the half-covered canvas would be turned to the wall. It is in the best of his portraits that we feel the painter's true greatness. These, and especially his female portraits, are full of grace, distinction, and sweetness. When we examine his heads of Cowper and Wilkes, his delicate and dignified full length of William Beckford, his Parson's Daughter in the National Gallery, and his group of the Duchess of Gordon and her Son, we are ready to admit his claim to rank as the third of the great portrait painters of 18th-century England.

See the *Memoirs* by William Hayley, 1809, and the artist's son, the Rev. John Romney, 1830; also Cunningham's *Lives of the Painters*.

ROMNY, a district town of Russia, on the Sula river, 112 miles to the north-west of Poltava, and in the government of that name. It acquired commercial importance during last century, especially on account of its fairs. The chief of these—that in wool—was removed to Poltava in 1852, but the prices established by the remaining three still determine to a great extent those at the greater fair of Poltava. Of the local industries, the manufacture of agricultural implements is the only one worthy of mention, but the petty trades, both in town and district, are of considerable importance. The population in 1881 was 12,300.

ROMULUS, the mythical eponym founder and first king of Rome, is represented in legend as the son of Mars. His mother, the Vestal Silvia or Ilia, was daughter of Numitor, who had been dispossessed of the throne of Alba by his younger brother Amulius; Silvia's twin sons, Romulus and Remus, were placed in a trough and cast into the Tiber by their cruel granduncle. The trough grounded in the marshes where Rome afterwards stood, under the wild fig-tree (*ficus ruminalis*) which was still holy in later days. The babes were suckled by a she-wolf and fed by a woodpecker, and then fostered by Acca Laurentia, wife of the shepherd Faustulus. Growing up they became leaders of a warlike band of shepherds on the Palatine, and in course of time were recognized by their grandfather, whom they restored to his throne, slaying the usurper Amulius. They now proposed to found a city on the site where they had been nurtured; but a quarrel broke out between the brothers, and Remus was slain. The story goes on to tell how Romulus strengthened his band by receiving outlaws, found wives for them by capture, and waged war with the indignant parents. The most formidable foe was Titus Tatius, king of the Sabines, but after an obstinate struggle he and Romulus united their forces and reigned side by side till Tatius fell in a blood feud with Laurentum. Romulus now reigned alone till he suddenly one day disappeared from earth in darkness and storm, and was thereafter worshipped as a god under the name of Quirinus, which, however, is really a Sabine form of Mars. This legend, best preserved in Livy (book i.), belongs throughout to mythology, not to history. See also Plutarch's *Romulus*, and Dionysius, books i., ii.

ROMULUS AUGUSTULUS. See ODOACER, vol. xvii. p. 726, and ROME, *supra*, p. 781.

RONDA, a town of Spain, in the province of Malaga, and about 43 miles to the west of that city. It occupies a site of singular picturesqueness on a high rock nearly surrounded by the Guadalvin (afterwards the Guadiaro), which flows through a deep and abrupt chasm (or "Tajo") by which the old town is separated from the new. Of the two bridges the more modern (1761) spans the stream in a single arch at a height of about 255 feet. On the edge of the Tajo is the alameda or public promenade, commanding a wide and beautiful prospect of the fertile valley or vega and the sierra beyond. The old part of the town has a Moorish aspect, with narrow, steep, and crooked lanes, and still retains some Moorish towers and other buildings. The Ronda bull-ring is one of the finest in Spain, and can accommodate 10,000 spectators. Ronda is the seat of a considerable trade in leather, saddlery, and horses, and has an important fair (May 20). The population within the limits of the municipality was 19,181 in 1877.

Some inconsiderable remains of an aqueduct and theatre, about 7 miles to the north of Ronda, are supposed to represent the *Acinipo* or *Arunda* of ancient geographers. Ronda was taken from the Moors in 1485. It was the birthplace of Espinel.

RONDEAU or RONDEL (Ital. *Rondo*). In poetry the rondeau is a short metrical structure which in its perfect form is divided into three strophes of unequal length, knit together by rapidly recurrent rhymes and a refrain. The laws of the rondeau have varied at different periods, and even with different poets of the same period—varied so fundamentally that some critics have found a generic difference between the "rondeau" and the "rondel" or "rondet." *Rondeau*, however, seems to be merely the modern spelling of the word *rondel*, as *marteau* is the modern spelling of *martel*, *château* of *châtel*, &c. When the rondeau was called the rondel it was mostly written in fourteen octosyllabic lines of two rhymes as in the rondels of Charles d'Orleans. In this variability of structure it contrasts with the stability of the SONNET (*q.v.*). While the proper sonnet of octave and sestet has always been a structure of fourteen verses (whatever may be the arrangement of the rhymes), the structure under consideration, whether called *rondeau* or *rondel* or *rondet*, may, it seems, consist of any number of verses from eight to thirteen. But when we find that the kind of triolet used by Froissart is a "rondel" we are compelled to admit that the names given to this form are very elastic. In Clement Marot's time, however, the laws of the rondeau became more settled, and, according to Voiture, in the 17th century the approved form of the rondeau was a structure of thirteen verses and a refrain.

Ma foy, c'est fait de moy, car Isabeau
M'a conjuré de luy faire un Rondeau :
Cela me met en une peine extrême.
Quoy treize vers, huit en *eau*, cinq en *ème*,
Je luy ferois aussi tôt un bateau !

En voilà cinq pourtant en un monceau :
Faisons en huict, en invoquant Brodeau,
En puis mettons, par quelque stratagème,
Ma foy, c'est fait !

Si je pouvois encore de mon cerveau
Tirer cinq vers, l'ouvrage seroit beau ;
Mais cependant, je suis dedans l'onzieme,
Et si je croy que je fais le douzième
En voilà treize ajustez au niveau.
Ma foy, c'est fait !

All forms of the rondeau, or rondel, however, are alike in this that the distinguishing metrical emphasis is achieved by a peculiar use of the refrain. Though we have the English rondels of Occleve and a set of rondeaus in the *Rolliad* (written by Dr Lawrence the friend of Burke, according to Mr Gosse, who has given us an admirable essay upon exotic forms of verse), it was not till our own day that the form had any real vogue in England. Considerable attention, however, has lately been given in England to the form. Some of the rondeaus of our own contemporary poets are as bright and graceful as Voiture's own. Mr Swinburne, who in his *Century of Roundels* was perhaps the first to make the refrain rhyme with the second verse of the first strophe, has brought the form into high poetry.

Although the origin of the refrain in all poetry was no doubt the improvisatore's need of a rest, a time in which to focus his forces and recover breath for future flights, the refrain has a distinct metrical value of its own ; it knits the structure together, and so intensifies the emotional energy, as we see in the Border ballads, in the *Oriana* of Lord Tennyson, and in the *Sister Helen* of Rossetti. The suggestion of extreme artificiality—of "difficulty overcome"—which is one great fault of the rondeau as a vehicle for deep emotion, does not therefore spring from the use of the refrain, but from the too frequent recurrence of the rhymes in the strophes—for which there is no metrical necessity as in the case of the Petrarchan sonnet. "Difficulty overcome," though a legitimate source of pleasure in French poetry even of the most serious kind (for the French language is essentially the most unpoetic in Europe), finds no place in the serious poetry of England.

In music the "rondo" seeks much the same effect as in poetry, the melodic emphasis of the refrain. The Italian composer Buononcini seems to have been the inventor of the rondo as thus understood.

RONSARD, Pierre de (1524–1585), "Prince of Poets" (as his own generation in France called him, and as after much change of criticism there is reason for calling him still in reference to that generation and country), was born at the Château de la Poissonnière, near the village of Couture in the province of Vendômois (department of Loir-et-Cher) on September 11, 1524. His family are said to have come from the Slav provinces to the south of the Danube (provinces with which the crusades had given France much intercourse) in the first half of the 14th century. Baudouin de Ronsard or Rossart was the founder of the French branch of the house, and made his mark in the early stages of the Hundred Years' War. The poet's father was named Loys, and his mother was Jeanne de Chaudrier, of a family not only noble in itself but well connected. Pierre was the youngest son. Loys de Ronsard was *maître d'hôtel du roi* to Francis I., whose captivity after Pavia had just been softened by treaty, and he had to quit his home shortly after Pierre's birth. The future Prince of Poets was educated at home for some years and sent to the Collége de Navarre at Paris when he was nine years old. It is said that the rough life of a mediæval school did not suit him. He had, however, no long experience of it, being quickly appointed page to the duke of Orleans. When Marguerite of France was married to James V. of Scotland Ronsard was attached to the king's service, and he spent three years in Great Britain. The latter part of this time seems to have been passed in England, though he had, strictly speaking, no business there. On returning to France in 1540 he was again taken into the service of the duke of Orleans. In this service he had other opportunities of travel, being sent to Flanders and again to Scotland. After a time a more important employment fell to his lot, and he was attached as secretary to the suite of Lazare de Baïf, the father of his future colleague in the Pléiade and his companion on this occasion, Antoine de Baïf, at the diet of Spires. Afterwards he was attached in the same way to the suite of the Cardinal du Bellay-Langey, and his mythical quarrel with Rabelais dates mythically from this period. His apparently promising diplomatic career was, however, cut short by an attack of deafness which no physician could cure, and he determined to devote himself to study. The institution which he chose for the purpose among the numerous schools and colleges of Paris was the Collége Coqueret, the principal of which was Daurat—afterwards the "dark star" (as he has been called from his silence in France) of the Pléiade. Baïf accompanied Ronsard ; Belleau shortly followed ; Joachim du Bellay, the second of the seven, joined not much later. Muretus, a great scholar and by means of his Latin plays a great influence in the creation of French tragedy, was also a student here.

Ronsard's period of study occupied seven years, and the first manifesto of the new literary movement, which was to apply to the vernacular the principles of criticism and scholarship learnt from the classics, came not from him but from Du Bellay. The *Défense et Illustration de la Langue Française* of the latter appeared in 1549, and the Pléiade may be said to have been then launched. It consisted, as its name implies, of seven writers whose names are sometimes differently enumerated, though the orthodox canon is beyond doubt composed of Ronsard, Du Bellay, Baïf, Belleau, Pontus de Tyard (a man of rank and position who had exemplified the principles of the friends earlier), Jodelle the dramatist, and Daurat. Ronsard's own work came a little later, and a rather idle story is told of a trick of Du Bellay's which at last determined him to publish. Some single and minor pieces, an epithalamium on Antoine de Bourbon and Jeanne de Navarre, a "Hymne de la France," an "Ode à la Paix," preceded the publication in 1550 of the four first books ("first" is characteristic and noteworthy) of the *Odes* of Pierre de Ronsard. This was followed in 1552 by the publication of his *Amours* with the fifth book of *Odes*. These books excited a violent literary quarrel. Marot was dead, but he left a numerous school, some of whom saw in the stricter literary critique of the Pléiade, in its outspoken contempt of merely vernacular and mediæval forms and so forth, an insult to the author of the *Adolescence Clémentine* and his followers. The French court, and indeed all French society, was just then much interested in literary questions, and a curious story is told of the rivalry that ensued. Mellin de St Gelais, it is said, the chief of the "École Marotique" and a poet of no small merit, took up Ronsard's book and read part of it in a more or less designedly burlesque fashion before the king. It may be observed that if he did so it was a distinctly rash and uncourtier-like act, inasmuch as from Ronsard's father's position in the royal household the poet was personally known and liked both by Henry and by his family. At any rate Marguerite the king's sister, who afterwards became duchess of Savoy, is said to have snatched the book from St Gelais and insisted on reading it herself, with the result of general applause. Henceforward, if not before, his acceptance as a poet was not doubtful, and indeed the tradition of his having to fight his way against cabals is almost entirely unsupported. It is quite true that he more than any other poet has had to suffer detraction from a remarkably different series of opposing forces. But none of these interfered with his popularity in his own time, which was overwhelming and immediate, or with his prosperity, which was unbroken. He published his *Hymns*, dedicated to Marguerite de Savoie, in 1555, the conclusion of the *Amours* in 1556, and then a collection of *Œuvres Complètes* said to be due to the invitation of Mary Stuart, queen of Francis II., in 1560.

The rapid change of sovereigns did Ronsard no harm. Charles IX., who succeeded his brother after a very short time, was even better inclined to him than Henry and Francis. He gave him rooms in the palace ; he bestowed upon him divers abbacies and priories ; and he called him and regarded him constantly as his master in poetry. Neither was Charles IX. a bad poet. This royal patronage, however, had its disagreeable side. It excited violent dislike to Ronsard on the part of the Huguenots, who wrote constant pasquinades against him, strove (by a ridiculous exaggeration of the Dionysiac festival at Arcueil, in which the friends had indulged to celebrate the success of the first French tragedy, Jodelle's *Cléopatre*) to represent him as a libertine and an atheist.

and (which seems to have annoyed him more than anything else) set up his follower Du Bartas as his rival. According to some words of his own which are quite credible considering the ways of the time, they were not contented with this variety of argument, but attempted to have him assassinated. During this period Ronsard's work was considerable but mostly occasional, and the one work of magnitude upon which Charles put him, the *Franciade*, has never been ranked, even by his most devoted admirers, as a chief title to fame. The metre (the decasyllable) which the king chose could not but contrast unfavourably with the magnificent alexandrines which Du Bartas and Agrippa d'Aubigné were shortly to produce; the general plan is feebly classical, and the very language has little or nothing of that racy mixture of scholarliness and love of natural beauty which distinguishes the best work of the Pléiade. The poem could never have had an abiding success, but at its appearance it had the singular bad luck almost to coincide with the massacre of St Bartholomew, which had occurred about a fortnight before its publication. One party in the state were certain to look coldly on the work of a minion of the court at such a juncture, the other had something else to think of. The death of Charles made, indeed, little difference in the court favour which Ronsard enjoyed, but, combined with his increasing infirmities, it seems to have determined him to quit court life. During his last year he lived chiefly at a house which he possessed in Vendôme, the capital of his native province, at his abbey at Croix Val in the same neighbourhood, or else at Paris, where he was usually the guest of Jean Galland, well known as a scholar, at the Collége de Boncourt. It seems also that he had a town house of his own in the Faubourg Saint Marcel. At any rate his preferments made him in perfectly easy circumstances, and he seems neither to have derived nor wished for any profit from his books. A half-jocular suggestion that his publisher should give him money to buy "du bois pour se chauffer" in return for his last revision of his *Œuvres Complètes* is the only trace of any desire of the kind. On the other hand he received not merely gifts and endowments from his own sovereign but presents from many others, including Elizabeth of England. His last years were, however, saddened not merely by the death of many of his most intimate friends, but by constant and increasing ill health. This did not interfere with his literary work in point of quality, for he was rarely idle, and some of his latest work is among his best. But he indulged (what few poets have wisely indulged) the temptation of constantly altering his work, and many of his later alterations are by no means for the better. Towards the end of 1585 his condition of health grew worse and worse, and he seems to have moved restlessly from one of his houses to another for some months. When the end came, which, though in great pain, he met in a resolute and religious manner, he was at his priory of Saint Cosme at Tours, and he was buried in the church of that name on Friday, December 27.

The character and fortunes of Ronsard's works are among the most remarkable in literary history, and supply in themselves a kind of illustration of the progress of French literature during the last three centuries. It was his fortune to be almost always extravagantly admired or violently attacked, and it is only recently that he has been set in his proper place. At first, as has been said, the enmity, not altogether unprovoked, of the friends and followers of Marot fell to his lot, then the still fiercer antagonism of the Huguenot faction, who, happening to possess a poet of great merit in Du Bartas, were able to attack Ronsard in his tenderest point, that of his reputation as the greatest living French poet. But fate had by no means done its worst with him in his lifetime. After his death the classical reaction set in under the auspices of Malherbe, a man of correct and narrow spirit who seems to have been animated with a sort of personal hatred of Ronsard, though it is not clear that they ever met. After Malherbe (who by no means himself produced the effect which some well-known but quite unhistorical lines of Boileau would convey) the rising glory of Corneille and his contemporaries obscured the tentative and equal work of the Pléiade, which was, moreover, directly attacked by Boileau himself, the dictator of French criticism in the last half of the 17th century. Then Ronsard was, except by a few men of taste, like La Bruyère and Fénelon, forgotten when he was not sneered at. In this condition he remained during the whole 18th century and the first quarter of the 19th. The romantic revival, seeing in him a victim of its special *bête noire* Boileau, and attracted by his splendid diction, rich metrical faculty, and combination of classical and mediæval peculiarities, adopted his name as a kind of battle cry, and for the moment exaggerated his merits somewhat. The critical work, however, first of Sainte-Beuve in his *Tableau de la Littérature Française au 16ème Siècle*, and since of others, has established Ronsard pretty securely in his right place, a place which may be defined in a few sentences.

For the general position of the Pléiade reference may be made to the article on the literature of FRANCE (vol. ix. p. 650). Ronsard, its acknowledged chief and its most voluminous poet, was probably also its best, though a few isolated pieces of Bellay excel him in airy lightness of touch. Several sonnets of Du Bellay exhibit what may be called the intense and voluptuous melancholy of the Renaissance more perfectly than anything of his, and the finest passages of the *Tragiques* and the *Divine Sepmaine* surpass his work in command of the alexandrine and in power of turning it to the purposes of satirical invective and descriptive narration. But that work is, as has been said, very extensive (we possess at a rough guess not much short of a hundred thousand lines of his), and it is extraordinarily varied in form. He did not introduce the sonnet into France, but he practised it very soon after its introduction and with admirable skill—the famous "Quand vous serez bien vieille" being one of the acknowledged gems of French literature. His odes, which are very numerous, are also very interesting and in their best shape very perfect compositions. He began by imitating the strophic arrangement of the ancients, but very soon had the wisdom to desert this for a kind of adjustment of the Horatian ode to rhyme, instead of exact quantitative metre. In this latter kind he devised some exquisitely melodious rhythms of which, till our own day, the secret died with the 17th century. His more sustained work sometimes displays a bad selection of metre; and his occasional poetry—epistles, eclogues, elegies, &c.—is injured by its vast volume. But the preface to the *Franciade* is a very fine piece of verse, far superior (it is in alexandrines) to the poem itself. Generally speaking, Ronsard is best in his amatory verse (the long series of sonnets and odes to Cassandre, Marie, Genèvre, Hélène, &c.), and in his descriptions of the country (the famous "Mignonne allons voir si la rose," the "Fontaine Bellerie," the "Forêt de Gastine," and so forth), which have an extraordinary grace and freshness. No one used with more art than he the graceful diminutives which his school set in fashion. He knew well too how to manage the gorgeous adjectives ("marbrine," "cinabrine," "ivoirine," and the like) which were another fancy of the Pléiade, and in his hands they rarely become stiff or cumbrous. In short, Ronsard shows eminently the two great attractions of French 17th-century poetry as compared with that of the two following ages,—magnificence of language and imagery and graceful variety of metre.

The chief separately published works of Ronsard are noted above. He produced, however, during his life a vast number of separate publications, some of them mere pamphlets or broadsheets which from time to time he collected, often striking out others at the same time, in the successive editions of his works. Of these he himself published seven, the first in 1560, the last in 1584. Between his death and the year 1630 ten more complete editions were published, the most famous of which is the folio of 1609. A copy of this presented by Sainte-Beuve to Victor Hugo, and now in the possession of M. Maxime du Camp, has a place of its own in French literary history. From 1630 Ronsard was not again reprinted for more than two centuries. Just before the close of the second, however, Sainte-Beuve printed a selection of his poems at the end of the above-mentioned *Tableau*. There are also selections by M. Noel (in the *Collection Didot*) and Becq de Fouquières. In 1857 M. Prosper Blanchemain, who had previously published a volume of *Œuvres Inédites de Ronsard*, undertook a complete edition for the *Bibliothèque Elzévirienne*. The eighth and last volume of this appeared ten years later. It is practically complete: a few pieces of a somewhat free character which are ascribed with some certainty to the poet are, however, excluded. The chief separate volume of criticism on Ronsard is that of M. Gandar (Metz, 1854), which considers him chiefly in his relation to the ancients. (G. SA.)

RONSDORF, a town in north-western Prussia, on the Morsbach, a small affluent of the Rhine, 18 miles west of Düsseldorf, contains considerable iron and brass works, foundries, and wire-works, besides carrying on extensive manufactures of ribbons, trimmings, and similar goods. The population in 1880 was 10,100.

Founded in 1737 by the followers of Elias Eller, a religious enthusiast, Ronsdorf received town-rights in 1745. The Ronsdorf sect, the members of which called themselves Zionites, is now extinct.

ROOF. See BUILDING and DOME.

ROOK (Anglo-Saxon *Hrôc*, Icelandic *Hrókr*,[1] Swedish *Råka*, Dutch *Roek*, Gaelic *Rocas*), the *Corvus frugilegus* of ornithology, and throughout a great part of Europe the commonest and best-known of the Crow-tribe. Besides its pre-eminently gregarious habits, which did not escape the notice of Virgil (*Georg.* i. 382)[2] and are so unlike those of nearly every other member of the *Corvidæ*, the Rook is at once distinguishable from the rest by commonly losing at an early age the feathers from its face, leaving a bare, scabrous, and greyish-white skin that is sufficiently visible at some distance. In the comparatively rare cases in which these feathers persist, the Rook may be readily known from the black form of **Crow** (vol. vi. p. 618) by the rich purple gloss of its black plumage, especially on the head and neck, the feathers of which are soft and not pointed. In a general way the appearance and manners of the Rook are so well known, to most inhabitants of the British Islands especially, that it is needless here to dwell upon them, and particularly its habit of forming communities in the breeding-season, which it possesses in a measure beyond that of any other land bird of the northern hemisphere. Yet each of these communities, or rookeries, seems to have some custom intrinsically its own, the details of which want of space forbids any attempt to set before the reader. In a general way the least-known part of the Rook's mode of life are facts relating to its migration and geographical distribution. Though the great majority of Rooks in Britain are sedentary or only change their abode to a very limited extent, it is now certain that a very considerable number visit this country in or towards autumn, not necessarily to abide here, but merely to pass onward, like most other kinds of birds, to winter further southwards; and, at the same season or even a little earlier, it cannot be doubted that a large proportion of the young of the year emigrate in the same direction. As a species the Rook on the European continent only resides during the whole year throughout the middle tract of its ordinary range. Further to the northward, as in Sweden and northern Russia, it is a regular summer-immigrant, while further to the southward, as in southern France, Spain, and most parts of Italy, it is, on the contrary, a regular winter-immigrant. The same is found to be the case in Asia, where it extends eastward as far as the upper Irtish and the Ob. It breeds throughout Turkestan, in the cold weather visiting Afghanistan, Cashmere, and the Punjab, and Sir Oliver St John found a rookery of considerable size at Casbin in Persia. In Palestine and in Lower Egypt it is only a winter-visitant, and Canon Tristram noticed that it congregates in great numbers about the mosque of Omar in Jerusalem.[1]

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[1] The bird, however, does not inhabit Iceland, and the language to which the name belongs would perhaps be more correctly termed Old Teutonic. From this word is said to come the French *Freux*. There are many local German names of the same origin, such as *Rooke*, *[illegible]*, *[illegible]*, and others, but the bird is generally known in Germany as the *Saat-Krähe*, i.e., Seed- (= Corn-) Crow.

[2] This is the more noteworthy as the district in which he was born and educated is almost the only part of Italy in which the Rook breeds. Shelley also very truly speaks of the "legioned Rooks" to which he stood listening "mid the mountains Euganean."

There are several moot points in the natural history of the Rook which it is impossible here to do more than mention. One is the cause of the curious shedding on reaching maturity of the feathers of its face, and another the burning question whether Rooks are on the whole beneficial or detrimental to agriculture. In England the former opinion seems to be generally entertained, but in Scotland the latter has long been popular. The absence of sufficient observations made by persons at once competent and without bias compels the naturalist to withhold his judgment on the matter, but the absence of such observations is eminently discreditable to the numerous Agricultural Societies of the United Kingdom. (A. N.)

ROOKE, Sir George (1650–1709), naval commander, was born near Canterbury in 1650. Entering the navy as a volunteer, he became post-captain in 1680, and vice-admiral in 1692. In May of this year he greatly distinguished himself in a night attack on the French fleet off Cape La Hogue, when he succeeded in burning six of their ships. Shortly afterwards he received the honour of knighthood and a reward of £1000. In 1702 he commanded the expedition against Cadiz, and on the passage home captured the Plate fleet off Vigo. Along with Sir Cloudesley Shovel he took part in the capture of Gibraltar, 21st July 1704. On 13th August of the same year he attacked the French fleet off Malaga, the battle being drawn. On account of the dissatisfaction expressed indirectly at the result of the contest, he retired from the service in February 1705. He died 24th January 1709.

See *The Life and Glorious Actions of Sir George Rooke*, 1707.

ROPE. All varieties of cordage having a circumference of an inch or more are known by the general name of rope. Twisted cordages of smaller dimensions are called cords, twines, and lines, and when the dimensions are still smaller the article becomes thread or doubled yarn. All these varieties of cordage are composed of at least two, and in most cases of very many separate yarns, which are textile fibres drawn out and twisted into a uniform compact line. From thread and fine twine upwards the whole art of manufacture is simply that of twisting together fibres and yarns, but the comparative heaviness and coarseness of the materials operated on in rope-making render necessary the adoption of strong machinery and modified processes which clearly define this manufacture as a distinct calling. The modern trade of rope-making is again divided into two branches dealing respectively with certain vegetable fibres and with metallic wire. Silk cords and hair lines and ropes do not come within the scope of rope-making proper.

Vegetable fibres fit for rope-making are numerous, but ordinarily not many are employed. Speaking generally, for the prime requisites of strength, suppleness, flexibility, and durability, none can compete with the common **Hemp** (*q.v.*), which consequently is the staple of the rope-maker. **Manila Hemp** (*q.v.*) is a fibre of the most remarkable tenacity, of unapproached value for heavy cordage, but too stiff and woody for small cords and twines. After these in utility come sisal hemp of South America (*Agave sisalana*), phormium hemp of New Zealand (*Phormium tenax*, see vol. xviii. p. 812), and the sunn hemp of the East Indies (*Crotalaria juncea*, see vol. xi. p. 647)—all fibres of great strength, and largely used by rope-makers. Among fibres more rarely seen in rope-works are Jubbulpore hemp (*Crotalaria tenuifolia*), bowstring hemp (*Sanseviera zeylanica*), and other "hemps" of the East Indies, and plantain fibre (*Musa paradisica*) and agave fibre (*Agave americana*) of America. Ropes and twine of cotton are extensively made, especially for driving-bands for machinery. **Jute** (*q.v.*) is now in considerable use by rope-makers, on account of its cheapness, but it is very deficient in strength and durability. **Coir** (see vol. vi. p. 917) is also largely employed, and many other fibres are used, principally in the localities of their production.

A rope is composed of a certain number of "strands," the strand being itself made up of many "yarns." Three strands laid or twisted together form a "hawser-laid" rope, and three such hawsers similarly laid make a "cable-laid rope" or "cable." A "shroud-laid" rope consists of four strands laid around a central strand or core. The prepared fibre is twisted or spun to the right hand to form yarn; the required number of yarns receive a left hand twist to make a strand; three strands twisted to the right make a hawser; and three hawsers twisted to the left yield a cable. Thus the twist in each successive operation is in a different direction from the preceding, and this alternation of direction serves to some extent to preserve the parallelism of the fibres.

The primary object of twisting fibres together in a rope is that by mutual friction they may be held together when a strain is applied to the whole. Hard twisting has the further advantage of compacting the fibres and preventing the penetration of moisture when the ropes are exposed to water. The proper degree of twist is a matter of considerable importance, as all twisting injuriously affects the strength of the individual fibres, and indeed it is possible to twist a cord so hard that it will break under the action. The degree of twist given to ropes is generally such that the rope is from three-fourths to two-thirds the length of the yarn composing it, and the lighter the twist the greater in proportion is the strength of the rope. In a bundle of fibres, equal in length and strength, fastened at the ends, each fibre will, upon a strain being applied to the bundle, bear its proper share of the stress; and the strength of the bundle will evidently be measured by adding together the strength of the separate fibres. But if this bundle is twisted so as to form a thread, the strain will no longer be equally distributed among the fibres, for, by the torsion, the external fibres of the bundle will be wound round those that lie nearest to the centre, and, in proportion to their distance from the heart of the bundle and the amount of twist given, will form spirals more or less inclined from the axis of the thread. The external fibres will in consequence be longer than the internal ones, and the greatest share of the strain will be borne by the latter. The depreciation in strength from twisting of hard woody fibres is greater than is the case with fine soft flexible fibres, such as common hemp of good quality.

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[1] It is right to mention that the Canon considers the Rook of Palestine entitled to specific distinction as *Corvus agricola* (*Proc. Zool. Society*, 1864, p. 444; *Ibis*, 1866, pp. 68, 69). In like manner the Rook of China has been described as forming a distinct species, under the name of *C. pastinator* (*Proc. Zool. Society*, 1845, p. 1), from having the feathers of its face only partially deciduous.

To prevent the decay of ropes which are frequently exposed to water, the yarns of which they are composed are soaked in hot Archangel tar before they are formed into strands. Tarring, it is found, also seriously diminishes the strength of the rope, but no other means of preventing water from penetrating and rotting the fibre has yet been found. M. Duhamel, from a series of investigations made in 1741–46, came to the conclusion that, apart from exposure to wet, untarred cordage in constant service was about one-third more durable than tarred, that it retained its strength for a longer period when kept in store, and that it resisted the ordinary influences of the weather better than when it was tarred. Subsequent experience has fully borne out these conclusions, and now that Manila hemp, which withstands the influence of water well, is so extensively used for heavy cordage, tarring is no longer so generally practised in rope-making as was at one time the case.

Ropewalk Spinning.—The sequence of operations in this ancient but still greatly used method of working is—(1) heckling the fibre; (2) spinning the yarn; (3) tarring the yarn (when necessary); (4) forming the strands; (5) laying the strands into ropes.

Heckling differs in no way from the hand-heckling process used in the preparation of flax (see vol. xiv. p. 604–5). The heckle-board consists of a wooden plank, studded with strong tapered and sharp-pointed steel prongs. A series of such heckle-boards is used in the progressive heckling operation, the prongs diminishing in size and being closely set together. In drawing his "stricks" of fibre through these gradually diminishing heckles the workman not only combs out and disentangles the material, separating "tow" from "line," but he also splits up and makes finer the fibres upon which he operates. A little oil is sprinkled on the heckles in course of the process. The spinning is done in a covered and enclosed walk from 300 to 400 yards in length, at both ends of which the machines are placed. These (one variety of which is shown in fig. 1) consist of a series of "whirls" *d*, *d*, generally twelve in number, set in a semicircular frame *e*. The whirls are set in rapid rotation by a belt which passes over them from a wheel *bb*; or, what is now more usual, they are driven by the direct friction of the wheel itself pressed hard against them. The point of the prolonged axis of the whirl is bent into a hook, on which the ends of the fibre are hung for spinning. Each spinner carries around his waist a quantity of heckled fibre, and, fastening an end on the whirl hook, he walks backward down the walk giving out even proportions of fibre all the while and regulating his pace so that the amount of twist communicated to the yarn is uniform. He draws the fibre from his waist with the left hand and lets it slip between the thumb and finger of the right, which, protected by a piece of woollen cloth, compresses and moulds into cylindrical form the yarn as it is spun. At intervals in the length of the walk there are posts and rails supplied with hooks into which the spinner throws the yarn to keep it off the ground. The spinners commonly work from both ends in sets of six, and as each set arrives at the end of the walk the yarns spun by them are unhooked from the whirls, tied together at the ends, and collected in large hooks along the side of the walk till a haul of about four hundred yarns is accumulated. When tarred rope is to be made the haul of yarn is at this stage passed through a kettle of tar heated to about 212° Fahr., from which it is drawn through a nipping apparatus which squeezes out superfluous tar, leaving the yarn a bright brown colour soaked with about one-fourth its weight of tar.

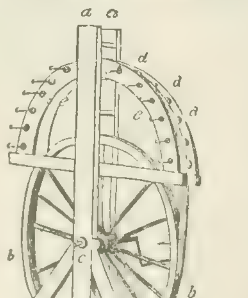

Fig. 1.

For "forming" strands the spun yarn is wound, each yarn separately, on bobbins and placed in a bobbin frame. From their bobbins the yarns are conducted through a concentric circle of holes in a steel register plate, behind which they come together and are pressed through a trumpet-mouthed tube, which varies in diameter according to the diameter of the strand being formed; and they are attached to the hooks of the forming machine or traveller. This machine travels down the ropewalk on rails moved by an endless rope passing over a grooved pulley, the hooks being at the same time set in rotation by gearing connected with the pulley. When the machine has reached the end of the walk and sufficient "twist" is given to the three strands, they are unhooked and hung together on the centre hook of the machine. A grooved conical block of wood called a "top" is inserted between the strands, one of which lies in each of the three equidistant concentric grooves. The strands at the fore-end are cut away and attached separately to three other hooks. The laying of the three strands into a hawser is now proceeded with by giving a reverse rotation to the central hook on which at the lower end they are hung. As twist is communicated to the strand between the top and the machine, the former is forced away towards the fore-end, and on the uniform motion outwards of the top depends the even and regular character of the lay. While the hook at the lower end is rotating in one direction to lay the strands, the three hooks holding the strands at the upper end are correspondingly revolved in the opposite direction to keep up the amount of twist in them which they would otherwise lose by the unwinding effect of the revolution of the laying hook. As the laying proceeds, the forming machine is gradually dragged up the rails owing to the shortening of the strands caused by twisting them into a hawser. The formation of a cable from three hawsers is effected in a similar manner; but the great weight of material dealt with necessitates some modified operations to ensure uniformity of laying. In many rope-works distinct machinery is used for the strand laying and rope-forming operations.

Machine or Factory Rope-Making.—The ropewalk system of manufacture has several inconveniences, among which, in towns, the most serious is the difficulty and expense of obtaining the long narrow strips of ground it requires. Hand-made ropes are also subject to certain irregularities of twist, and the yarns are less uniform than can be obtained from the operations of automatic machinery. Moreover in machine-spinning it is possible so to form the strands and lay the finished rope that any strain can be more equally distributed over all the fibres than can be done with hand-spinning and twisting. The essential feature of the factory system consists in having yarns, strands, and ropes wound upon bobbins or drums in each successive stage, the material being drawn direct from the reel to be twisted and immediately wound up again. The length of rope made is only limited by the carrying capacity of the drum on which it is finally wound.

The earliest practical attempt to introduce machine rope-spinning was made by Cartwright, the famous inventor of the power loom,—who, in 1792, obtained a patent for a machine called by him a "Cordelier." Cartwright's cordelier, as improved in 1805 by Captain Huddart, became the basis of modern laying and forming machines. Numerous modifications and improved combinations have been introduced, but the principle on which they are worked is essentially the same. A complete set of rope and twine making machinery includes heckling machines, spreading and drawing frames for line yarns, and carding engines and drawing frames for tow. These machines do not differ from the ordinary preparing machinery in flax manufactures, nor is there any essential difference in the spinning frames for the smaller counts of yarns. The heavier yarns for rope-making are spun upon a gill-spinning frame, such as Goode's automatic spinner, which is fitted with a self-feeding motion by which when the sliver is presented in large quantity the rate of motion and spinning is proportionally increased, when the sliver becomes attenuated the motion is correspondingly slow, and when the sliver is broken the spinner stops. Thus a yarn well laid and uniform in thickness is secured by automatic machinery. For spinning heckled yarn such as is used in the ropewalk a machine of simple construction, Ronald's patent (fig. 2), is now extensively used. The yarn in this machine has the advantage of being hand-spun, as the spinner draws out, compresses, and feeds the fibre from a supply round his or her waist just as on the ropewalk. In this way the strength, evenness, and other good qualities of hand-spun yarn are secured.

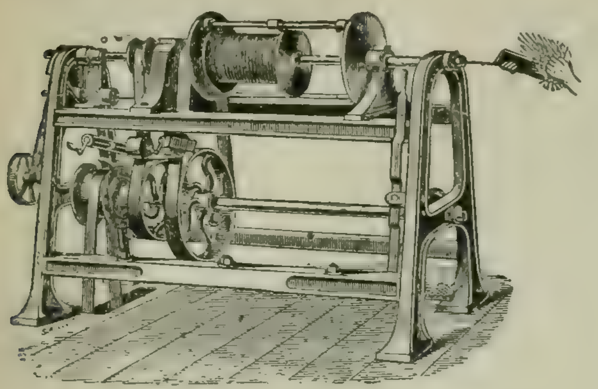

Fig. 2.

Twine Manufacture.—The making of twines and small cords forms a distinct branch of the rope trade, the whole of the operations being carried out on a series of machines in which a large number of twines and cords are twisted and otherwise prepared simultaneously, while in rope-making the machines deal only in general with the material of one rope at a time. Common twines are twisted from prepared yarns on a twine-twisting frame, the same in principle as the doubling spindle frames of the ordinary textile trade. The bobbins of yarn are placed on pegs in the creel above the twisting spindles, from two to five bobbins being placed over each spindle according to the number of yarns which go to make up the twine. These yarns are passed round a pair of rollers, which pull them off the bobbins and deliver them evenly and with regularity to the flyer of the spindle, by which they are twisted and wound on the bobbin round which they rotate. By a recent improvement the required number of yarns, instead of being drawn from separate bobbins, are first wound together upon one bobbin in a "doubling winding frame." A series of bobbins so filled are placed on spindles in a twisting frame and twisted by inverted flyers; the twisted twine is drawn off by pairs of conical grooved twist rollers round which it passes, and is wound on taking-up bobbins. Cord or cable laid twine—that is, twine twisted first as above and then in strands of three, cabled or twisted in the reverse direction—is prepared on cabling machines. At the back of the machine the yarns receive their first twist as above described, and thence the strands from three spindles are drawn off together over a pair of cone rollers, by which they are laid, and thence they pass to the front of the machine, where there is a range of powerful flyers and spindles by which they are twisted and wound upon a large bobbin. Twines and cords at this stage are rough and bristly in appearance, and for finishing them they undergo a dressing, sizing, and polishing operation in a special polishing machine. From the bobbins they are unwound and passed through a trough of hot water, thence in parallel order over the surface of a set of rubbing rollers covered with strong card cloth revolving at high speed in a contrary direction to that in which the twine is travelling. The friction of the strong card wires shaves and smooths the twine, which then passes through the sizing trough containing a hot paste, usually of potato farina. The superfluous paste is squeezed out by passing the twine between rollers, and it is next passed over rollers covered with rough coir, which presses in all fibres yet protruding from the twine, and finally it is dried by passing round a range of steam-heated cylinders, running parallel with which are coir-covered polishing rollers which smooth the twine while it is being dried. The finished twine is wound into balls of a definite weight on a balling machine.

Rope-Spinning.—The machines required for making ropes from spun yarn consist of a forming flyer for forming the strands and a laying machine for twisting the strands into rope. A cabling machine for uniting three-strand hawsers into a cable is only a second laying machine of larger and heavier dimensions; but it is still a common practice to lay the heavy cable on the ropewalk. The two operations of forming strands and laying rope may be performed on one combined machine, especially in dealing with light ropes composed of a few yarns; but as a rule separate machines are preferred for each operation. In a simple machine designed only for a single twisting operation there must be one fixed and one revolving section. If the section which contains the bobbins of yarn to be twisted is fixed, then the section in which is placed the bobbin for receiving the twisted product must be made to revolve. A machine in which the two operations of forming strands and laying rope are combined is of necessity cumbrous in proportion and complex in gearing. It must embrace three forming flyers, to form simultaneously three strands which in another part of the machine are laid into one rope. The forming flyers revolve in one direction to twist the strands, while they move in the opposite direction as a whole with the revolution of the laying section which gives the finishing twist to the rope, and such complex inter-revolutions within one frame are somewhat unwieldy. Finally, the machines may be made with their axis of revolution either vertical or horizontal. With all these alternatives there is considerable room for modification in the twisting arrangements.

The ordinary form of strand-laying machine is a vertical flyer (fig. 3). It consists of two or more upright frames or creels *a*, *a*, capable of holding ranged above each other a certain number of bobbins, from which the yarn may be easily run off and carried upward to be formed into a strand. The creels are fixed above and below in a stout circular plate and framework *bb*, to which motion of rotation is given by gearing *c*, placed on the under side. At the upper end of the revolving framework the yarns from the various bobbins are passed through a register plate *d*, a circular piece of metal pierced with concentric holes corresponding in number with the bobbins which the creels are fitted to hold. Beyond the register plate *d* the yarns come together in the trumpet-shaped mouth of the stranding tube. The stranding tube itself varies in gauge according to the diameter of the strand being made, and in it the yarns are caught, rounded, compressed, twisted, and smoothed, and, passing out, the new-formed strand is drawn over a pulley *e* around "drawing-off" gear *f*, and wound on a large bobbin or drum *g*. The speed at which the drawing-off gear revolves regulates the hardness or softness of twist given to the strand, and its rotation can be varied at pleasure by the use of change wheels.

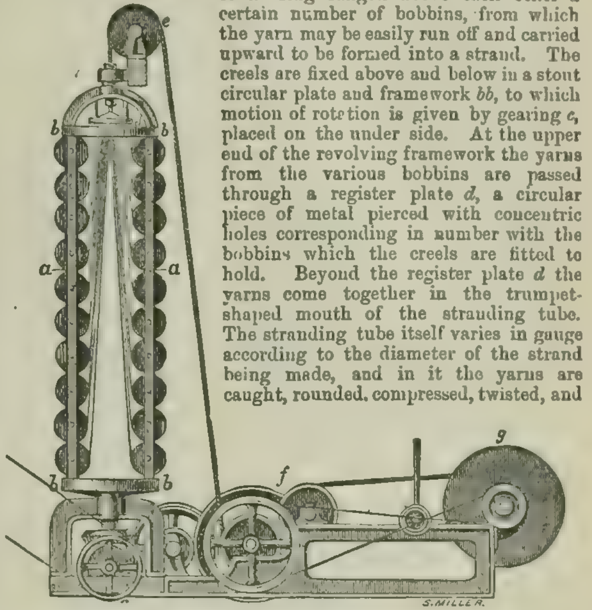

Fig. 3.

In fig 4 is illustrated a different form of stranding machine, of American origin. In this apparatus the bobbin creel is stationary and the yarns are drawn through the register plate and twisted in the stranding tube by the revolution of the entire framework in which are placed the drawing-off gear and the large drum or spool on which the finished strand is wound. The advantages claimed for this apparatus are facility of replacing bobbins as the yarns run out, and increased production owing to the rapid and uninterrupted rotation of the flyer.

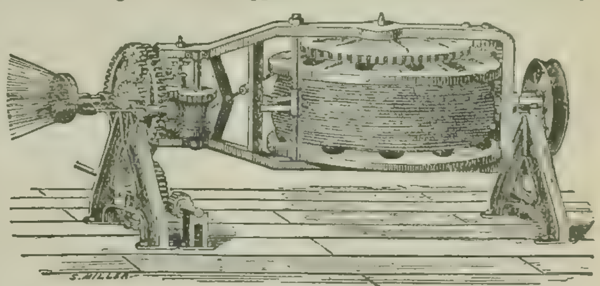

Fig. 4.

In the ordinary laying machine there are only three bobbins of strand to deal with; but, from the fact that it is necessary to give a certain amount of "forehard" or twisting to the strands themselves while they are being twisted together in an opposite direction for laying, the machine is not without complexity. The three bobbins revolve together within a strong iron frame, and that motion forms the strand into a rope. But each bobbin is at the same time revolving in a contrary direction on its own axis at the rate tempered to the amount of forehard it is desired to put on the rope in laying. Moreover, in order to deliver evenly and in equal quantities the heavy and intractable strands from each bobbin to the laying top, it is necessary to have within each bobbin frame a drawing-off motion, and thus we have three distinct sets of motions in an ordinary laying machine. Fig. 5, in which only one bobbin frame is shown, will make plain one method of communicating these three motions, which in this case are controlled by a series of three shafts, placed one within the other. The external shaft gives motion to the entire apparatus, and its revolution in one direction forms the rope, which passes away over a pulley. The second shaft controls the spur wheel *a*, which, geared into the spur-wheel *a′* attached to the bobbin frame, turns it in a direction contrary to the motion of the whole. The internal shaft gears into a spur-wheel *b*, which again is centred on a tubular shaft *c* passing into the bobbin frame, and by a pair of bevel wheels controlling the rate of motion of the "drawing-off" pulley *d*, around which the strand is once wound, and from which it is conveyed by the tubular shaft to a small guide pulley on the upper part of the revolving frame.

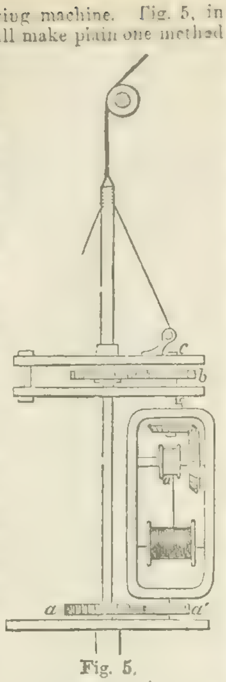

Fig. 5.

An American rope-laying machine is in use, similar in principle to the forming machine fig. 4, from which it differs only in having the strand bobbins mounted in flyers to give the strand the necessary amount of forehard in laying.

Wire Rope.—Ropes made of wire have only come into use in the course of the present century, but now their employment is very extensive, and they play an important part in connexion with traction railways, mines, collieries, hoists, steam ploughing, and many other modern developments of industry. In the year 1822 a suspension bridge of wire was erected at Geneva. The wire used in this case, however, was not twisted. but consisted of parallel bundles bound with wire and other coverings wrapped spirally around them to compact and keep the whole together. A bundle of small wires so treated presents the maximum of strain-resisting power combined with great rigidity, but it is obviously unsuited for most of the uses to which rope is put. Formed wire rope, consisting of strands laid in the manner of ordinary rope, began to be made about 1837; and now wire ropes of many kinds and dimensions are made from charcoal iron wire of fine quality, from mild steel, and from fine crucible steel. Copper wire and brass wire are also used for rope-making.

Wire ropes are stranded and laid or closed in machines which do not differ in essential features from the ordinary rope-making machinery. Both vertical and horizontal forms of revolving machines are used; but, as the rope-closing machine has sometimes to carry as many as nine bobbins of strand, each with about two tons of wire, a vertical machine is best for enormous weights. An ingenious wire-rope machine has been invented by Mr Archibald Smith, in which the bobbins of wire are suspended, and only the framework around them and the wire drawn off are rotated for the forming and laying operations, and thus the necessity for rotating these enormous weights at a high speed is obviated.

The number of wires in a wire-rope strand are few—generally from six to nine, and never more than eighteen. They are lightly twisted in the stranding machine, and they receive no foretwist in the rope-closing apparatus. The strands, on the other hand, which go to form a rope are numerous—from six to nine and upwards; and they are always wound round a core, which is generally of hemp, but sometimes a wire core is used. A wire rope thus forms a series of gentle spirals arranged continuously round a core. A large proportion of the wire is galvanized, to protect it from rusting.

The following table shows the relative circumference, weight, and strength of hemp, charcoal iron wire, and steel wire round ropes:—

Hemp.		Charcoal Iron.		Crucible Steel.		Breaking Strain.	Working Load.
Circumference.	Weight per Fathom	Circumference.	Weight per Fathom.	Circumference.	Weight per Fathom.		
Inches.	lbs.	Inches.	lbs.	Inches.	lbs.	Tons.	Cwt.
11	30	5	·22	4	14	32	100
10	26	4¼	15½	3½	9	24	85
9	20	3¾	12	2¾	7	18	67
8	16	3¼	8½	2⅜	5½	16	50
7	12	2¾	6½	2⅛	4	11	36
6	9	2¼	4½	1⅞	3	8	28
5	6	1⅞	3	1½	1¾	5	18
4	4	1½	2	1¼	1¼	3	10
3	3	1¼	1½	⅞	¾	2	6

(J. PA.)

RORQUAL. See WHALE.

ROSA, SALVATOR (1615-1673), a renowned painter of the Neapolitan school, was born in Arenella, in the outskirts of Naples, in 1615: the precise day is given as 20th June, and also as 21st July. His father, Vito Antonio de Rosa, a land surveyor, was bent upon making the youth a lawyer, and sent him to study in the convent of the Somaschi fathers. Here Salvator began showing a turn for art: he went in secret to his maternal uncle Paolo Greco to learn the practice of painting, but soon found that Greco had little pictorial lore to impart, so he transferred himself to his own brother-in-law Francesco Fracanzaro, a pupil of Ribera, and afterwards had some practice under Ribera himself. Above all he went to nature, frequenting the Neapolitan coast, and keeping his eyes open and his hand busy. At the age of seventeen he lost his father; the widow was left unprovided for, with at least five children, and Salvator found himself immersed in a sea of troubles and perplexities, with nothing for the while to stem them except a buoyant and adventurous temperament. He obtained some instruction under the battle-painter Aniello Falcone, but chiefly painted in solitude, haunting romantic and desolate spots, beaches, mountains, caverns, verdure-clad recesses. Hence he became in process of time the initiator of romantic landscape, with a special turn for scenes of strange or picturesque aspect—often turbulent and rugged, at times grand, and with suggestions of the sublime. He picked up scanty doles when he could get them, and his early landscapes sold for a few pence to petty dealers. The first person to discover that Rosa's work was not as trumpery as it was cheap was the painter Lanfranco, who bought some of the paintings, and advised the youth to go to Rome. Hither in 1635, at the age of twenty, Rosa betook himself; he studied with enthusiasm, but, catching fever, he returned to Naples and Falcone, and for a while painted nothing but battle-pieces, and these without exciting any attention. This class of work was succeeded by the landscape art peculiarly characteristic of him—wild scenes wildly peopled with shepherds, seamen, or especially soldiers. He then revisited Rome, and was housed by Cardinal Brancaccio; this prelate being made bishop of Viterbo, Rosa painted for the Chiesa della Morte a large and noticeable picture of the Incredulity of Thomas—the first work of sacred art which we find recorded from his hand. At Viterbo he made acquaintance with a mediocre poet named Abati, and was hence incited to try his own faculty in verse. He then returned to Naples. Here the monopolizing triumvirate—Ribera, Caracciolo, and Corenzio—were still powerful. Rosa was as yet too obscure to suffer from their machinations; but, having painted a picture of Tityus Torn by the Vulture, which went to Rome and there produced a great sensation, he found it politic to follow in the footsteps of his fame, and once more, in 1638, resought the papal city.

Rosa was a man of facile and versatile genius, and had by this time several strings to his bow. It is said that, still keeping painting steadily in view as his real objective, he resolved to secure attention first as a musician, poet, improvisatore, and actor—his mother-wit and broad Neapolitan dialect (which appears to have stuck to him through life) standing him powerfully in stead. In the carnival he masqued as Formica and Capitan Coviello, and bustled about Rome distributing satirical prescriptions for diseases of the body and more particularly of the mind. As Formica he inveighed against the farcical comedies acted in the Trastevere under the direction of the celebrated Bernini. Some of the actors, in one of their performances, retaliated by insulting Rosa, but the public was with him, and he now enjoyed every form of success,—social prestige, abundant commissions, and any amount of money, which he was wont to throw about broadcast to the populace. In 1646 he returned to Naples, and is said to have taken an active part in the insurrection of Masaniello; certain it is that he sympathized with and admired the fisherman autocrat, for a passage in one of his satires proves this. His actual share in the insurrection is, however, dubious; it appears only in recent narratives, and the same is the case with the well-known story that at one time he herded with a band of brigands in the Abruzzi—an incident which cannot be conveniently dove-tailed into any of the known dates of his career. As regards the popular revolt against Spanish tyranny, it is alleged that Rosa, along with other painters—Coppola, Porpora, Micco Spadaro, Dal Po, Masturzo, the two Vaccari, and Cadogna—all under the captaincy of Aniello Falcone, formed the Compagnia della Morte, whose mission it was to hunt up Spaniards in the streets and despatch them, not sparing even those who had sought some place of religious asylum. He painted a portrait of Masaniello—probably from reminiscence rather than from life: indeed it is said that he painted him several times over in less than life size. On the approach of Don John of Austria the blood-stained Compagnia dispersed, Rosa escaping or at any rate returning to Rome. Here he painted some important subjects, showing the uncommon bent of his mind as it passed from landscape into history—Democritus amid Tombs, the Death of Socrates, Regulus in the Spiked Cask (these two are now in England), Justice Quitting the Earth, and the Wheel of Fortune. This last work, the tendency of which was bitingly satirical, raised a storm of ire and remonstrance. Rosa, endeavouring at conciliation, published a description of its meaning (probably softened down not a little from the real facts); none the less an order for his imprisonment was issued, but ultimately withheld at the instance of some powerful friends. It was about this time that Rosa wrote his satire named *Babylon*, under which name Rome was of course indicated.

Cardinal Giancarlo de' Medici now invited the painter to leave Rome—which had indeed become too hot to hold him—for Florence. Salvator gladly assented, and remained in the Tuscan capital for the better part of nine years, introducing there the new style of landscape; he had no pupils, but various imitators. Lorenzo Lippi the painter poet, Baldovini, and other *beaux esprits* shared with Rosa the hospitalities of the cardinal, and they formed an academy named I Percossi (the Stricken), indulging in a deal of ingenious jollity—Rosa being alike applauded as painter, poet, and musician. His chief intimate at this time was Lippi, whom he encouraged to proceed with the poem *Il Malmantile Racquistato*. He was well acquainted also with Ugo and Giulio Maffei, and housed with them more than once in Volterra, where he wrote other four satires—*Music*, *Poetry*, *Painting*, and *War*. About the same time he painted his own portrait, now in the Uffizi Gallery of Florence. Finally he reverted once more to Rome, and hardly left that city again. Much enmity still brooded there against him, taking the form more especially of an allegation that the satires which he zealously read and diffused in MS. were not his own production, but filched from some one else. Rosa indignantly repelled this charge, which remains indeed quite unsubstantiated, although it is true that the satires deal so extensively and with such ready manipulation in classical names, allusions, and anecdotes that one is rather at a loss to fix upon the period of his busy career at which Rosa could possibly have imbued his mind with such a multitude of semi-erudite details. It may perhaps be legitimate to suppose that his literary friends in Florence and Volterra had coached him up to a large extent—the satires, as compositions, remaining none the less strictly and fully his own. To confute his detractors he now wrote the last of the series, entitled *Envy*. Among the pictures of his closing years were the admired Battlepiece now in the Louvre, painted in the short space of forty days, full of long-drawn carnage, with ships burning in the offing; Pythagoras and the Fishermen; the Oath of Catiline (Pitti Gallery); and the very celebrated Saul and the Witch of Endor (Louvre), which is perhaps his latest work. He undertook a series of satirical portraits, to be closed by one of himself, but while occupied with this project he was assailed by dropsy, which, after lasting fully half a year, brought his life to a close on 15th March 1673. In his last moments he married a Florentine named Lucrezia, who kept his house and had borne him two sons, one of them surviving him, and he died in a contrite frame of mind. He lies buried in the Chiesa degli Angeli, where a protrait of him has been set up. Salvator Rosa, after the hard struggles of his early youth, had always been a successful man, and he left a handsome fortune.

Rosa was indisputably a great leader in that modern tendency of fine art towards the romantic and picturesque which, developing in various directions and by diversified processes, has at last almost totally differentiated modern from olden art. He saw appearances with a new eye, and presented new images of them on his canvases, and deserves therefore all the credit due to a vigorous innovator, even if we contest the absolute value of his product. He himself courted reputation for his historical works, laying comparatively little stress on his landscapes; in portraits he was forcible. In chiaroscuro he is simple and effective; his design has energy and a certain grandeur, without any high type of form or any superior measure of correctness. His colour is too constantly of a sandy or yellowish-grey tone. Personally he was a man of high spirit, and he sold his pictures at large prices, more (it is said) to assert the honour of his art than from love of money; rather than sell them cheap he destroyed them. In his later Florentine period he etched several of his works, subjects of mythology, soldiering, &c. He was choleric, but kind and generous. Though a man of gaiety and pleasure, and a jovial boon-companion, he does not appear to have been vicious in any serious degree. He was talkative, very sharp-tongued, and an unblushing encomiast of his own performances. Among his pictures not already mentioned we may name, in the London National Gallery, Mercury and the Dishonest Woodman, and two others; in Raynham Hall, Belisarius; in the Grosvenor Gallery, Diogenes; in the Pitti Gallery, a grand portrait of a man in armour, and the Temptation of St Anthony, which contains his own portrait. This last subject appears also in St Petersburg, and in the Berlin Gallery.

The satires of Salvator Rosa deserve more attention than they have generally received. Though considerably spread abroad during his lifetime, they were not published until 1719. They are all in terza rima, written without much literary correctness, but remarkably spirited, pointed, and even brilliant. They are slashingly denunciatory, and from this point of view too monotonous in treatment. Rosa here appears as a very severe castigator of all ranks and conditions of men, not sparing the highest, and as a champion of the poor and down-trodden, and of moral virtue and Catholic faith. It seems odd that a man who took so free a part in the pleasures and diversions of life should be so ruthless to the ministers of these. The satire on *Music* exposes the insolence and profligacy of musicians, and the shame of courts and churches in encouraging them. *Poetry* dwells on the pedantry, imitativeness, adulation, affectation, and indecency of poets—also their poverty, and the neglect with which they were treated; and there is a very vigorous sortie against oppressive governors and aristocrats. Tasso's glory is upheld; Dante is spoken of as obsolete, and Ariosto as corrupting. *Painting* inveighs against the pictorial treatment of squalid subjects, such as beggars (though Rosa must surely himself have been partly responsible for this misdirection of the art), against the ignorance and lewdness of painters, and their tricks of trade, and the gross indecorum of painting sprawling half-naked saints of both sexes. *War* (which contains the eulogy of Masaniello) derides the folly of hireling soldiers, who fight and perish while kings stay at home; the vile morals of kings and lords, heresy, and unbelief also come in for a flagellation. In *Babylon* Rosa represents himself as a fisherman, Tirreno, constantly unlucky in his net-hauls on the Euphrates; he converses with a native of the country, Ergasto. Babylon (Rome) is very severely treated, and Naples much the same. *Envy* (the last of the satires, and generally accounted the best, although without strong apparent reason) represents Rosa dreaming that, as he is about to inscribe in all modesty his name upon the threshold of the temple of glory, the goddess or fiend of Envy obstructs him, and a long interchange of reciprocal objurgations ensues. Here occurs the highly-charged portrait of the chief Roman detractor of Salvator (we are not aware that he has ever been identified by name); and the painter protests that he would never condescend to do any of the lascivious work in painting so shamefully in vogue.

As authorities for the life of Salvator Rosa, Passeri, *Vite de' Pittori*, may be consulted, and Salvini, *Satire e Vita di Salvator Rosa*; also Baldinucci and Dominici. The *Life* by Lady Morgan is a romantic treatment, mingling tradition or mere fiction with fact. (W. M. R.)

ROSAMOND, Fair. Rosamond Clifford, mistress of Henry II., was the daughter of Sir Walter Clifford, a Berkshire knight (Dugdale, *Monasticon*, iv. 366). She appears to have died in or about the year 1177, and was buried in the nunnery at Godstow. At the command of St Hugh, bishop of Lincoln, her body was removed from the church in which it had been buried, and was interred again outside the church. Such are all the facts that are known about Fair Rosamond. She is said to have been the mother of William Longsword, and of Geoffrey, archbishop of York. But this is impossible, for both William and Geoffrey were born before 1155, and Rosamond was still a girl at the time of her death. The story of the labyrinth or maze built by Henry to conceal her from Queen Eleanor occurs first in Brompton (end of 12th century). The legend of her death at Queen Eleanor's hand is variously related, but does not appear to be traceable beyond the first half of the 14th century. It can hardly be true in any form, for Eleanor was in confinement during the last fifteen years of Henry's reign.

ROSARIO, a river-port on the Paraná, and the chief town of a department in the province of Santa Fé in the Argentine Republic, 186 miles by river from Buenos Ayres. In 1853 an insignificant village, with less than four thousand inhabitants, it now ranks in commercial importance as the second city in the republic, being the centre of almost the entire trade of the eleven provinces lying between the Paraná and the Andes and the terminus of the great railways which since 1863 have gradually been pushed further north and west to Cordoba (1870), Tucuman (1876), Mendoza (1884), and San Juan (1885). The population had increased to 21,000 by 1870 and to 45,000 in 1883, while the imports in the latter year reached the value of £4,560,000 and the exports £3,780,000.

Rosario stands about 65 feet above the level of the river. It is laid out chess-board fashion; and the streets are paved, and lighted with gas (introduced in 1869). The area, 145 acres in 1870, is now about 2000 acres. Brick is the principal building material, and the houses are mostly of one story. There are no suburbs, the city terminating abruptly on the great plain. The industrial establishments are extensive foundries, a large number of brick kilns, a jam and fruit-preserving factory, breweries, tanneries, soap-works, saw-mills, and flour-mills.

Rosario was founded in 1725 by Don Francisco Godoy as a settlement of "reduced" Calchaqui Indians, and the parish was established in 1731 and dedicated to Our Lady of the Rosary, whose colours, blue and white, were adopted in 1813 as those of the national flag. The prosperity of the town dates from 1854, when it was made a port of entry by General Urquiza. In 1867 and 1868 it suffered from a severe cholera plague. The proposal to make Rosario the capital of the republic instead of Buenos Ayres has more than once been nearly carried in the legislature.

ROSARY (*Rosarium*, Germ. Rosenkranz) is defined in the Roman *Breviary* as a series of one hundred and fifty repetitions of the "Ave Maria," with a "Pater Noster" interpolated after each decade, the whole exercise being accompanied with pious meditation on the mysteries of redemption. This particular method of devotion, though said to have been not altogether unknown previously, first became extensively popular through St Dominic, who was admonished by the Virgin Mary to preach the rosary as a special defence against heresy and vice. The Feast of the Rosary of the Blessed Virgin (Duplex Majus—first Sunday in October) was instituted by Clement XI. to commemorate the successes of the Christian arms against the Turks in 1716; it has reference also to the battle of Lepanto (Oct. 7, 1571). The word "rosary" or "chaplet" (capellina) is also employed to denote the string of beads of larger and smaller size by the use of which in repeating the rosary the faithful secure the due alternation of Ave Marias with Pater Nosters. In strict language the word chaplet is applied only to the "lesser" rosary, consisting of but fifty Aves and five Pater Nosters. Similar expedients to assist the memory in complex repetitions occur among Mohammedans and Buddhists: in the former case the so-called sobha has ninety-nine beads, and is used for the pious repetition of the ninety-nine names which express the attributes of God.

ROSAS, Juan Manuel de, born at Buenos Ayres March 30, 1793, died in England March 14, 1877 (see Argentine Republic, vol. ii. p. 491).

ROSCELLINUS (also written Rousselin and Rucelinus), often called the founder of nominalism (see Scholasticism), was born in Armorica or Lower Brittany somewhere about the middle of the 11th century. Our information about his life is scanty, and, as he appears to have written nothing, we are dependent for a knowledge of his doctrine upon the statements of his opponents and the cursory statements of later writers. He studied at Soissons and Rheims, was afterwards attached to the cathedral of Chartres, and became canon of Compiègne. It seems most probable that Roscellinus was not strictly the first to promulgate nominalistic doctrines; but in his exposition they received more definite expression, and, being applied to the dogma of the Trinity, attracted universal attention. The chief opponent of Roscellinus was Anselm of Canterbury, who defended at once the realistic doctrine of universals and the orthodox tradition of the church. It appears from the polemic of Anselm that "the heretics in dialectic" whom he combats denied the substantial reality of universals, asserting, for example, that colour has no real existence except as coloured body. There is no reason, however, to suppose that Roscellinus meant thereby to deny the real existence of attributive differences in things, though Anselm endeavours to involve him in that consequence. But we may conclude from the censure of his pupil Abelard that his reaction against realism had led Roscellinus into rashness of expression. In conformity with his general nominalistic position, Roscellinus taught that whatever exists as a real thing or substance exists as one self-identical whole, and is not susceptible of division into parts. This was the part of his teaching which created so much scandal when applied to the doctrine of the Trinity. Roscellinus maintained that it is merely a habit of speech which prevents our speaking of the three persons as three substances or three Gods. If it were otherwise, and the three persons were really one substance or thing (*una res*), we should be forced to admit that the Father and the Holy Spirit became incarnate along with the Son. Roscellinus seems to have put forward this doctrine in perfect good faith, and to have claimed for it at first the authority of Lanfranc and Anselm. In 1092, however, a council convoked by the archbishop of Rheims condemned his interpretation, and Roscellinus, who was in danger of being lynched by the orthodox populace, recanted his error. As his enforced penitence did not prove lasting, his opinions were condemned by a second council (1094), and he himself fled to England. Forced by a fresh persecution to return to France at a later date, he taught at Tours and Loc-menach in Brittany (where he had Abelard as a pupil), and resided latterly as canon at Besançon. He is heard of as late as 1121, when he came forward to oppose Abelard's views on the Trinity.

ROSCOE, WILLIAM (1753–1831), historian and miscellaneous writer, was born March 8, 1753, at Liverpool, where his father, who was a market gardener, kept the public house known as the Bowling Green at Mount Pleasant. Young Roscoe showed an early eagerness in the acquisition of knowledge, and at twelve he left school, having learned all that his schoolmaster could teach. He now assisted his father in the work of the garden, and gave his leisure hours to reading and study. "This mode of life," he says, "gave health and vigour to my body, and amusement and instruction to my mind; and to this day I well remember the delicious sleep which succeeded my labours, from which I was again called at an early hour. If I were now asked whom I consider to be the happiest of the human race, I should answer, those who cultivate the earth by their own hands." At fifteen it was necessary to decide upon a path in life. A month's trial of bookselling sufficed to disgust him, and in 1769 he was articled to a solicitor, on whose death he was transferred to the office of Peter Ellames, who had more than a local reputation. Although a diligent student of law, he did not bid farewell to the Muses, but continued to read the classics, and made that acquaintance with the language and literature of Italy which became the instrument of his distinction in after life. He wrote many verses: his *Mount Pleasant* was composed when he was sixteen, and this and similar compositions, though now forgotten, won the esteem of good critics. In 1774 he commenced business as an attorney, and as soon as his professional gains warranted he married (1781). His sympathies were attracted to the miseries of the victims of the African slave trade, and he had the courage to denounce it in his native town, where not a little of the wealth came from this source. He wrote the *Wrongs of Africa* (1787–88), and entered into a controversy with an apostate Roman Catholic priest, who undertook to prove the "licitness of the slave trade" from the Bible. Roscoe was also a political pamphleteer, and like many other Liberals of the day hailed the promise of liberty in the French Revolution.

Meanwhile he had steadily pursued his Italian studies, and had made extensive collections relating to the great ruler of Florence. The result was his *Life of Lorenzo de' Medici, called the Magnificent*, which appeared in 1796, and at once placed him in the front rank of contemporary historians. The first edition was produced at Liverpool by John M'Creery, an elegant printer who had settled there by Roscoe's encouragement. Soon after the appearance of the book, Cadell & Davis bought the copyright for £1200. The work has often been reprinted, and translations in French, German, and other languages show that its popularity was not confined to its author's native land. Perhaps the most gratifying testimony was that of Fabroni, who had intended to translate his own Latin life of Lorenzo, but abandoned the design and induced Gaetano Mecherini to undertake an Italian version of Roscoe instead. In 1796 Roscoe gave up practice as an attorney, and had some thought of going to the bar, but abandoned the idea after keeping a single term. Between 1793 and 1800 he gave much attention to agriculture, and was one of those who helped to reclaim Chat Moss, near Manchester. He also succeeded in restoring to good order the affairs of a banking house in which his friend William Clark, then resident in Italy, was a partner. This task led to his introduction to the business, which eventually proved disastrous. His translation of Tansillo's *Nurse* appeared in 1798, and went through several editions. It is dedicated in a sonnet to his wife, who had practised the precepts of the Italian poet.

The Life and Pontificate of Leo the Tenth appeared in 1805, and was a natural sequel to that by which he had made his reputation. For one half of the copyright he received £2000 from Cadell & Davis. The work, whilst it maintained its author's fame, did not, on the whole, meet with so favourable a reception as the *Life of Lorenzo*. It has been frequently reprinted, and the insertion of the Italian translation in the *Index* did not prevent its circulation even in the papal states. Roscoe was elected member of parliament for Liverpool in 1806, but the House of Commons was not a congenial place, and at the dissolution in the following year he declined to be again a candidate. The commercial troubles of 1816 brought into difficulties the banking house with which he was connected, and forced the sale of his collection of books and pictures. It was on this occasion that he wrote the fine *Sonnet on Parting with his Books*. After a five years' struggle to discharge the liabilities of the bank, the action of a small number of creditors forced the partners into bankruptcy in 1820. For a time Roscoe was in danger of arrest, but ultimately he received an honourable discharge. On the dispersal of his library, the volumes most useful to him were secured by friends and placed in the Liverpool Athenæum, where they still remain. The sum of £2500 was also invested for his benefit. The independent and sensitive nature of Roscoe made both these operations difficult. Having now resigned commercial pursuits entirely, he found a pleasant task in the arrangement of the great library at Holkham, the property of his friend Coke. In 1822 he issued an appendix of illustrations to his *Lorenzo* and also a *Memoir of Richard Robert Jones of Aberdaron*, a remarkable self-taught linguist. The year 1824 was memorable for the death of his wife and the publication of his edition of the works of Pope, which involved him in a controversy with Bowles. His versatility was shown by the appearance of a folio monograph on the *Monandrian Plants*, which was published in 1828. It appeared first in numbers, and the last part came out after his recovery from a paralytic attack. He died on the 30th June 1831.

Roscoe's character was a fine one. Under circumstances uncongenial and discouraging he steadfastly maintained the ideal of the intellectual life. Sensitive and conscientious, he sacrificed his possessions to a punctilious sense of duty. He had the courage of unpopular opinions, and, whilst promoting every good object in his native town, did not hesitate to speak out where plain dealing, as in the matter of slavery, was required. Nor was his public life more meritorious than his private career, for he was a sincere friend and exemplary in his domestic relations. Posterity is not likely to endorse the verdict of Horace Walpole, who thought Roscoe "by far the best of our historians," but in spite of newer lights and of some changes of fashion in the world of letters, his books on Lorenzo de' Medici and Leo X. remain important contributions to historical literature.

In addition to the writings already named, Roscoe wrote tracts on penal jurisprudence, and contributed to the *Transactions* of the Royal Society of Literature and of the Linnean Society. The first collected edition of his *Poetical Works* was published in 1857, and is sadly incomplete, omitting, with other verses known to be from his pen, the *Butterfly's Ball*, a fantasy, which has charmed thousands of children since it appeared in 1820-21 in *Poems for Youth, by a Family Circle.*

The *Life* by his son Henry Roscoe (2 vols., London, 1833) contains full details of Roscoe's career. Fuller bibliographical details are given in Allibone's *Dictionary of English Literature.* (W. E. A. A.)

ROSCOMMON, an inland county of Ireland, in the province of Connaught, is bounded N.E. by Leitrim, N.W. by Sligo, W. by Mayo, W. and S. by Galway, E. by Longford, and E. and S. by Westmeath and King's County. The total area is 607,691 acres or nearly 950 square miles. The greater part of the county belongs to the great limestone plain, and is either flat or very slightly undulating. In the north-east, on the Leitrim border, the Braulieve Mountains, consisting of rugged and precipitous ridges of limestone gravel with flattened summits, attain an elevation at their highest point of 1377 feet; and in the north-west the Curlew Mountains, of similar formation, between Roscommon and Sligo rise abruptly to a height of over 800 feet. In the east the Slievebawn range, formed of sandstone, have a somewhat similar elevation. The Connaught coal field, which embraces the mountainous district round Lough Allen, touches on Roscommon, but the mineral is not much wrought within the limits of the county. Ironstone is also found in the same district, but mining is no longer prosecuted. The Shannon with its expansions forms nearly the whole eastern boundary of the county, and on the west the Suck from Mayo forms for over 50 miles the boundary with Galway till it unites with the Shannon at Shannon Bridge. The other tributaries of the Shannon within the county are the Arigna, the Feorish, and the Boyle. The lakes formed by expansions of the Shannon on the borders of Roscommon are Loughs Allen, Boderg, Boffin, Forbes, and Ree. Of the numerous other lakes within the county the most important are Lough Key in the north, very picturesquely situated with finely wooded banks, and Lough Gara in the west.

Agriculture.—The subsoil is principally limestone, but there is some light sandy soil in the south. In the level parts the land when drained and properly cultivated is very fertile, especially in the district known as the plains of Boyle, which includes some of the richest grazing land in Ireland. Along the banks of the Suck and Shannon there is, however, a large extent of bog and marsh. Of the 130,426 acres in crop in 1884 only 61,055 acres were under tillage, while 69,371 acres were under meadow and clover. Corn crops occupied 26,931 acres, of which 26,246 were under oats; and green crops occupied 33,443 acres, of which 26,178 were under potatoes and 5236 under turnips. Horses and mules in 1884 numbered 11,134, cattle 106,546 (of which 27,084 were milch cows), asses 8801, sheep 147,077, pigs 35,493, and goats 10,822. According to the latest return the county was divided among 707 proprietors possessing 577,999 acres at an annual valuation of £294,698. The following possessed upwards of 20,000 acres:—Colonel King-Harman, 29,242 acres; H. S. P. Mahon, 26,980; Lord De Freyne, 25,437; and Thos. Wills-Sandford, 24,411.

Railways.—A branch of the Midland Great Western Railway traverses the north-eastern boundary of the county to Sligo, and another the south-western boundary to Westport, whilst a third crosses the southern corner to Galway.

Administration and Population.—The county is divided into 10 baronies, and contains 53 parishes, 7 parts of parishes, and 1995 townlands. The population in 1881 was 132,490—a decrease of nearly one-half since 1841, when it was 253,591. The number of persons who could read and write in 1881 was 66,858, the number who could read only was 18,373, while 47,259 were unable to read or write. The number who spoke Irish and English was 21,494, and 95 were able to speak Irish only. The towns containing over 1000 inhabitants are Roscommon, the county town (2117), Boyle (2994), and Castlerea (1229). Within the county are also included a part (3683) of Athlone, the remainder being in Westmeath, a part (947) of Ballinasloe, the larger part being in Galway, and a very small portion (100) of Carrick-on-Shannon, which is situated chiefly in Leitrim. Ecclesiastically the county belongs to the Elphin diocese, with small portions in those of Tuam, Clonfert, and Ardagh. It is in the Connaught circuit. Assizes are held at Roscommon and quarter sessions at Athlone, Boyle, Castlerea, and Roscommon. There are nine petty sessions districts within the county and parts of four others. It is in the Dublin military district, and there are barrack stations at Athlone, Boyle, Castlerea, and Roscommon.

History.—The district was granted by Henry III. to Richard de Burgo, but remained almost wholly in the possession of the native septs. Until the time of Elizabeth Connaught was included in the two districts of Roscommon and Clare, and when these were subdivided Roscommon was assigned its present limits. It takes its name (Irish *Ros-Comain*, Comain's wood) from the county town, at which a monastery was founded by St Coman in the 6th century. All the old proprietors were dispossessed at the Cromwellian settlement, except the O'Conor family, now headed by the O'Conor Don. The most interesting antiquarian remains within the county are the ruins of Crogan, the ancient palace of the kings of Connaught. The principal ancient castles are the old stronghold of the M'Dermotts on Castle Island, Lough Key, the dismantled castle of the M'Donoughs at Ballinafad, the extensive fortress at Roscommon rebuilt by John D'Ufford, justiciary of Ireland in 1268, and the keep of Athlone, now used as barracks. The abbey of Boyle is in remarkably good preservation, and exhibits good specimens of the Norman arch. The other monastic remains within the county are of comparatively small importance.

ROSCOMMON WENTWORTH DILLON, EARL OF (1634–1684), one of the pioneers of the so-called "classical" school in English poetry, owed his burial in Westminster Abbey more to his rank than to his achievements in poetry. But his *Essay on Translated Verse* (1684), though feeble in thought, has a certain distinction in the history of our literature as being the first definite enunciation of the principles of the "poetic diction" of our Augustan age. He is very refined and fastidious in his notions of dignified writing, and intimates, though with a genteel affectation of humility, that the "railing heroes" and "wounded gods" of Homer are too vulgar for a correct taste. He himself wrote in the finest of diction, but he wrote little. On Fenton's remark that his imagination might have been more fertile if his judgment had been less severe Johnson makes the comment that his judgment might have been less severe if his imagination had been more fertile. The subjects of his half-dozen of original poems range from the death of a pet dog to the day of judgment, both treated in the same elevated and conventional style. Roscommon, a nephew of the great earl of Strafford, was born in Ireland, and educated partly under a tutor at his uncle's seat in Yorkshire, partly at Caen in Normandy, and partly at Rome. He published a translation of Horace's *Art of Poetry* in 1680.

ROSE (*Rosa*). The rose has for all ages been the favourite flower, and as such it has a place in general literature that no other plant can rival. In most cases the rose of the poets and the rose of the botanist are one and the same in kind, but popular usage has attached the name rose to a variety of plants whose kinship to the true plant no botanist would for a moment admit. In this place we shall employ the word in its strict botanical significance, and in commenting on it treat it solely from the botanical point of view (see also HORTICULTURE, vol. xii. p. 260). The rose gives its name to the order *Rosaceæ*, of which it may be considered the type. The genus consists of species varying in number, according to the diverse opinions of botanists of opposite schools, from thirty to one hundred and eighty, or even two hundred and fifty, exclusive of the many hundreds of mere garden varieties. While the lowest estimate is doubtless too low, the highest is enormously too large, but in any case the wide discrepancies above alluded to illustrate very forcibly the extreme variability of the plants, their adaptibility to various conditions, and consequently their wide dispersion over the globe, the facility with which they are cultivated, and the readiness with which new varieties are continually being produced in gardens by the art of the hybridizer or the careful selection of the raiser. The species are natives of all parts of the northern hemisphere, but are scantily represented in the tropics unless at considerable elevations.

They are erect or climbing shrubs, never herbs or trees, generally more or less copiously provided with thorns of various shapes and with glandular hairs, as in the sweet brier or in the moss rose of gardens. The thorns serve the purpose of enabling the shrub to sustain itself amid other vegetation, and perhaps in some sort serve as a protection against marauders. The viscid hairs which are specially frequent on the flower stalks or in the neighbourhood of the flower serve to arrest the progress of undesirable visitants, while the perfume emitted by the glands in question may co-operate with the fragrance and colour of the flower to attract those insects whose presence is desirable. The leaves are invariably alternate, provided with stipules, and unequally pinnate, the stipules themselves being in this case perhaps merely the lowest pair of "pinnæ" or leaflets less perfectly developed than the others. The flowers are solitary or in loose cymes (cluster-roses) produced on the ends of the shoots. The flower-stalk expands into a vase- or urn-shaped dilatation, called the receptacle or receptacular tube, which ultimately becomes fleshy and encloses in its cavity the numerous carpels or fruits. From the edge of the urn or "hip" proceed five sepals, often more or less compounded like the leaves and overlapping in the bud. Within the sepals are five petals, generally broad or roundish in outline, with a very short stalk or none at all, and of all hues except blue. The very numerous stamens originate from about the same spot as the sepals and petals; each has a slender filament and a small two-celled anther. The inner portion of the receptacular tube whence the stamens spring is thick and fleshy, and is occasionally spoken of as the "disk"; but, as in this case it does not represent any separate organ, it is better to avoid the use of the term. The carpels are very numerous, ultimately hard in texture, covered with hairs, and each provided with a long style and button-like stigma. The carpels are concealed within the receptacular tube and only the stigmas as a rule protrude from its mouth. Each carpel contains one ovule without perisperm. The so-called fruit is merely the receptacular tube, which, as previously mentioned, becomes fleshy and brightly coloured as an attraction to birds, which devour the hips and thus secure the dispersion of the seed. The stamens are in whorls, and, according to Payer, they originate in pairs one on each side of the base of each petal (parapetalous), so that there are ten in each row; a second row of ten alternates with the first, a third with the second, and so on. By repeated radial and tangential branching a vast number of stamens are ultimately produced, and when these stamens assume a petaloid aspect we have as a consequence the double flowers which are so much admired. The carpels are much less subject to this petaloid change, and, as it generally happens in the most double of roses that some few at least of the anthers are formed with pollen, the production of seed and the possibility of cross-breeding become intelligible. Under natural circumstances rose flowers do not secrete honey, the attraction for insects being provided, according to Müller, by the colour and perfume and the abundance of pollen for food. The stigmas and anthers come to maturity at the same time, and thus, while cross-fertilization by insect agency is doubtless most common, close fertilization is not prevented.

In *The Student's Flora* Sir Joseph Hooker recognizes seven species of *Rosa* as British. Among them may be mentioned *R. spinosissima*, the Scotch Rose, much less variable than the others, *R. rubiginosa*, the Sweet Brier, represented by several varieties, *R. canina*, the Dog Rose, of which no fewer than twenty-nine varieties are described, and *R. arvensis*. Cultivated roses are frequently "budded" or worked upon the stems of the brier or *R. canina*, or upon young seedling plants of the same species. Other species also are used for stocks (see HORTICULTURE). Roses have been grown for so many centuries and have been crossed and recrossed so often that it is difficult to refer the cultivated forms to their wild prototypes. The older roses doubtless originated from *R. gallica*, a native of central and southern Europe. *R. centifolia* (the Cabbage Rose), a native of the Caucasus, contributed its share. A cross between the two species named may have been the source whence originated the Bourbon Roses. The yellow-flowered Austrian and Persian Brier originated from *R. eglanteria*, a native of Austria. The Monthly or China Roses sprang from the Chinese *R. indica*, and these crossed with others of the *R. centifolia* or *gallica* type are the source of the hybrid perpetuals so commonly grown nowadays, because, in addition to their other attractions, their blooming season is relatively prolonged, and, moreover, is repeated in the autumn. Tea Roses and Noisettes, it is to be presumed, also acknowledge *Rosa indica* as one of their progenitors. The Banksian Rose is a Chinese climbing species, with small white or fawn-coloured flowers of great beauty; the Macartney Rose (*R. bracteata*) is also of Chinese origin. Its nearly evergreen deep green leaves and large white flowers are very striking. The Japanese *R. rugosa* is also a remarkable species, notable for its bold rugose foliage, its large white or pink flowers, and its conspicuous globular fruit. *R. damascena* is cultivated in some parts of Roumelia for the purpose of making attar of roses (see OILS and PERFUMERY). According to Hanbury, the flowers are gathered before sunrise and distilled the same day. The distilled liquid is allowed to remain for a day or two, by which time most of the oil will have risen to the surface, from which it is skimmed off. The percentage yielded is very small, not more than 0·04.

In India *R. damascena* is grown largely near Ghazipur for the purpose of procuring attar of roses and rose water. The roses are distilled with double their weight of water. The attar is skimmed off in the Turkish method. Colonel Drury mentions that it takes 200,000 roses to yield the weight of a rupee in attar. This quantity sells on the spot for 100 rupees.

Rose water is chiefly produced in Europe from the Provence or cabbage rose, *R. centifolia*, grown for the purpose at Mitcham and much more abundantly in the south of France. Conserve of roses and infusion of roses, two medicinal preparations retained for their agreeable qualities rather than for any special virtue, are prepared from the petals of *Rosa gallica*, one variety of which was formerly grown for the purpose near the town of Provins. Conserve of dog rose is made from the ripe hips of the dog rose, *Rosa canina*. Its only use is in the manufacture of pills.

The name ROSE OF JERICHO is popularly applied to a small Cruciferous weed, *Anastatica hierochuntina* a native of the desert regions of Egypt, Arabia, Palestine, and Persia. In the dry season the dead branches are strongly incurved, and thus serve to protect the still living seed in the pods. In the wet season the branches absorb the moisture to a large extent, unfold, resume the direction they had in life, and facilitate the dispersion of the seed under circumstances favourable to germination. The plant is frequently carried off as a curiosity, inasmuch as immersion in a basin of water enables it to resume the original form and to create the impression that the plant "comes to life again," but the process is purely a physical one.

ROSELLINI, IPPOLITO (1800–1843), a native of Pisa and subsequently professor there of Oriental languages, in which Mezzofanti was his teacher, is best known as the associate of J. F. CHAMPOLLION (*q.v.*), whose studies he shared and whom he accompanied in his Egyptian explorations (1828). On the death of Champollion the publication of the results of their expedition fell to Rosellini (*Monumenti dell' Egitto e della Nubia*, Florence, 1832–1840, 10 vols. fol.).

ROSEMARY (*Rosmarinus*), a well-known Labiate plant, the only representative of the genus and a native of the Mediterranean region. It is a low shrub with linear leaves, dark green above, white beneath, and with margins rolled back on to the under surface. The flowers are in small axillary clusters. Each has a two-lipped calyx, from which projects a bluish two-lipped corolla enclosing two stamens, the other two being deficient. The fruit consists of four smooth nutlets. Botanically the genus is near to *Salvia*, but it differs in the shorter connective to the anther. Rosemary was highly esteemed by the ancients for its aromatic fragrance and medicinal uses. In modern times it is valued mainly as a perfume, for which purpose the oil is obtained by distillation. It doubtless has slight stimulant properties, which may account for the general belief in the efficacy of the plant in promoting the growth of the hair. Rosemary plays no unimportant part in literature and folk-lore, being esteemed as an emblem of remembrance. "There's rosemary, that's for remembrance," says Ophelia. Its use in connexion with funeral ceremonies is not extinct in country places to this day, and it was formerly as much valued at wedding festivities. The name "ros marinus" or "ros maris" was probably given in allusion to its native habitat in the neighbourhood of the sea.

ROSETTA (see EGYPT, vol. vii. p. 768). The celebrated Rosetta Stone, a basalt stele containing a decree of Ptolemy V. Epiphanes in hieroglyphics, demotic, and Greek, which supplied the key for the decipherment of the ancient monuments of Egypt, was found near Fort St Julien, 4 miles north of the town, in 1799, by Boussard, a French officer. It is now in the British Museum.

ROSEWOOD. Under this name several distinct kinds of ornamental timber are more or less known. That, however, so called in the United Kingdom is Brazilian rosewood, the *palissandre* of the French, the finest qualities of which, coming from the provinces of Rio de Janeiro and Bahia, are believed to be the produce principally of *Dalbergia nigra*, a Leguminous tree of large dimensions, called *cabiuna* and *jacaranda* by the Brazilians. The same name, jacaranda, is applied to several species of *Machærium*, also trees belonging to the natural order *Leguminosæ*; and there can be no doubt that a certain proportion of the rosewood of commerce is drawn from these sources. Formerly Brazilian rosewood was said, on the authority of the French botanist and traveller Guillemin, to be the produce of a species of *Triptolomæa*, but that genus has now been constituted a section of *Dalbergia*. Rosewood comes to the United Kingdom from Rio, Bahia, Jamaica, and Honduras. The heartwood attains large dimensions, but as it begins to decay before the tree arrives at maturity it is always faulty and hollow in the centre. On this account squared logs or planks of rosewood are never seen, the wood being imported in half round flitches 10 to 20 feet in length and from 5 to 12 inches in their thickest part. Owing to its irregular form the wood is sold by weight, and its value varies within wide limits according to the richness of colour. Rosewood has a deep ruddy brown colour, richly streaked and grained with black resinous layers. It takes a fine polish, but on account of its resinous nature it is somewhat difficult to work. The wood is very much in demand both by cabinetmakers and pianoforte-makers, by whom it is used both solid and in veneer.

The wood of *Dalbergia latifolia*, a native of the East Indies used for ornamental furniture and carvings under the name of black wood, is frequently termed East Indian Rosewood, as is also the allied tree of Madras, *Dalbergia sissoides*. The *Bois de Rose* of the French, the Portuguese *Pao de Rosa*, and the German *Rosenholz*, is a Brazilian wood, the produce of *Physocalymma floribunda*, called in the United Kingdom tulip wood, and very highly esteemed on account of its beautiful rose colour and grain. African rosewood is from *Pterocarpus erinaceus*, Dominican from *Cordia Gerascanthus*, and in New South Wales the wood of *Synoum glandulosum* locally receives the same name.

ROSH, also Harosh (ר״אש, הר״אש, *i.e.*, "chief," "the chief"), stands by contraction for Rabbenu Asher, or Harab Rabbenu Asher (b. Yeḥiel), chief rabbi of all Castile. He was born in Germany about the middle of the 13th century and died at Toledo on the 25th of October 1327.[1]

Rosh enjoys a sixfold celebrity. (1) He was a descendant of a long line of distinguished ancestors, among whom Raban (*q.v.*) may be specially named. (2) He was "the distinguished of the most distinguished disciples"[2] of the foremost rabbi of his age in Germany, viz., Rabbenu Meir b. Barukh, better known under the name of R. Meir of Rothenburg, whose tragic fate[3] even more than his learning and piety has endeared him to all Jews down to this very day. (3) He was the father of eight great Rabbinic scholars.[4] (4) He was in his own right, after 1293 in Germany and after 1310 everywhere, the greatest Talmudist.[5] (5) He was the first rabbi of the Ashkenazic school who possessed powers of systematization. (6) He was a man not merely of the deepest piety but of the sternest and, if we may say so, the most savage[6] morality. Rosh, in despair at the state of affairs in Germany (some, however, say through his being involved in negotiations with the emperor for the delivery of the body of his master, which he could not bring to a successful issue),[7] left his home and travelled aimlessly about with his numerous family till he arrived in Provence. There he would have remained gladly had not the Maimonidean controversy broken out.[8] He went therefore to Castile, where Toledo, jealous of Barcelona possessing such a great rabbi as R. Shelomoh Ibn Addereth was,[9] received him with open arms and great respect and elected him their rabbi. Under his eyes the celebrated astronomical work *Yesod 'Olam*, by R. Yisḥak b. Yoseph Yisraeli, was composed.[10]

Of the numerous works by Rosh, which have been printed times innumerable, we can only mention the most important:—

(1) Commentary on the Pentateuch (see *Hadar Zeḳenim*, Leghorn, 1840, folio). (2) Commentary on the Mishnic treatises of the orders *Zera'im* and *Tohoroth* (see editions of the Babylonian Talmud). (3) Commentary on the whole Babylonian Talmud (*ibid.*; the *Ḳiṣṣur Piseḳe Harosh* is by Rabbenu Ya'aḳob, the author's son, see note 4). (4) *Tosephe Harosh* on several treatises (see Schiller-Szinessy, *Catalogue*, ii. pp. 76-94). (5) *Responsa* (Constantinople, 1517, folio, and reprints). (6) *Halakhoth Ketannoth* (see Talmud editions). (7) *Hanhagah, Seraah*, &c. (Testament, &c., Venice, 1578, 16mo, and reprints). (S. M. S.-S.)

ROSICRUCIANS (Rosenkreuzer), a celebrated but entirely fabulous secret society. In 1614 there appeared at Cassel an anonymous German work, *Allgemeine und General-Reformation der ganzen Welt beneben der* Fama Fraternitatis *des löblichen Ordens des Rosenkreuzes*, inviting the scholars of Europe to test the pretensions and join the ranks of a secret society, said to have been founded two hundred years before by a certain Christian Rosenkreuz, who had acquired on a pilgrimage the hidden wisdom of the East. The society, according to this account, possessed many secret gifts of knowledge, of which goldmaking was one of the least. Its character was Christian and of Protestant type; its chief aim was the gratuitous healing of the sick. Though the origin of the *Fama* and some subsequent tracts in supplement to it has never been made quite clear, it has generally been held that Arnold, in his *Kirchen- und Ketzer-Historie*, renders it highly probable that the author was the talented theologian and polymath Johann Valentin Andreæ (1586–1654), and that the book was originally a sort of elaborate joke composed in the stift at Tübingen. But the marvellous elements in the account of Rosenkreuz and his society only served in that age to draw serious attention to the supposed order. A large controversial literature sprang up, and, while some violently condemned the Rosicrucians as heretics in theology and medicine, others, and among them R. Fludd (*q.v.*), defended them and hoped great things from the enlarged activity which was proposed for them in the *Fama* and its companion tracts. Gradually it came to be generally seen that the whole thing was a mystification. The name and fable of the Rosicrucians have, however, from time to time been made use of by such impostors as Cagliostro.

ROSIN, or Colophony, is the resinous constituent of the oleo-resin exuded by various species of pine, known in commerce as crude turpentine (see Turpentine). The separation of the oleo-resin into the essential oil-spirit of turpentine and common rosin is effected by distillation in large copper stills. The essential oil is carried off at a heat of between 212° and 316°, leaving fluid rosin, which is run off through a tap at the bottom of the still, purified by passing through a straining wadding, and received into a vat, whence it is ladled into barrels ready for the market. Rosin varies in colour, according to the age of the tree whence the turpentine is drawn and the amount of heat applied in distillation, from an opaque almost pitchy black substance through grades of brown and yellow to an almost perfectly transparent colourless glassy mass. The commercial grades are numerous, ranging by letters from A, the darkest, to N, extra pale,—superior to which are W, "window glass," and WW, "water white" varieties, the latter having about three times the value of the common qualities. Rosin is a very brittle and friable resin, with a faint piny odour, softening at about 176° and melting completely at the temperature of boiling water. It dissolves freely in ether, benzol, and chloroform, and to some extent in alcohol and fatty oils. When exposed to the action of hot dilute alcohol or when boiled with alkaline solutions it takes up a molecule of water and becomes converted into abietic acid, a change which also takes place slowly in the air when the resin is yet mixed with the essential oil as it flows from the trees. Rosin is thus regarded as an anhydride of abietic acid, and its use in yellow soaps is due to the fact that this acid itself combines with caustic alkalies to form a kind of soap. In addition to its extensive use in soap-making, rosin is largely employed in making inferior varnishes, sealing wax, and various cements. It is also used for preparing shoemaker's wax, for soldering metals, for pitching lager-beer casks, for rosining the bows of musical instruments, and numerous minor purposes. In pharmacy it forms an ingredient in several plasters and ointments. On a large scale it is treated by destructive distillation for the production of an oily complex hydrocarbon, having a tarry odour and a whitish opalescent colour, which under the name of rosin oil is much used as a lubricant. Rosin oil also enters extensively into the common kinds of fatty oils as an adulterant.

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[1] See Schiller-Szinessy, *Catal. Heb. MSS.*, &c., i. p. 66, note 3, and ii. p. 77, note 3.

[2] R. Meir of Rothenburg (see next note) had among his many disciples four more distinguished than the rest:—(1) R. Mordekhai b. Hillel, who was slain with his wife and children at Nuremberg in 1310,—a fine Latin and general scholar and author of the *Mordekhai*, now an integral part of the Rifh (*q.v.*); (2) R. Meir Hakkohen, the author of the *Haggahoth Maimoniyyoth*, now an integral part of the *Mishneh Torah* of Maimonides (*q.v.*); (3) R. Shimshon b. Ṣadoḳ, who wrote his master's *Tashbeṣ* in prison, &c. (see *Catal. Arab. MSS. of Trin. Coll., Cambr.*, App. p. 229); (4) Rosh.

[3] The persecutions and massacres of the Jews in many parts of Germany in the 13th century made life so unendurable that the wealthier of them determined to quit the land of their birth and to emigrate to that of their ancient fathers. R. Meir of Rothenburg, being at the head of the emigration, had in the spring of 1286, with his whole family and several other families, already arrived in Lombardy. But one Kinppa, or Knippa, or Konpil, *i.e.*, *Koppel* (=*Jacob*), a converted Jew, recognized and betrayed him to his master, the bishop (? הגמון) of Basel, who had him arrested by Captain Meinert (Meinhard) of Görz, who handed him over to the emperor. Rudolph of Hapsburg, who had only a dozen years before or so (to speak in the great German poet's language) "made an end, after the long destructive strife, to the emperorless, terrible time," was, though very rich in dignities, as yet comparatively poor in purse. He therefore, in the midsummer of the same year (to extort money from the Jews), caused the poor rabbi to be imprisoned in the tower of Ensisheim (in Alsace) and subsequently in other places,—*e.g.*, Weissenburg, or Wasserburg (ושבורק). Considerable sums were offered by the Jews for their revered chief, but the negotiations were brought to nought by the command of the rabbi himself, who would not permit more than a trifling sum to be given for his release (Reshal (*q.v.*), *Yam shel Shelomoh*, on Gittin, iv. 66). He died in prison in 1293. Rudolph's successors, Adolph of Nassau (1291–1298) and Albrecht of Austria (1298–1308), were so heartless as not to deliver up for nearly fourteen years the poor rabbi's corpse for burial, hoping to extort from the Jews even greater sums than they had originally offered to Rudolph for the rabbi alive. In 1307, however, a rich and pious but childless man, Alexander Süsskind Wimpfen of Frankfort, offered an enormous sum on the condition that the congregation of Worms should bury the rabbi's corpse and should allow at his own death his body to rest near it (see Lewysohn, *Sechzig Epitaphien . . . zu Worms*, Frankfort-on-Main, 1855, 8vo, pp. 35–41). R. Meir of Rothenburg was not merely a fine Biblical and Rabbinic scholar but also a great Cabbalist, as R. David b. Yehudah Ḥasid testifies in his *Mar'oth Haṣṣobeoth* (Camb. Univ. MS. Add. 664, leaf 72a). Most of his literary productions are incorporated with works of his disciples and the disciples of these disciples. For instance, some of his massoretico-ethical explanations are to be found in R. Ya'aḳob b. Asher's so-called *Ba'al Hatturim*, and part of his commentary on the Mishnah is to be found in R. Yomtob Lipmann Heller's *Tosephoth Yomtob* (see Mishnah). Other Rabbinic work of his is to be found in *Rosh, Mordekhai*, &c. But there exists also independent literature of his as (1) *Tosaphoth* on Yoma (in the editions of the Babylonian Talmud); (2) *Responsa*, in three volumes (i., Cremona, 1557, 4to; ii., Prague, 1608, fol., which contains, however, matter by other authors also, as Rabbenu Gershom, Rabbenu Tham, the *Taḳḳanoth Shum*, Rules of Penitence, by R. El'azar of Worms, &c.; iii., Lemberg, 1860, 4to); (3) *Tashbeṣ* (see last note); (4) *Birkhoth Maharam* (Riva di Trento, 1558, 8vo); (5) religious poems of considerable value, which are to be found in the Ashkenazic Maḥzor.

[4] Of these we will only mention two. (1) R. Yehudah, his successor in the rabbinate, is the author of the *Zikhron Yehudah* (*Responsa*, Berlin, 1846, 4to) (2) Rabbenu Ya'aḳob, is the author of (*a*) the *Turim*, printed times innumerable (*ed. princeps*, Pieve di Sacco, 1475, fol.), a code of laws for a long time normative, but now almost superseded by the *Shulḥan 'Arukh* of R. Yoseph Caro (see Reshal, note 1); (*b*) the commentary on the Pentateuch mentioned in the foregoing note, a portion of which forms now an integral part of every Rabbinic Bible (it was first issued at Constantinople in 1514, 4to); and (*c*) the *Ḳiṣṣur Piseḳe Harosh* (Constantinople, 1515, fol.).

[5] *I.e.*, after the death of his master and that of R. Shelomoh b. Abraham Ibn Addereth (see Rashba III.).

[6] See Schiller-Szinessy, *Catal.*, ii. p. 78, note 2

[7] See Ibn Yaḥya's *Shalsheleth Haḳḳabbalah*.

[8] See Schiller Szinessy, *Catal.*, i. p. 188 *seq.*

[9] See Rashba III.

[10] Printed in 1777, and from an ancient MS. again in 1848, both times at Berlin and in 4to. The library of Cambridge university possesses a most valuable MS. of it (Oo. 6, 65)

The chief region of rosin production is the southern coast States of the American Union,—the ports of Wilmington, Charleston, Savannah, and Brunswick being the principal centres of the trade. American rosin is obtained from the turpentine of the swamp pine, *Pinus australis*, and of the loblolly pine, *P. Tæda*. The main source of supply in Europe is the "landes" of the departments of Gironde and Landes in France, where the sea pine, *P. maritima*, is extensively cultivated. In the north of Europe rosin is obtained from the Scotch fir, *P. sylvestris*, and throughout European countries local supplies are obtained from other species of pine. The imports into the United Kingdom average about 1,250,000 cwts. annually, nearly the whole of which comes from America. In 1883 the amount imported was 1,377,368 cwts. (1,337,848 cwts. from the United States and 16,242 cwts. from France), the total estimated value of the imports being £400,938.

ROSMINI-SERBATI, Antonio (1797-1855), perhaps the most important figure in modern Italian philosophy, was born at Rovereto in the Italian Tyrol in 1797, and died in 1855. With every worldly advantage as the eldest son of a noble and wealthy family, from an early age he resolved to devote himself to God's service in the Catholic priesthood. He became the founder of a new religious order, named the Institute of Charity, but known in Italy generally as the Rosminians. The members may be priests or laymen. All are prepared to do any works of charity—corporal, intellectual, or spiritual—to which they may be directed by divine providence, under obedience to their superior, to the bishops, and to the pope. They have branches in Italy, England, Ireland, France, and America. In London they are attached to the ancient church of St Etheldreda, Ely Place, Holborn, where the English translations of Rosmini's works are edited.

Rosmini's *Sistema Filosofico* set forth the conception of a complete encyclopædia of the human knowable, synthetically conjoined, according to the order of ideas, in a perfectly harmonious whole. This conception Rosmini developed in more than forty volumes. Here a brief notice of the characteristic principle of his philosophy must suffice.

Rosmini, contemplating the position of recent philosophy from Locke to Hegel, and having his eye directed to the ancient and fundamental problem of the origin, truth, and certainty of our ideas, wrote:—"If philosophy is to be restored to love and respect, I think it will be necessary, in part, to return to the teachings of the ancients, and in part to give those teachings the benefit of modern methods" (*Theodicy*, n. 148). Pursuing therefore the now generally approved method of the observation of facts, he most carefully examined and analysed the fact of human knowledge, and obtained the following results:—(1) that the notion or idea of being or existence in general enters into, and is presupposed by, all our acquired cognitions, so that, without it, they would be impossible; (2) that this idea is essentially objective, inasmuch as what is seen in it is as distinct from and opposed to the mind that sees it as the light is from the eye that looks at it; (3) that it is essentially true, because "being" and "truth" are convertible terms, and because in the vision of it the mind cannot err, since error could only be committed by a judgment, and here there is no judgment, but a pure intuition affirming nothing and denying nothing; (4) that by the application of this essentially objective and true idea the human being intellectually perceives, first, the animal body individually conjoined with him, and then, on occasion of the sensations produced in him *not by himself*, the causes of those sensations, that is, from the action felt he perceives and affirms an agent, a being, and therefore a true thing, that acts on him, and he thus gets at the external world,—these are the true primitive judgments, containing (*a*) the subsistence of the particular being (subject), and (*b*) its essence or species as determined by the quality of the action felt from it (predicate); (5) that reflexion, by separating the essence or species from the subsistence, obtains the full specific idea (universalization), and then from this, by leaving aside some of its elements, the abstract specific idea (abstraction); (6) that the mind, having reached this stage of development, can proceed to further and further abstracts, including the first principles of reasoning, the principles of the several sciences, complex ideas, groups of ideas, and so on without end; (7) finally, that the same most universal idea of being, this generator and formal element of all acquired cognitions, cannot itself be acquired, but must be innate in us, implanted by God in our nature. Being, as naturally shining to our mind, must therefore be what men call the light of reason. Hence the name Rosmini gives it of ideal being; and this he laid down as the one true fundamental principle of all philosophy, and the supreme criterion of truth and certainty. This he firmly believed to be the teaching of St Augustine, as well as of St Thomas, of whom he was an ardent admirer and defender. The above seven points could only be hinted at here. A complete and exhaustive treatment of them will be found in Rosmini's *New Essay on the Origin of Ideas*, which has lately been rendered into English (London, 1883-84).

Rosmini's *Sistema Filosofico* has been translated into English by Davidson (*Rosmini's Philosophical System*, London, 1882). The volume contains also a biographical sketch of the author, with a complete catalogue of his writings, ninety-nine in all, on philosophical, religious, and miscellaneous subjects, and a copious list of works relating to his life and philosophy.

ROSS, a county in the north of Scotland. CROMARTY (*q.v.*) consists of detached portions scattered throughout Ross, and for most administrative purposes the two counties are regarded as one. The united area of their mainland portion lies between 57° 8′ and 58° 6′ N. lat., and 3° 47′ and 5° 52′ W. long., and is bounded N. by the Dornoch Firth and Sutherlandshire, E. by the Moray Firth, S. by

Inverness-shire, and W. by the Atlantic. It comprehends 2,003,065 acres, of which only about 220,280 acres are included in Cromarty. Its length from east to west is 67 miles, and from north to south 58 miles. The area of the islands is 437,221 acres. Ross includes the northern part of Lewis (see vol. xiv. p. 492), and other ten islands of the Hebrides, of which eight only were inhabited in 1881 (nine in 1871). The outline of Ross and Cromarty is very irregular, and both east and west coasts are much indented by bays and inland lochs, but except in the more inland recesses of these inlets the coast scenery is comparatively tame and uninteresting. The Moray Firth, an extension of Loch Beauly, separates the county from Nairn; the northern shore of the peninsula of the Black Isle is washed by Cromarty Firth, including the Bay of Nigg and extending from Dingwall to the headlands known as the Sutors of Cromarty; and the extreme northern coast is bounded by the Dornoch Firth, an extension of the river Oykel. On the west coast the inlets are for the most part long, narrow, and irregular, the principal being Loch Broom, Little Loch Broom, Lochs Gruinard, Ewe, Torridon, Carron, and Alsh.

Surface and Geology.—In the north-west of Ross the Archæan series of rocks, consisting of gneisses, schists, and other crystalline rocks, are well developed. Above them rest unconformably red conglomerates and sandstones of Cambrian age, rising into the picturesque mountains which form such a striking feature of the scenery of western Ross. Farther east they are overlaid unconformably by the quartzites and limestones belonging to the Lower Silurian division. Over these, by enormous terrestrial displacement, the Archæan and Cambrian rocks have been pushed, sometimes for a horizontal distance of ten miles. New crystalline structures have been superinduced upon all the rocks affected by these movements, and the resulting crystalline schists may consist of what originally were Archæan, Cambrian, or Silurian rocks of ordinary types. In their present condition, however, these eastern schists are certainly later than the older part of the Silurian system. They cover by far the larger part of the two counties. Along the east coast they are unconformably covered by the Old Red Sandstone formation. Rocks of Jurassic (Oolitic) age fringe the eastern shores. In the Black Isle peninsula they include a thin coal seam. Near the Sutors of Cromarty they abound in ammonites, belemnites, and other shells, and in the remains of various woods and ferns. Ironstone, chiefly in the form of bog iron ore, is found in considerable quantities. Of the various mineral springs the best known is that of Strathpeffer, characterized chiefly by sulphuretted hydrogen gas and various salts. The surface consists principally of lofty mountain groups, intersected by comparatively narrow valleys, occupied partly by lakes and rivers; but in the east there is a considerable extent of comparatively level ground. A large number of the mountains are over 3000 feet in height, the highest summits being Carn Eige (3877 feet) and Mam Soul (3862) on the borders of Inverness, while An Riabhachan, wholly within Ross, has a height of 3696 feet, and Sgurr Mor of 3657 feet. Ben Wyvis, remarkable for its immense isolated bulk, has a height of 3429 feet, and another well-known mountain, Ben Attow, attains 3383 feet. A mere fraction of the western district of Ross is under 1000 feet in height. The principal rivers are the Oykel, which, rising in Sutherland, forms for about 20 miles the boundary with Ross, from which near its mouth it receives the Carron; the Conan, falling into Cromarty Firth; and the Carron, flowing south-west into Loch Carron. Besides Loch Maree (area 7090 acres), which is dominated by the imposing mass of Ben Slioch (3217 feet) on the north, the principal freshwater lakes are Lochs Fannich, Fuir, Luichart, and Glass; but in addition to these there are over a dozen of considerable size, besides a large number of smaller ones.

Soil and Agriculture.—The most fertile part of the counties is the eastern district, especially that included in the peninsulas of the Black Isle and Easter Ross, the soil varying from a light sandy gravel to a rich deep loam. In this district agriculture is quite as advanced as in any other part of Scotland. In the valleys and along the shores of the western coast there are many patches of good soil, but, partly on account of the excessive rainfall, tillage is not prosecuted with the same enterprise as in the eastern districts. On the higher grounds there is a large extent of good pasturage for sheep. According to the agricultural statistics for 1885 the total area in Ross and Cromarty under crops, bare fallow, and grass was 134,399 acres, of which 47,639 acres were under grain crops, 26,496 under green crops, 40,819 rotation grasses, 19,075 permanent pasture, and 370 fallow. The area under wheat has been gradually diminishing, being 9715 acres in 1857 and only 1185 in 1885, while that under barley on the other hand has increased from 6435 acres to 13,681, and that under oats from 16,256 to 31,685. The area under potatoes has also doubled, the earlier year being only 4471, while in 1885 it was 8982. The area under turnips has increased from 12,228 to 16,557 and that under rotation grasses from 20,869 to 40,819. Horses, principally half-breeds between the old "garrons" and Clydesdales, numbered 7365 in 1885, of which 5674 were used solely for purposes of agriculture; cattle numbered 42,976, of which 17,811 were cows and heifers in milk or in calf, and 17,561 under two years old. They are principally the native Highland breed or crosses. Sheep in 1885 numbered 309,590, of which 213,522 were one year old and above. Besides black-faced, crosses with Leicesters and crosses between Leicesters and Cheviots are not uncommon. There is still in Ross and Cromarty a considerable extent of native woodland, the trees being principally firs, oaks, ash, and alder. The area under woods in 1881 was 43,201 acres. The red and roe deer have free scope on the extensive mountain regions, the area under deer forests being 719,305 acres. Foxes, badgers, wild cats, alpine hares, and other wild animals abound. The usual varieties of winged game are plentiful. The golden eagle and osprey are both common, as well as many other birds of prey. Waterfowl of all kinds abound in the extensive sea lochs, and the rivers and inland lochs are specially abundant in trout and salmon. The pearl mussel is found in the bed of the river Conan.

According to the latest Landowners' Return, 2043 proprietors possessed 1,971,682 acres in the county of Ross, of a gross annual value of £269,342. The owners of less than one acre numbered 1719. The following owned more than 100,000 acres:—Sir James Matheson, 406,070; Alex. Matheson, 220,433; Sir Kenneth S. Mackenzie, 164,680; the duchess of Sutherland, 149,879; and Sir C. W. A. Ross, 110,445. For Cromarty separately the Return gives 231 owners, possessing 16,206 acres, of £11,966 annual value.

Manufactures and Trade.—With the exception of distillation, there are no important manufactures within the counties, although home-made woollen cloth is woven in the country districts. The counties depend chiefly on their agriculture and their fishing, which within recent years has greatly developed through improved means of communication with the south. Stornoway and the west coast have regular communication by steamers with Glasgow, and on the east coast a steamer leaves Cromarty and Invergordon for Aberdeen and Leith once a week. Fish, cattle, and sheep are the principal exports. The Highland Railway skirts the Firth of Cromarty by Dingwall and Tain to Bonar Bridge, a branch passing from Dingwall south-westwards to Strome Ferry, whence there is communication with Skye by steamer. Salmon fishing is extensively carried on in the bays and mouths of the rivers, and the deep-sea fishings for herring, and for cod and other large fish, are among the most important in Scotland. They include the districts of Cromarty on the east coast, of Stornoway in Lewis, of Loch Broom and part of Loch Carron on the west coast, the remainder of the Loch Carron district being in Inverness-shire. The Broad Bay of Stornoway is famed for its flounders.

Administration and Population.—The two counties of Ross and Cromarty form one sheriffdom, and return one member to parliament. The burghs of Cromarty, Dingwall, Fortrose, and Tain are included in the Wick district of burghs, which returns one member. From 56,318 in 1801 the population of Ross and Cromarty had increased in 1841 to 78,685, and in 1871 to 80,955; in 1881 it was 78,547 (37,027 males and 41,520 females), of whom 56,086 were Gaelic-speaking. It is the fourth most thinly populated county in Scotland, the number of persons to the square mile being 25 The island population amounted to 23,960, of whom 23,149 were in Lewis. The town and village population amounted to 28,665, and the rural to 49,882. The police burghs are Cromarty (population 1352), Dingwall, which is also a royal burgh (1921), Fortrose (869), Invergordon (1092), Stornoway (2627), and Tain (1742). There are thirty-one entire parishes, and parts of two others.

History and Antiquities.—Ross proper, possessed by the Rosses, originally only included the district adjoining the Dornoch and Moray Firths. The first who bore the title of earl of Ross was Malcolm Macbeth, upon whom it was bestowed by Malcolm IV. After his rebellion in 1179 there was a period of chronic insurrection. By Alexander II. the earldom was bestowed on Fearchar Mac an t-Sagairt (the son of the priest), who being abbot of Applecross had already possession of the western district. William, fourth earl, was present with his clan at the battle of Bannockburn. The earldom reverted to the crown in 1424, and James I. restored it to the heiress of the line, the mother of Alexander, Lord of the Isles (see HEBRIDES, vol. xi. 607). The lands of the earldom were in 1481 conferred on Prince James, second son of James III., who in 1478 had been created duke of Ross. Ross was constituted a county in 1661, but the sheriffdom of Cromarty is of more ancient date. At Invercarron Montrose was totally defeated by Colonel Strachan, 27th April 1650; and at Glenshiel, 11th June 1718, General Wightman defeated the Jacobites. So-called Druidical circles and cairns are very common. Among ancient sculptured stones may be mentioned the three according to tradition marking the burial-places of the three sons of a Danish king. The largest, at Shandwick, *Clach-a-charridh*, or the "Stone of Lamentation," was blown down in a storm in 1847 and broken into three pieces; a smaller one at Nigg churchyard, struck down by the fall of the belfry in 1725, has been re-erected and fenced round; and the third, which formerly stood at Cadboll of Hilltown has been removed for preservation to the grounds of Invergordon Castle. An ancient vitrified fort, 420 feet by 120, crowns the hill of Knockfarrel in Fodderty parish. Among old castles are those of Lochslin, in the parish of Fearn, said to date from the 13th century, which, though very ruinous, still possesses two square towers in good preservation; Balone, in the parish of Tarbat, said to have been built by the earls of Ross; and the remains of Dingwall Castle, the earls of Ross's original seat. Of the abbey of Fearn, transferred from Edderton in 1338, and interesting as having had for its tenth abbot the Reformer Patrick Hamilton, the abbey church, much altered, is still used as the parish church. There are a very large number of fine modern mansions.

ROSS, Sir James Clark (1800–1862), arctic voyager, was born in London 15th April 1800. He entered the navy in 1812 under his uncle Sir John Ross (see below), whom he accompanied in his first voyage in search of a north-west passage. From 1819 to 1825, and again in 1827, he was engaged with Captain Parry in his voyages. He served under his uncle from 1829 to 1833, discovering the position of the north magnetic pole on 1st June 1831 (see Polar Regions, vol. xix. p. 320). He commanded the expedition in the "Erebus" and "Terror" to the Antarctic seas from 1839 to 1843, and after his return he received in 1844 the honour of knighthood. In 1847 he published *A Narrative of a Voyage in the Antarctic Regions*, 2 vols. His last expedition was in 1848 in the "Enterprise" to Baffin's Bay in search of Sir John Franklin. He died at Aylesbury, 3d April 1862.

ROSS, Sir John (1777–1856), arctic voyager, was the fourth son of the Rev. Andrew Ross, minister of Inch, Wigtonshire, where he was born in 1777. He entered the navy in 1786. In 1818 he sailed in command of an Arctic expedition (see Polar Regions, vol. xix. p. 319), an account of which he published, under the title *Voyage of Discovery for the Purpose of Exploring Baffin's Bay*, in 1819. In 1829, through the munificence of his friend Sir Felix Booth, he was able to undertake a second expedition (see vol. xix. p. 320). Shortly after his return in 1833 he was knighted, made C.B., and elected a member of many learned societies. In accordance with a promise made to Sir John Franklin, he undertook a third expedition in 1850 and remained one winter on the ice, but accomplished nothing. His own account of the causes of his failure is given in a pamphlet published in 1855 He died 31st August 1856.

Ross also wrote *A Treatise on Navigation by Steam*, 1828; *Memoirs and Correspondence of Admiral Lord De Saumarez*, 1838; *Arctic Expedition*, 1850; and several other minor works.

ROSSANO, a city of Italy, in the province of Cosenza, most picturesquely situated on a precipitous spur of the great mountain mass of Sila (geologically the oldest part of Italy) overlooking the Gulf of Taranto. The railway station, 93 miles from Taranto, is about an hour from the town. Rossano is the seat of an archbishop and the centre of a circondario; marble and alabaster quarries are worked in the neighbourhood; and the inhabitants numbered 14,688 in 1881 (17,979 in the commune). In the cathedral is preserved the *Codex Rossanensis*, an uncial MS. of the Gospels of Matthew and Mark (6th century) in silver characters on purple vellum, with twelve miniatures, of great interest in the history of Byzantine art.

Mentioned in the Itineraries, Rossano (*Roscianum*) appears under the Latin empire as one of the important fortresses of Calabria. Totila took it in 548. The people showed great attachment to the Byzantine empire, and the Greek rite was maintained in the cathedral till the time of the Angevins. In the 14th century Rossano was made a principality for the great family of De Baux. Passing to the Sforza, and thus to Sigismund of Poland, it was ultimately in 1558 united to the crown of Naples by Philip II. of Spain in virtue of a doubtful will by Bona of Poland in favour of Giovanni Lorenzo Pappacoda. Under Isabella of Aragon and Bona of Poland the town had been a centre of literary culture; but under the Spaniards it rapidly declined even in the matter of population (2256 households in 1561, 1177 in 1669). The crown sold the lordship in 1612 to the Aldobrandini, and from them it passed to the Borghesi and the Caraffa. Rossano is best known as the birthplace of St Nilus the younger, whose life is the most valuable source of information extant in regard to the state of matters in southern Italy in the 10th century. Pope John VII. (705–707) was also a native of the town.

See Lenormant, *La Grande-Grèce*, vol. i.

ROSSE, William Parsons, third Earl of (1800–1867), the distinguished constructor of reflecting telescopes, was born at York on June 17, 1800, a son of the second earl, who as Sir Lawrence Parsons, Bart., had been a prominent member of the Irish Parliament. Until his father's death (1841) he was known as Lord Oxmantown. He was M.P. for King's County from 1821 to 1834, Irish representative peer from 1845, president of the Royal Society from 1848 to 1854, and chancellor of the university of Dublin from 1862. From 1827 he devoted himself to the improvement of reflecting telescopes; in 1839 he mounted a telescope of 3 feet aperture at his seat, Birr Castle, Parsonstown; and in 1845 his celebrated 6-foot reflector was finished. Owing to the famine and the disturbed state of the country, which demanded his attention as a large landowner and lieutenant of King's County, the instrument remained unused for nearly three years, but since 1848 it has been in constant use, chiefly for observations of nebulæ, for which it was particularly suited on account of its immense optical power. Lord Rosse died on October 31, 1867.

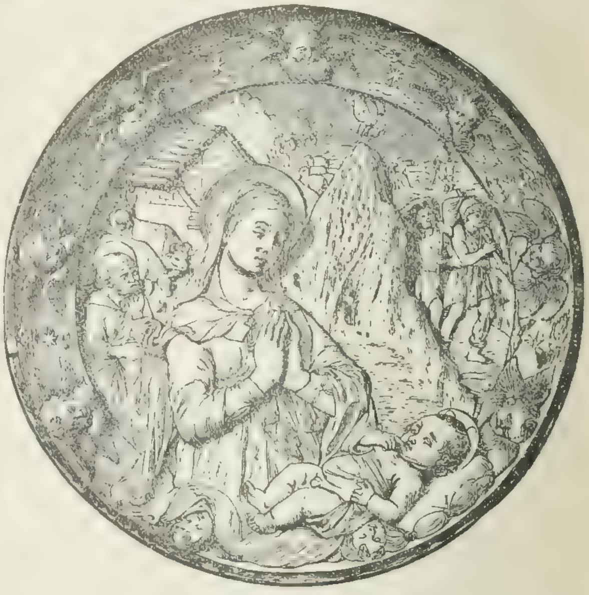
The first constructor of reflecting telescopes on a large scale, William Herschel, never published anything about his methods of casting and polishing specula, and he does not appear to have been very successful beyond specula of 18 inches diameter, his 4-foot speculum ("the 40-foot telescope") having been very little used by him (about this question see an interesting discussion between Sir J. Herschel and Robinson in *The Athenæum*, Nos. 831–36, 1843, which deserves to be rescued from oblivion). Lord Rosse had therefore no help whatever in working his way from a small beginning to the brilliant results he achieved. His speculum metal is composed of four equivalents of copper and one of tin, a very brilliant alloy, which resists tarnish better than any other compound tried. Chiefly owing to the extreme brittleness of this material, Lord Rosse's first larger specula were composed of a number of thin plates of speculum metal (sixteen for a 3-foot mirror) soldered on the back of a strong but light framework made of a peculiar kind of brass (2·75 of copper to 1 of zinc), which has the same expansion as his speculum metal. In Brewster's *Edinburgh Journal of Science* for 1828 he described his machine for polishing the speculum, which in all essential points remained unaltered afterwards. It imitates the motions made in polishing a speculum by hand by giving both a rectilinear and a lateral motion to the polisher, while the speculum revolves slowly; by shifting two eccentric pins the course of the polisher can be varied at will from a straight line to an ellipse of very small eccentricity, and a true parabolic figure can thus be obtained. The speculum lies face upwards in a shallow bath of water (to preserve a uniform temperature), and the polisher fits loosely in a ring, so that the rotation of the speculum makes it revolve also, but more slowly. Both the grinding and polishing tools are grooved, to obtain a uniform distribution of the emery used in the grinding process and of the rouge employed in polishing, as also to provide for the lateral expansion of the pitch with which the polisher is coated. In September 1839 a 3-foot speculum was finished and mounted on an altazimuth stand similar to Herschel's; but, though the definition of the images was good (except that the diffraction at the joints of the speculum caused minute rays in the case of a very bright star), and its peculiar skeleton form allowed the speculum to follow atmospheric changes of temperature very quickly, Lord Rosse decided to cast a solid 3-foot speculum. Hitherto it had been felt as a great difficulty in casting specula that the solidification did not begin at one surface and proceed gradually to the other, the common sand mould allowing the edges to cool first, so that the central parts were subject to great straining when their time of cooling came, and in large castings this generally caused cracking. By forming the bottom of the mould of hoop iron placed on edge and closely packed, and the sides of sand, while the top was left open, Lord Rosse overcame this difficulty, and the hoop iron had the further advantage of allowing the gas developed during the cooling to escape, thus preventing the speculum from being full of pores and cavities. This happy invention secured the success of the casting of a solid 3-foot speculum in 1840, and encouraged Lord Rosse to make a speculum of 6 feet diameter, which he also succeeded in doing in 1842. In the beginning of 1845 this great reflector (which up to the present time has remained without a rival) was mounted and ready for work. The instrument has a focal length of 54 feet and the tube is about 7 feet in diameter; owing to these large dimensions it cannot be pointed to every part of the heavens, but can only be moved a short distance from the meridian and very little to the north of the zenith; these restrictions have, however, hardly been felt, as there is almost at any moment a sufficient number of objects within its reach. From 1848 to 1878 it was with but few interruptions employed for observations of nebulæ; and many previously unknown features in these objects were revealed by it, especially the remarkable spiral configuration prevailing in many of the brighter nebulæ. A special study was made of the nebula of Orion, and the resulting large drawing gives an extremely good representation of this complicated object. Since 1845 others have followed in Lord Rosse's footsteps and several 3- and 4-foot mirrors have been made, while the development of refracting telescopes has been so rapid that, whereas twenty-five years ago there were no object glasses larger than 15 inches in existence, a 30-inch glass has now actually been completed. But, though the refractors surpass the large reflectors in general convenience of use and are very much better adapted to work of precision (micrometer measures), Lord Rosse's great reflector is still unapproached in light-grasping power, and remains a noble monument of its maker, who (as beautifully expressed on a memorial tablet in the parish church of Birr) "revealed to mankind by the unrivalled creation of his genius a wider vision of the glory of God."

Lord Rosse gave a detailed account of the experiments which step by step had led to the construction of the 3-foot speculum in the *Philosophical Transactions* for 1840. In the same publication for 1844 and 1850 he communicated short descriptions and drawings of some of the more interesting nebulæ, and in the volume for 1861 he published a paper *On the Construction of Specula of 6 feet aperture, and a Selection from the Observations of Nebulæ made with them*, with numerous engravings. The accounts of the observations given in these papers were, however, of a very fragmentary character; but in 1879–80 a complete account of them was published by the present earl ("Observations of nebulæ and clusters of stars made with the 6-foot and 3-foot reflectors at Birr Castle from 1848 to 1878") in the *Scient. Trans. R. Dublin Soc.*, vol. ii. The drawing of the nebula of Orion was published in the *Phil. Trans.* for 1868.

ROSSELLI, Cosimo (1439–*c.* 1507), a Florentine painter, was born in 1439. At the age of fourteen he became a pupil of Neri di Bicci, and in 1460 he worked as assistant to his cousin Bernardo di Stefano Rosselli. The first work of Cosimo mentioned by Vasari still exists in S. Ambrogio, in Florence, over the third altar on the left. It is an Assumption of the Virgin, a youthful and feeble work of but little merit. In the same church, on the wall of one of the chapels, is a fresco by Cosimo which Vasari praises highly, especially for a portrait of the young scholar Pico of Mirandola. The scene, a procession bearing a miracle-working chalice, is painted with much vigour and less mannerism than most of this artist's work. A picture painted by Rosselli for the church of the Annunziata, with figures of SS. Barbara, Matthew, and the Baptist, is now in the Academy of Florence. Rosselli also spent some time in Lucca, where he painted several altar-pieces for various churches, none of any great importance. A picture attributed to him, taken from the church of S. Girolamo at Fiesole, is now in the National Gallery of London. It is a large retable, with, in the centre, St Jerome in the wilderness kneeling before a crucifix, and at the sides standing figures of St Damasus and St Eusebius, St Paolo and St Eustachia; below is a predella with small subjects. Though dry and hard in treatment, the figures are designed with much dignity. The Berlin Gallery possesses three pictures by Rosselli, the Virgin in Glory, the Entombment of Christ, and the Massacre of the Innocents. In 1480 Rosselli, together with the chief painters of Florence, was invited by Sixtus IV. to Rome to assist in the painting of the frescos in the Sistine Chapel. Three of these were executed by him—the Destruction of Pharaoh's Army in the Red Sea, Christ Preaching by the Lake of Tiberias, and the Last Supper. The last of these is still well preserved, but is a very mediocre work. Vasari's story about the pope admiring his paintings more than those of his abler brother painters has probably but little foundation. Rosselli's Sistine frescos were partly painted by his assistant Piero di Cosimo, who was so called after Cosimo Rosselli. His chief pupil was Fra Bartolommeo. According to Vasari, Rosselli died in 1484, but this is evidently a mistake, as his will still exists dated November 25, 1506 (see Gaye, *Car. ined.*, ii. 457, note).

For an account of Rosselli's Sistine frescos, see Platner and Bunsen, *Beschreibung der Stadt Rom*, ii. pt. i.; and Rumohr, *Italien. Forschungen*, ii. 265.

ROSSELLINO, Antonio (1427–*c.* 1479), one of the most skilful of Florentine sculptors, was the son of Matteo di Domenico Gamberelli, and had four brothers, who all practised some branch of the fine arts. Almost nothing is known about the life of Antonio, but many of his works still exist, and are of the highest beauty, full of strong religious sentiment, and executed with the utmost delicacy of touch and technical skill. The style of Antonio and his brother (see below) is a development of that of Donatello and Ghiberti; it possesses all the refinement and soft sweetness of the earlier masters but is not equal to them either in vigour or originality. Antonio's chief work, still in perfect preservation, is the very lovely tomb of a young cardinal prince of Portugal, who died in 1459, aged only twenty-six. It occupies one side of a small chapel on the north of the nave of San Miniato.[1] The recumbent effigy of the cardinal is very remarkable for the grace of its pose and the beauty of the portrait face. It rests on a handsome sarcophagus, and over it, under the arch which frames the whole, is a beautiful relief of the Madonna between two flying angels. The tomb was begun in 1461 and finished in 1466, Antonio received four hundred and twenty-five gold florins for it. A reproduction of this tomb with slight alterations, and of course a different effigy, was made by Antonio for the wife of Antonio Piccolomini, duke of Amalfi, in the church of S. Maria del Monte at Naples, where it still exists. For the same church he also executed some delicate reliefs, which perhaps err in being too pictorial in style, especially in the treatment of the backgrounds. A fine medallion relief by him is preserved in the Bargello at Florence (see fig.), and the original terra cotta model for this is in the possession of Mr Drury Fortnum; in some small matters of



Marble Relief by Antonio Rossellino.

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[1] Illustrated by Gonnelli. *Mon. Sepol. della Toscana*, Florence, 1819. plate xxiii.

detail the original terra cotta is superior to the finished marble, especially in the treatment of the infant Christ.

ROSSELLINO, BERNARDO (1409–1464), was no less able as a sculptor than his younger brother (see above), and was also a very distinguished architect. His finest piece of sculpture is the tomb, in the Florentine Santa Croce, of Leonardo Bruni of Arezzo, the historian of Florence; the recumbent effigy is a work of great merit. The inner cathedral pulpit at Prato, circular in form on a tall slender stem, was partly the work of Mino da Fiesole and partly by Bernardo Rossellino. The latter executed the very minute reliefs of St Stephen and the Assumption of the Virgin. For his part in the work he received sixty-six gold florins. The South Kensington Museum possesses a relief by Bernardo, signed and dated (1456). It is a fine portrait of the physician Giovanni da S. Miniato.[1] Bernardo's works as an architect were very numerous and important, and he was also very skilful as a military engineer. He restored the church of S. Francis at Assisi, and designed several fine buildings at Civita Vecchia, Orvieto, and elsewhere. He also built fortresses and city walls at Spoleto, Orvieto, and Civita Castellana. He was largely employed by Nicholas V. and Pius II. for restorations in nearly all the great basilicas of Rome, but at present little trace of his work remains, owing to the sweeping alterations which were made during the tasteless 17th and 18th centuries. Between the years 1461 and 1464 (the date of his death) he occupied the important post of *capo-maestro* to the Florentine duomo. A number of buildings at Pienza, executed for Pius II., are attributed to him; the Vatican registers mention the architect of these as M° Bernardo di Fiorenza, but this indication is too slight to make it certain that the elder Rossellino is referred to (see Vasari, ed. Milanesi, iii. 93 *sq.*).

ROSSETTI, DANTE GABRIEL (1828–1882), poet and painter, whose full baptismal name was Gabriel Charles Dante, was born May 12, 1828, at 38 Charlotte Street, Portland Place, London. He was the first of the two sons and the second of the four children of Gabriele Rossetti, the Italian poet and patriot, whose career was at one period as turbulent as that of his illustrious son was (as far as mere outward incidents went) uneventful.

About 1824 Gabriele Rossetti, the father, after many vicissitudes, reached England, where he married in 1826 Frances Polidori, sister of Byron's Dr Polidori and daughter of a Tuscan who had in early youth been Alfieri's secretary and who had married an English lady. From his mother the subject of this notice inherited as many English traits as Italian, or indeed more. In 1831 Gabriele became professor of Italian in King's College, London, and afterwards achieved a recognized position as a subtle and original, if eccentric, commentator on Dante.

Dante Rossetti's education was begun at a private school in Foley Street, Portland Place, where he remained, however, only nine months, from the autumn of 1835 to the summer of 1836. He next went (in the autumn of 1836) to King's College School, where he remained till the summer of 1843, having reached the fourth class. From early childhood he had displayed a marked propensity for drawing and painting. It had therefore from the first been tacitly assumed that his future career would be an artistic one, and he left school early. In Latin, however, he was already fairly proficient for his age; French he knew well; Italian he had spoken from childhood, and he had some German lessons about 1844–45. But, although he learned enough German to be able to translate the *Arme Heinrich* of Hartmann von Aue, and some portions of the *Nibelungenlied*, he afterwards forgot the language almost entirely. His Greek too, such as it had been, he lost. On leaving school he went to Cary's Art Academy (previously called Sass's), near Bedford Square, and thence obtained admission to the Royal Academy Antique School towards 1846. He did not attend the Royal Academy Life School, and no doubt his defective knowledge of anatomy was some obstacle to him in after life. The truth is, however, that Rossetti's occasionally defective drawing (which, as regards the throat, is most striking) did not arise mainly from ignorance; it was the result of a peculiar mannerism. Admiring long and slender necks, and drawing them admirably in such masterpieces as Beata Beatrix and Monna Vanna, he refused to see that in art as in ethics the point of virtue lies midway between two opposite vices. Admiring large hands and massive arms in a woman, and drawing them admirably in such designs as Proserpine, Reverie, &c., he refused to see that hands can be too large, arms too massive. As a colourist, however, Rossetti may be said to have required no teaching. Mastery over colour seemed to have come to him by instinct.

Of the artistic education of foreign travel Rossetti had very little. But in early life he made a short tour in Belgium, where he was indubitably much impressed and influenced by the works of Van Eyck at Ghent and Memling at Bruges. In the spring of 1848 he took an active part in forming the so-called pre-Raphaelite brotherhood, the members of which believed that the time had come for the artist to confront again Nature herself—imitating no longer man's imitations of her—even though the imitations be those splendid works of the great Raphaelite or post-Raphaelite masters which had hitherto been the inspiration of modern art. The revolution was to be one of motives no less than of methods. Of motive Rossetti was from the first a master. His struggle with methods we have already indicated.

To "paint nature as it is around them, with the help of modern science," was the object of the pre-Raphaelites according to Mr Ruskin, but to do so artists require something more than that "earnestness of the men of the 13th and 14th centuries" which Mr Ruskin speaks of: they require knowledge. Without knowledge, as we see in even such a marvellous design as Christ at the Door of Simon the Pharisee (1859), the artistic camel has to be drawn from the artist's inner consciousness, and the result is rarely a satisfactory quadruped. Intensity of seeing does not necessarily imply truth of seeing; otherwise what phenomenon can be more real than Blake's Ghost of a Flea?

But Rossetti's genius absorbed from pre-Raphaelitism all that it had to give, and then passed on its way towards its own special goal. Often and indeed mostly an artist's true and best education is unlearning rather than learning. It was so in Rossetti's case, though he had the most vivid personality and the rarest imagination of any man of his time. Plastic as molten wax, the mind from the dawn of consciousness begins learning, for good or ill. Youth, therefore, how rich soever in individual force, can no more help being imitative than a river, even though it be the Amazon itself, can help reflecting the scenery through which it flows. The goal before the young Rossetti's eyes (as we see in such designs as Taurello's First Sight of Fortune, 1848, and Cassandra) was to reach through art the forgotten world of old romance—that world of wonder and mystery and spiritual beauty which the old masters knew and could have painted, had not lack of science, combined with slavery to monkish traditions of asceticism, crippled their strength. And he reached it—he reached early that world which not all the pseudo-classicism that arose in the 15th century, ripened in the 16th, and rotted in the 18th could banish from the dreams of man, as we see in even such juvenile work as the pen and ink drawings of Gretchen in the Chapel, and Genevieve. In that great rebellion against the renascence of classicism which (after working much good and much harm) resulted in 18th-century materialism,—in that great movement of man's soul which may be appropriately named "the Renascence of the Spirit of Wonder in Poetry and Art" —he became the acknowledged protagonist before ever the pre-Raphaelite brotherhood was founded and down to his last breath at Birchington.

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[1] See Perkin *Italian Sculptors*, 1864, i. p. 207; also Id., *Tuscan Sculptors*, p. 202, and *Historical Handbook of Italian Sculpture*, 1883, p. 121

And it was by inevitable instinct that Rossetti turned to that mysterious side of nature and man's life which to other painters of his time had been a mere fancy-land, to be visited, if at all, on the wings of sport. It is not only in such masterpieces of his maturity as Dante's Dream, La Pia, &c., but in such early designs as How they Met Themselves, La Belle Dame Sans Merci, Cassandra, &c., that Rossetti shows how important a figure he is in the history of modern art, if modern art claims to be anything more than a mechanical imitation of the facts of nature.

For if there is any permanent vitality in the Renascence of Wonder in modern Europe—if it is not a mere passing mood—if it is really the inevitable expression of the soul of man in a certain stage of civilization (when the sanctions which have made and moulded society are found to be not absolute and eternal, but relative, mundane, ephemeral, and subject to the higher sanctions of unseen powers that work behind "the shows of things"), then perhaps one of the first questions to ask in regard to any imaginative painter of the 19th century is, In what relation does he stand to the newly awakened spirit of romance? Had he a genuine and independent sympathy with that temper of wonder and mystery which all over Europe had preceded and now followed the temper of imitation, prosaic acceptance, pseudo-classicism, and domestic materialism? or was his apparent sympathy with the temper of wonder, reverence, and awe the result of artistic environment dictated to him by other and more powerful and original souls around him?

We do not say that the mere fact of a painter's or a poet's showing but an imperfect sympathy with the Renascence of Wonder is sufficient to place him below a poet in whom that sympathy is more nearly complete, because we should then be driven to place some of the disciples of Rossetti above our great realistic painters, and we should be driven to place a poet like the author of *The Excursion* and *The Prelude* beneath a poet like the author of *The Queen's Wake*; but we do say that, other things being equal or anything like equal, a painter or poet of our time is to be judged very much by his sympathy with that great movement which we call the Renascence of Wonder—call it so because the word romanticism never did express it even before it had been vulgarized by French poets, dramatists, doctrinaires, and literary harlequins. To struggle against the prim traditions of the 18th century, the unities of Aristotle, the delineation of types instead of characters, as Chateaubriand, Madame de Staël, Balzac, and Hugo struggled, was well. But in studying Rossetti's works we reach the very key of those "high palaces of romance" which the English mind had never, even in the 18th century, wholly forgotten, but whose mystic gates no Frenchman ever yet unlocked. Not all the romantic feeling to be found in all the French romanticists (with their theory that not earnestness but the grotesque is the life-blood of romance) could equal the romantic spirit expressed in a single picture or drawing of Rossetti's, such, for instance, as Beata Beatrix or Pandora. For, while the French romanticists—inspired by the theories (drawn from English exemplars) of Novalis, Tieck, and Herder—cleverly simulated the old romantic feeling, the "beautifully devotional feeling" which Holman Hunt speaks of, Rossetti was steeped in it: he was so full of the old frank childlike wonder and awe which preceded the great renascence of materialism that he might have lived and worked amidst the old masters. Hence, in point of design, so original is he that to match such ideas as are expressed in Lilith, Hesterna Rosa, Michael Scott's Wooing, the Sea Spell, &c., we have to turn to the sister art of poetry, where only we can find an equally powerful artistic representation of the idea at the core of the old romanticism—the idea of the evil forces of nature assailing man through his sense of beauty. We must turn, we say, not to art—not even to the old masters themselves—but to the most perfect efflorescence of the poetry of wonder and mystery—to such ballads as the "Demon Lover," to Coleridge's "Christabel" and "Kubla Khan," to Keats's "La Belle Dame sans Merci," for parallels to Rossetti's most characteristic designs. Now, although the idea at the heart of the highest romantic poetry (allied perhaps to that apprehension of the warring of man's soul with the appetites of the flesh which is the basis of the Christian idea) may not belong exclusively to what we call the romantic temper (the Greeks, and also most Asiatic peoples, were more or less familiar with it, as we see in the *Salámán and Absal* of Jami), yet it became peculiarly a romantic note, as is seen from the fact that in the old masters it resulted in that asceticism which is its logical expression and which was once an inseparable incident of all romantic art. But, in order to express this stupendous idea as fully as the poets have expressed it, how is it possible to adopt the asceticism of the old masters? This is the question that Rossetti asked himself, and answered by his own progress in art. Not that it is possible here to give a chronological catalogue of Rossetti's pictures. Moreover this has been already done in great measure by Mr William Sharp, Mr W. M. Rossetti, and others. We shall only dwell upon a few of those which most strongly indicate the course his genius took.

In all of them, however, the poorest and the best, is displayed that power which Blake calls vision—the power which, as he finely says, is "surrounded by the daughters of inspiration," the power, that is, of seeing imaginary objects and dramatic actions—physically seeing them as well as mentally—and flashing them upon the imaginations (even upon the corporeal senses) of others.

It was as early as 1849 that Rossetti exhibited in the so-called Free Exhibition the Girlhood of the Virgin, one of the most beautiful and characteristic of all his works. He scarcely ever exhibited again in London, though just before his death his largest and most ambitious picture, Dante's Dream, was exhibited at Liverpool.

Then came, in 1850, *The Germ*, that short-lived magazine of four numbers upon which so much has of late been written. If *The Germ* was really "an official manifesto or apologia of pre-Raphaelitism," all that it had to preach was the noble doctrine of the sacredness, the saving grace, of conscience in art. In it appeared Rossetti's poem the "Blessed Damozel," the prose poem "Hand and Soul" (written as early as 1848), six sonnets, and four lyrics, but none of his designs, though two illustrations had been prepared and discarded on account of their unsatisfactory condition when reproduced. Like the other contributors to *The Germ* Rossetti had a belief that can only be called passionate in the value of subject in art. For some years his fecundity as a designer was called into astonishing activity, but not always in the field of wonder and poetic mystery. The artist who had had the strongest influence upon Rossetti's early tastes was Madox Brown, whose genius, dramatic and historic, has at length obtained universal recognition through the magnificent frescos at Manchester. Though not one of the pre-Raphaelite brotherhood, he had been a contributor to *The Germ*. Rossetti was deeply impressed with the power and fecundity of design displayed by Mr Brown's cartoons exhibited in Westminster Hall, and when he himself began serious work as a painter he thought of Brown as the one man from whom he would willingly receive practical guidance, and wrote to him at random. He became Brown's pupil; but only once or twice, as in Found and Dr Johnson at the Mitre, did Rossetti try his hand at such realistic subjects as Brown loved, and then with a success that is very surprising if we consider how entirely his artistic energy had worked in very different lines. Found, begun in 1853, still remains unfinished. A countryman entering London in the early morning is accidentally or fatally encountered at the foot of the bridge by his rustic sweetheart, who, having gone to London, has been, in the most pathetic and terrible sense of the word, "lost." At sight of her lover the girl falls fainting at his feet. The expression of shame and horror on her still beautiful face as she cowers against the wall, and the expression of pity and grief on the man's as he clasps her hands and tries to raise her are unsurpassed and perhaps for sheer power unequalled in modern dramatic art.

Many circumstances—for instance, the beginning of such grand designs as Magdalene at the Door of Simon the Pharisee, "Aspectâ Medusâ," the Boat of Love, &c.,—interfered with the completion of Found. With the exception of the Boat of Love, Dante's Dream (1870) was perhaps Rossetti's most ambitious design in purely imaginative art. From the painting of this picture to his death Rossetti never satisfactorily completed a large and elaborate design —not because his faculty of invention was ever exhausted; in the very year of his death his brain was teeming with ideas as restlessly as when he designed Found and the Boat of Love. But the truth is that he wanted to write more poetry; and those wonderful half-lengths of women for which, late in life, he became so famous were not only beautiful and satisfying but comparatively easy of achievement; moreover purchasers were keen to commission them. Among those half-lengths, however, will be found some of his greatest works. Chief among them (if it is not Proserpine) is the marvellous crayon design Pandora in the possession of the present writer. In it is seen at its highest Rossetti's unique faculty of treating classical legend in the true romantic spirit. The grand and sombre beauty of Pandora's face, the mysterious haunting sadness in her deep blue-grey eyes as she tries in vain to reclose the fatal box from which are still escaping the smoke and flames that shape themselves as they curl over her head into shadowy spirit faces, grey with agony, between tortured wings of sullen fire, are in the highest romantic mood. And if the Proserpine does not equal this design in elaborate allegorical richness it has perhaps the still higher merit of suggesting lofty tragedy by the simplest means. By sheer force of facial expression, a woman clasping a pomegranate renders a tragic situation as fully as though the canvas had been crowded with figures.

But we must turn to his poetry. "The Blessed Damozel" was written so early as 1848. "Sister Helen" was produced in its original form in 1850 or 1851. The translations from the early Italian poets also began as far back as 1845 or 1846, and may have been mainly completed by 1849. Materials for the volume of original poetry (1870) accumulated slowly, and these having been somewhat widely read in manuscript had a very great influence upon our poetic literature long before their appearance in print; but this is not the place for criticizing them in detail. All that we can here say is that in poetry no less than in art what makes Rossetti so important a figure is the position he took up with regard to the Renascence of Wonder—to that modern revival of what is called the "romantic" spirit, that spirit without which English poetry, as the present writer has on a former occasion said when discussing the romantic movement, can scarcely hold an original place at all when challenged in a court of universal criticism. The Renascence of Wonder culminates in Rossetti's poetry as it culminates in his painting. The poet who should go beyond Rossetti would pass out of the realm of poetry into pure mysticism, as certain of his sonnets show. Fine as are these sonnets, it is in his romantic ballads that Rossetti (notwithstanding a certain ruggedness of movement) shows his greatest strength. In this opinion (which is not the general one) we agree with Dr Hueffer. "Sister Helen" "The Blessed Damozel," "Staff and Scrip," "Eden Bower," "Troy Town," "Rose Mary," as representing the modern revival of the true romantic spirit, take a place quite apart from the other poetry of our time.

By the modern revival of the romantic spirit in English poetry we mean something much more than the revival, at the close of the last century, of natural language, the change discussed by Wordsworth in his famous Preface, and by Coleridge in his comments thereon—that change of diction and of poetic methods which is commonly supposed to have arisen with Cowper, or, if not with Cowper, with Burns. The truth is that Wordsworth and Coleridge were too near the great changes in question, and they themselves took too active a part in those changes, to hold the historical view of what the changes really were. Important as was the change in poetic methods which they so admirably practised and discussed, important as was the revival of natural language, which then set in, it was not nearly so important as that other revival which had begun earlier and of which it was the outcome—the revival of the romantic spirit, the Renascence of Wonder, even beneath the weight of 18th-century diction, the first movement of which no one has yet been able clearly and decisively to point out, but which is certainly English, and neither German nor French in its origin, and can be traced through Chatterton, Macpherson, and the Percy Ballads.

As a mere question of methods, a reaction against the poetic diction of Pope and his followers was inevitable. But, in discussing the romantic temper in relation to the overthrow of the bastard classicism and didactic materialism of the 18th century, we must, as we have just seen in discussing Rossetti's pictures, go deeper than mere artistic methods in poetry. When closely examined it is in method only that the poetry of Cowper is different from the ratiocinative and unromantic poetry of Dryden and Pope and their followers. Pope treated prose subjects in the ratiocinative—that is to say, the prose—temper, but in a highly artificial diction which people agreed to call poetic. Cowper treated prose subjects too—treated them in the same prose temper, but used natural language, a noble thing to do, no doubt—but this was only a part (and by no means the chief part) of the great work achieved by English poetry at the close of last century. That period, to be sure, freed us from the poetic diction of Pope; but it gave us something more precious still—it gave us entire freedom from the hard rhetorical materialism imported from France; it gave a new seeing to our eyes, which were opened once more to the mystery and the wonder of the universe and the romance of man's destiny; it revived in short the romantic spirit, but the romantic spirit enriched by all the clarity and sanity that the renascence of classicism was able to lend.

The greatest movement that has occurred in later times was that which substituted for the didactic materialism of the 18th century the new romanticism of the 19th, the leaders of which movement, Coleridge and Scott, were admirably followed by Byron, Shelley, and Keats. Not that Wordsworth was a stranger to the romantic temper. The magnificent image of Time and Death under the yew tree is worthy of any romantic poet that ever lived, yet it cannot be said that he escaped save at moments from the comfortable 18th-century didactics, or that he was a spiritual writer in the sense that Coleridge, Blake, and Shelley were spiritual writers.

Of the true romantic feeling, the ever present apprehension of the spiritual world and of that struggle of the soul with earthly conditions which we have before spoken of, Rossetti's poetry is as full as his pictures—so full indeed that it was misunderstood by certain critics, who found in the most spiritualistic of poets and painters the founder of a "fleshly school." Although it cannot be said that "The Blessed Damozel" or "Sister Helen" or "Rose Mary" reaches to the height of the masterpieces of Coleridge, the purely romantic temper was with Rossetti a more permanent and even a more natural temper than with any other 19th-century poet, even including the author of "Christabel" himself As to the other 19th-century poets, though the Ettrick Shepherd in *The Queen's Wake* shows plenty of the true feeling, Hogg's verbosity is too great to allow of really successful work in the field of romantic ballad, where concentrated energy is one of the first requisites. And even Dobell's "Keith of Ravelston" has hardly been fused in the fine atmosphere of fairy land. Byron's "footlight bogies" and Shelley's metaphysical abstractions had of course but very little to do with the inner core of romance, and we have only to consider Keats, to whose "La Belle Dame sans Merci" and "Eve of St Mark" Rossetti always acknowledged himself to be deeply indebted. In the famous close of the seventh stanza of the "Ode to a Nightingale"—

> Charmed magic casements opening on the foam
> Of perilous seas in faery lands forlorn—

there is of course the true thrill of the poetry of wonder, and it is expressed with a music, a startling magic, above the highest reaches of Rossetti's poetry. But, without the evidence of Keats's two late poems, "La Belle Dame sans Merci" and the "Eve of St Mark," who could have said that Keats showed more than a passing apprehension of that which is the basis of the romantic temper —the supernatural? In contrasting Keats with Rossetti it must always be remembered that Keats's power over the poetry of wonder came to him at one flash, and that it was not (as we have said elsewhere) "till late in his brief life that his bark was running full sail for the enchanted isle where the old ballad writers once sang and where now sate the wizard Coleridge alone." Though outside Coleridge's work there had been nothing in the poetry of wonder comparable with Keats's "La Belle Dame sans Merci," he had previously in "Lamia" entirely failed in rendering the romantic idea of beauty as a maleficent power. The reader, owing to the atmosphere surrounding the dramatic action being entirely classic, does not believe for a moment in the serpent woman. The classic accessories suggested by Burton's brief narrative hampered Keats where to Rossetti (as we see in "Pandora," "Cassandra," and "Troy Town") they would simply have given birth to romantic ideas. It is perhaps with Coleridge alone that Rossetti can be compared as a worker in the Renascence of Wonder. Although his apparent lack of rhythmic spontaneity places him below the great master as a singer (for in these miracles of Coleridge's genius poetry ceases to appear as a fine art at all —it is the inspired song of the changeling child "singing, dancing to itself"), in permanence of the romantic feeling, in vitality of belief in the power of the unseen, Rossetti stands alone. Even the finest portions of his historical ballad "The King's Tragedy" are those which deal with the supernatural.

In the spring of 1860 Rossetti married Elizabeth Eleanor Siddall, who being very beautiful was constantly painted and drawn by him. She had one still-born child in 1861, and died in February 1862. Mrs Rossetti's own water-colour designs show an extraordinary genius for invention and a rare instinct for colour. He felt her death so acutely that in the first paroxysm of his grief he insisted upon his poems (then in manuscript) being buried with her. These were at a later period recovered, however, and from this time to his death he continued to write poems and produce pictures,—in the latter relying more and more upon his manipulative skill but exercising less and less,—for the reasons above mentioned,—his exhaustless faculty of invention.

About 1868 the curse of the artistic and poetic temperament, insomnia, attacked him. One of the most distressing effects of this malady is a nervous shrinking from personal contact with any save a few intimate and constantly seen friends. This peculiar kind of nervousness may be aggravated by the use of narcotics, and in his case was aggravated to a very painful degree; at one time he saw scarcely any one save his own family and immediate family connexions and the present writer. During the time that his second volume of original poetry, *Ballads and Sonnets*, was passing through the press (in 1881) his health began to give way, and he left London for Cumberland. A stay of a few weeks in the Vale of St John, however, did nothing to improve his health, and he returned much shattered. He then went to Birchington-on-Sea, but received no benefit from the change, and, gradually sinking from a complication of disorders, he died on Sunday the 9th April 1882.

In all matters of taste Rossetti's influence has been immense. The purely decorative arts he may be said to have rejuvenated directly or indirectly. And it is doubtful whether any other Victorian poet has left so deep an impression upon the poetic methods of his time.

One of the most wonderful of Rossetti's endowments, however, was neither of a literary nor an artistic kind: it was that of a rare and most winning personality which attracted towards itself, as if by an unconscious magnetism, the love of all his friends, the love, indeed, of all who knew him.

See T. Hall Caine, *Recollections of Dante Gabriel Rossetti*, 1882; and William Sharp, *Dante Gabriel Rossetti, a Record and a Study*, 1882. (T. W.)

ROSSINI, Gioachino Antonio (1792–1868), Italian dramatic composer, was born at Pesaro, February 29, 1792. He first studied music under Angelo Tesei, and that so successfully that he was able to sing solos in church when only ten years old, and three years later to appear at the opera house as Adolfo, in Paer's *Camilla*. He was next placed under a retired tenor, named Babbini, and on the breaking of his voice he entered the Liceo at Bologna for the purpose of studying counterpoint under Mattei. On his departure from the school, Mattei, who was not pleased with his progress, told him that he knew enough counterpoint to enable him to write in the free style, but that he was quite unfit for the composition of church music. "Do I know enough to write operas?" asked Rossini. "Quite enough," was the reply. "Then," said the boy, "I care to know no more." But in truth his wonderful instinct had taught him a great deal more than either he or Mattei suspected. Rossini's first opera, *La Cambiale di Matri-*

monio, was produced with success at the Teatro San Mosè at Venice in 1810. In 1811 he produced *L'Equivoco stravagante*, at Bologna; but his first real triumph was achieved at Venice in 1812, in *L'Inganno felice*, a work in which his genius unmistakably asserted itself. In the same year he produced *La Pietra del Paragone*, with equal applause, at Milan, besides four other operas in other places. These pieces were all successful, but *Tancredi*, written for the Teatro San Fenice at Venice, in 1813, produced a veritable *furore*. The name of the young *maestro* was now famous; yet, strange to say, his greatest comic opera was hissed on its first performance at Rome in 1816. This delightful inspiration, first entitled *Almaviva*, but now known as *Il Barbiere di Siviglia*, was founded on a libretto which Paisiello had already treated with success, and hence the refusal of the Roman audience to tolerate it. But the beauty of the music overcame the scruples of the most prejudiced listeners, and, by the time the *Barbiere* reached its third representation, Rossini was openly accepted as the greatest dramatic composer in Italy. Between 1815 and 1823 Rossini composed no less than twenty operas, including his masterpieces *Elisabetta* (1815), *Il Barbiere* (1816), *Otello* (1816), *La Cenerentola* (1817), *La Gazza Ladra* (1817), *Mosè in Egitto* (1818), *Le Donna del Lago* (1819), and *Semiramide* (1823), the last of which has lately been revived, with so great success, by Madame Adelina Patti.

Rossini visited England in 1823, and in 1824 accepted an engagement as musical director of the Théâtre Italien in Paris, where, in 1829, he produced his last great masterpiece, *Guillaume Tell*. After completing this beautiful work, he composed no more until 1832, when he wrote the first six movements of the *Stabat Mater* for private performance only. He completed this lovely composition in 1839, and it was first publicly performed at the Salle Ventadour in 1842. In 1855 he settled permanently in Paris, at 2 Rue Chaussée d'Antin, where he composed his last work, the *Petite Messe Solennelle*, which was first privately performed at the house of M. Pillet Will, March 16, 1864, and posthumously produced at the Théâtre Italien February 28, 1869. Rossini was twice married—to Isabella Colbran in 1821, and in 1847 to Olympe Pelissier. After his final return to Paris he spent a part of every year in a suburban villa in the Avenue Ingres, at Passy, and here he died of a very painful illness, November 13, 1868. He was buried at the church of the Trinité, November 21, with every possible honour. He was a foreign associate of the Institute, "grand officer of the Legion of Honour," the recipient of innumerable orders, and a member of innumerable musical institutions. Honour was justly lavished upon him; and, though his career was not free from temporary misfortunes, probably no man of genius ever lived a happier life, or enjoyed more fully the appreciation both of brother artists and the general public.

Rossini effected a complete revolution in the style of Italian opera. His accompaniments were richer than any that had ever been previously heard in Italy, and in their masterly instrumentation rivalled some of the most notable achievements of German art. His use of the crescendo and the "cabaletta," though sometimes carried to excess, gave a brilliancy to his music which added greatly to the excellence of its effect. He first accompanied his recitatives with the stringed orchestra in *Elisabetta*, and with stringed and wind instruments combined in *Otello*. And his overtures are by far the most masterly and complete compositions of the kind that the Italian school has ever produced.

ROSTOCK, the largest town of Mecklenburg-Schwerin, and one of the most important commercial cities on the Baltic, is situated on the left bank of the estuary of the Warnow, about eight miles from the sea. It lies 177 miles north-west of Berlin by railway, 80 miles north-east of Lübeck, and 106 miles south of Copenhagen. The city consists of three parts—the old town to the east, and the middle and new towns to the west—of which the first retains some of the antique features of an old Hanse town, while the last two are for the most part regularly and even handsomely built. There are several fine squares in Rostock, among them the Blücher Platz, with a statue of Field-marshal Blücher, who was born in the town in 1742. Rostock was at one time a fortress of some strength, but the old fortifications have been razed, and their site is now occupied by a promenade. Within the last twenty years the suburbs have considerably extended themselves. Rostock has five old parochial churches:—St Mary's, dating from 1398–1472, one of the most imposing Gothic buildings in Mecklenburg; St Nicholas's, begun about 1250 and restored in 1450; St Peter's, with a lofty tower built in 1400, which serves as a landmark to ships 20 miles at sea; St James's, completed in 1588; and the church of the Holy Rood, begun in 1270, but now no longer used for service. St Mary's church contains a monument marking the original tomb of Grotius, who died in Rostock in 1645, though his remains were afterwards removed to Delft. Among the other interesting buildings are the curious 14th-century Gothic town-house, the façade of which is concealed by a Renaissance addition; the palace of the grand duke of Mecklenburg-Schwerin, built in 1702; the law courts, built in 1878–79; and the new university buildings, erected in 1867–70. The university of Rostock was founded in 1418 by the dukes Johann III. and Albrecht V. From 1437 till 1443 it had its seat at Greifswald in consequence of commotions at Rostock; and in 1760 it was again removed—on this occasion to Bützow. The professors appointed by the city, however, still taught there, so that there were practically two universities in the duchy until 1789, when they were reunited at the original seat. In winter 1884–5 the university had a teaching staff of 39, with 265 students; and it possesses a library of 145,000 volumes, various collections and museums, and a number of scientific and literary auxiliary institutions. Rostock is the seat of the supreme court for both the duchies of Mecklenburg, and is well equipped with schools, hospitals, and other institutions. The population in 1810 was 10,979; in 1880 it was 36,967, of whom only 224 were Roman Catholics, and only 221 were Jews; in 1885 it was 39,212.

Although the population, commerce, and wealth of Rostock have all declined since its palmy days as a flourishing Hanse town in the Middle Ages, it has still a very considerable trade, and no Baltic port possesses so large a merchant fleet. In 1882 314 ships, with a total burden of 97,447 tons, were registered as belonging to Rostock; and in 1882 730 ships, with a total burden of 80,578 tons entered, and 724 ships, with a total burden of 82,537 tons, cleared, the port. Ships of more than 200 tons burden must discharge part of their cargo at Warnemünde, at the mouth of the Warnow, the port of Rostock, a fishing village and watering place with 1766 inhabitants, who are distinguished by a peculiar dialect and costume. By far the most important export of Rostock is grain, which goes almost entirely to British ports; but wool, flax, and cattle are also shipped. The chief imports are coal from Great Britain, herrings from Sweden, petroleum from America, timber, wine, and colonial goods. Rostock has an important fair at Whitsuntide, lasting for fourteen days, and also a frequented wool and cattle market. The industries of the town are very varied. One of the chief is shipbuilding, which, however, has declined of late years. Cotton, straw hats, tobacco, carpets, soap, cards, chocolate, and dye-stuffs are among the manufactures of the town, which also contains distilleries, saw-mills, oil-mills, tanneries, and breweries.

Local historians assert that a village existed on the site of Rostock as early as 329 A.D., but no certain proofs have been traced of any earlier community than that founded here by Pribislaw II. in the 12th century, which is said to have received town rights in 1218. The earliest signs of commercial prosperity date from about 1260. For a time Rostock was under the dominion of the kings of Denmark. Soon after returning into the protection of Mecklenburg in 1317, it joined the Hanseatic League; and in fact was one of the original members of the powerful and prosperous Wendish Hansa, in which it exercised an influence second only to that of Lübeck. The most prosperous epoch of its commercial history began in the latter half of the 15th century, precisely at the period when its political power began to wane. Rostock, however, never entirely lost the independence which it enjoyed as a Hanse town; and in 1788, as the result of long contentions with the rulers of Mecklenburg, it secured for itself a peculiar and liberal municipal constitution, administered by three burgomasters and three chambers. In 1880 this constitution was somewhat modified, and the city became less like a state within a state. The badge of Rostock is the figure 7; and a local rhyme explains that there are 7 doors to St Mary's church, 7 streets from the market place, 7 gates on the landward side and 7 wharves on the seaward side of the town, 7 turrets on the town-house, which has 7 bells, and 7 linden trees in the park.

ROSTOFF, on the Don, is one of those modern towns which have grown up with such remarkable rapidity in South Russia since the definite occupation by the Russians of the Black Sea coast. In 1731 a small fort was erected on an island in the Don, near its mouth. Thirty years later the fortifications were transferred to the site now occupied by Rostoff, 5 miles above the head of the first branch of the delta of the Don (Mertvyi Donets), and 13 miles above the real head of the delta, the fort being called Dmitri Rostovskiy. Settlers of all nationalities immediately gathered around it, and here within less than a century a city, which in 1881 had 70,700 inhabitants, sprung up, having a mixed population of Great Russians, Ukrainians, Greeks, Germans, Jews, &c. Rostoff stands on the elevated right bank of the Don, and, viewed from the river, looks fairly imposing; but the interior still retains the aspect of a large village.

The Don, which here has a breadth of no more than 230 to 250 yards, with a hardly perceptible current, offers an excellent roadstead. The navigation, however, is considerably impeded by the shallowness of the branches of the river, which are thirty in number at its entrance to the sea, but of which only three (Mertvyi Donets, Kolontcha, and the Don proper) are navigable. During the east winds, however, there is only 4 feet depth of water on the bars of the delta; and ships formerly were often compelled to stay outside for several weeks, waiting for a south-west wind. Recent dredging operations have but partially remedied this evil, and the goods have to be carried on lighters to Taganrog and Mariupol, where they are shipped. In 1882 only forty-one ships of small size coming from foreign countries under the Russian and Turkish flags entered the port, but no fewer than 3175 vessels (349,500 tons), engaged in cabotage or lighter traffic, left the roadstead. The export of corn, oil-seeds, wool, tallow, butter, iron, hides, ropes, coarse linen, pitch, &c., from 12,311,000 roubles in 1865, had risen to 41,634,252 roubles in 1882, while the imports were valued at only 886,120 roubles. The agricultural produce thus exported is drawn from the entire basin of the Don in central Russia, while ores and metals are brought from the Urals. The commercial importance of Rostoff is further increased by its position on the great highway from Kharkoff and Voronezh to Caucasus, on which traffic has greatly increased since Rostoff became connected by rail with Kharkoff and Voronezh on the one side and Vladikavkaz on the other. Two fairs, one of which has considerable importance for the whole of south-eastern Russia, are yearly held here, with an estimated turnover of about 5,000,000 roubles. Rostoff has also excellent fisheries, and in summer it becomes the gathering place of many thousands of labourers on their way to assist in harvesting operations in the provinces of the Don and in northern Caucasia. The population then exceeds 100,000. The administrative position of Rostoff is quite unique. Along with a territory of 2520 square miles it belongs to the government of Ekaterinoslaff, of which it is a district town; but this territory is quite separated from the government, being enclosed by the territory of the Don Cossacks.

ROSTOFF, on Lake Nero, a district town of Russia, in the government of Yaroslavl, and 35 miles by rail south-west of Yaroslavl, is probably the oldest town of north-eastern Russia. Its present importance is due to its fair, which rapidly developed towards the close of last century, and still remains a market where prices of cotton wares are established preliminary to the great fair of Nijni-Novgorod, and where a brisk exchange in various kinds of raw materials and unmanufactured articles is carried on. The specialty of Rostoff is the production of a variety of kitchen-garden produce and apothecary's herbs. Chicory and dried sweet peas are the principal objects of trade; in 1880 350,000 cwts., chiefly of kitchen-garden produce, were exported. Another industry formerly developed in consequence of the great influx of pilgrims—that of painting sacred pictures on a kind of enamel—still continues to flourish. The saddlery and linen manufactures, and the fishing, may likewise be mentioned. The population of Rostoff in 1883 was 12,500.

Rostoff was founded by the Slavonians in territory formerly occupied by the (Finnish) Meres, and it played so prominent a part in the history of that part of Russia that it used to be known as Rostoff the Great. From the beginning of the 11th century to the 13th it was the chief town of the great Rostoff territory, which included large parts of the present governments of Yaroslavl, Vladimir, and Novgorod, and seems to have been a populous city. After the Mongolian invasion it rapidly declined, and in 1474 it was purchased by Ivan III. and annexed to the growing Moscow principality. It was repeatedly plundered by Tartars, Lithuanians, and Poles in the 15th, 16th, and 17th centuries. Its cathedral, built in 1231, still stands, notwithstanding numerous conflagrations; some of the relics it contains are more than eight centuries old. Another church is of still older date, having been built in 1216. Each of its five monasteries has venerated relics of renowned Christian missionaries or Russian princes.

ROSWITHA. See HROSVITHA.

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